WORLD REVISION OF THE GENUS TRIAENODES (TRICHOPTERA: LEPTOCERIDAE)

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WORLD REVISION OF THE GENUS *TRIAENODES* (TRICHOPTERA: LEPTOCERIDAE)

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Entomology

by
Jun Mi Hur
December 2006

Accepted by:
John C. Morse, Committee Chair
Peter H. Adler
Matthew W. Turnbull
Kjer M. Karl
ABSTRACT

One genus, *Triaenodes* of the long-horned caddisfly family Leptoceridae includes approximately 245 species globally and is cosmopolitan in distribution, occurring in all major faunal regions. The species of the genus, along with other species of caddisflies, are especially sensitive to pollution and are used by developed countries to monitor water quality.

Two hundred twenty-one species are reviewed and an additional 9 species are new to science. Twenty-six species groups are recognized in these subgenera of *Triaenodes*. The genus *Triaenodes* is divided here into seven monophyletic subgenera. The subgenus *Ylodes* Milne, 1934, has 15 species distributed in the Australasian, East and West Palearctic, and Nearctic regions, but not reviewed (see the “Checklist and Classification of World *Triaenodes*” section at the end of Chapter III). The new subgenus *Nototriaena* has 24 species distributed in only the Neotropical region. The new subgenus *Neotriaena* has 18 species distributed in only the Australasian region. The subgenus *Austrotriaena* Yang and Morse, 1993, has 10 species distributed in the Australasian and Oriental regions. The new subgenus *Microtriaena* has 6 species distributed in the Afrotropical, Oriental, and Nearctic regions. The subgenus *Triaenodella* Mosely, 1932a, has 57 species distributed worldwide except the Neotropical region. The subgenus *Triaenodes* Mclachlan, 1865b, has 92 species distributed worldwide except the Neotropical region.

A phylogeny and classification is provided for 203 species in this work, based mainly on morphological characters of the male genitalia. A phylogeny and classification of the subgenus *Ylodes* is not included.

Keys are provided for the diagnosis of males of all *Triaenodes* species except those of *Ylodes* and some *nomina dubia*, for which the description of the males are inadequate for diagnosis.
DEDICATION

I would like to dedicate this dissertation to people who have encouraged and supported my study at Clemson University: my sister, Jun A Hur; my fiancé, Chang Suk Lee; my parents, Ok Hur and Sung Bun Lee; and my adoptive grandparents Jim and Mary Dusenberry.
ACKNOWLEDGMENTS

I am especially grateful to my advisor, Dr. John C. Morse, for his myriad of help throughout my graduate career in Clemson University. I would like to thank my committee members, Dr. Peter H. Adler, Dr. Kjer M. Karl, and Dr. Matthew W. Turnbull for their guidance of my academic pursuits and encouragement and patience over four years.

I thank the people listed in Chapter II who allowed me to borrow specimens, especially Dr. R. Marchant and Mr. Peter Lillywhite at Museum Victoria (Melbourne), Mr. David Goodger at The Natural History Museum (London) and Dr. Philip D. Perkins at Museum of Comparative Zoology (Harvard University) who allowed me to borrow a large number of specimens and to work at their laboratories, and Dr. Oliver S. Flint and his wife Mrs. Carol Flint who provided me generous hospitality during my visits at the National Museum of Natural History (Washington, D. C.). Also, I would like to thank David E. Ruiter, in Colorado, U.S.A., and Dr. Trond Andersen at Museum of Zoology (University of Bergen, Norway) who willingly loaned specimens from their personal collections. I sincerely thank Dr. Jorge A. Santiago-Blay, Editor, Entomological News, and Dr. Wayne Gardner, Editor, Journal of Entomological Science (formerly Journal of the Georgia Entomological Society) for permission to include copyrighted illustrations Figures 4.22, 4.26 and 4.30 in my dissertation. Finally, the support of Dr. Arturs Neboiss is greatly acknowledged. He has been generous with sharing his drawings and notes of Australian Triaenodes species. Without their cooperation, this research would not have been possible.

I received from Mr. Ken L. Manuel preliminary review of an upcoming publication describing Triaenodes new species A and T. new species C, as I described in this dissertation. I also had the opportunity to review his drawings (not included in this dissertation). I found these to be very helpful.
Travel support provided by an E. W. King Endowed Memorial Grant (Entomology Graduate Program, Clemson University) and an Ernst Mayr Grant (Harvard University) is gratefully acknowledged.

I express my thanks for family in the Clemson University Comparative Entomology Laboratory, C. J. Geraci, Ben Powell, Ian Stocks, James Korecki, Lauren Harvey, Michael Biondi, and Suvdtsetseg Chuluunbat who shared with me their warm hearts and their ideas and experiences. Special thanks go to Tatyana Vshivikova, Institute of Biology and Soil Science, Vladivostok, Russia, who kindly shared with me her enthusiasm about caddisflies and her friendship.

Finally, I deeply appreciate Dr. Bae Yeon Jae, my MS advisor in Seoul Women’s University, Korea, for his emotional support and encouragement.
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PREFACE

This work and the new scientific names and nomenclatureal acts included in it are not being issued for permanent scientific record in the sense of Article 8.1.1 of the Internal Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999).

The references to original illustrations of this work are capitalized as “Figure.” Other researchers’ illustrations in this dissertation are referred to with lower case letters as “figure.” Explanations or new interpretations of other researcher’s quotations are indicated by brackets “[…].” A synapomorphy in the text is indicated by a number in parentheses (XX) and the same number is used in the cladograms and the tables.
CHAPTER I

REVIEW OF THE SYSTEMATICS

BACKGROUND OF THE TRIAENODES SPECIES

*Triaenodes*, a genus of the long-horned caddisfly family Leptoceridae, is cosmopolitan, occurring in all major faunal regions, although its distribution in the Neotropical biogeographical region appears to be restricted to Central America and the northern part of the South American continent (Andersen and Holzenthal, 2001). The species of the genus are especially sensitive to pollution, with the pollution tolerance values ranging from 2.2 to 6.0 in North Carolina (Lenat 1993), for example, and are used by developed countries to monitor water quality.

The biology and distribution of *Triaenodes* larvae of Nearctic species have been discussed by Glover (1996). The color pattern of the head and thorax, metathoracic leg chaetotaxy, and abdominal gill number and position were the most useful characters for species identification of larvae (Glover 1996). *Triaenodes* larvae occur among aquatic macrophytes and the roots of riparian vegetation. Cases are constructed of spirally arranged elongate pieces of plant material.

Until now, all 245 *Triaenodes* species have been described from all faunal regions: 72 species from the Australasian region, 50 species from the Afrotropical region, 43 species from the Oriental region, 26 species from the Nearctic region, 25 species from the Neotropical region, 21 species from the East Palearctic region, and 8 species from the West Palearctic region. However, the species of the genus have not been reviewed in sufficient detail to determine with confidence whether the genus and its included subgenera are each monophyletic and what is the appropriate


subgenus for each species. Many of the species are not known well enough to assure accurate identification and there are other species yet to be described.

The genus *Triaenodes* belongs to the subfamily Leptocerinae, tribe Triaenodini Morse, 1981. This tribe was erected for the genera *Adicella* McLachlan, 1877, *Allosetodes* Banks, 1931, *Erotesis* McLachlan, 1877, *Triaenodes* McLanchlan, 1865b, and *Ylodes* Milne, 1934, by the following evidences for monophyly: (1) the absence of Fork 5 in the hindwing and (2) the trifid upper part of tergum X of male genitalia. The genus was first recognized by McLachlan (1865b) for two European species (*T. bicolor* Curtis, 1834, and *T. conspersa* Rambur, 1842) based on a difference in wing venation. Banks (1931) proposed the genus *Allosetodes* for an Asian species (*Allosetodes plutonis* Banks, 1931) based on the denuded forewing venation. However, he considered this genus to be closely related to *Triaenodes* and possibly a subgenus of it. Mosely (1932a) established the genus *Triaenodella* for a group of African *Triaenodes* based on the presence of a scent organ in the basal segment of each male antenna. Milne (1934) proposed the genus *Ylodes* for two North American species (*Y. grisea* Banks, 1899; and *Y. frontalis* Banks, 1907) which he thought different from the typical *Triaenodes* based on the absence of a scent organ in the basal segment of each male antenna and differences of male and female genital morphology. Ross (1944) considered *Triaenodella* and *Ylodes* to be subgenera of *Triaenodes*. Schmid (1980), however, resurrected *Ylodes* as a distinct genus based on the genital structure but also mentioned an alternative: to consider *Ylodes* a subgenus of *Triaenodes* based on their identical wing venation. Manuel and Nimmo (1984) supported the validity of *Ylodes* as a genus by comparison of certain characters of the adult, larva, and pupa of *Ylodes* and *Triaenodes*, but did not provide phylogenetic evidence for them as monophyletic groups. Also, they thought *Ylodes* is significantly different from *Triaenodes*.

Yang and Morse (1993) outlined the phylogeny of the Triaenodini and divided the genus *Triaenodes* into three subgenera, *Triaenodes sensu stricto*, *Triaenodella* Mosely, 1932a, and
Austrotriaena Yang and Morse, 1993, the latter for 8 species occurring in the Oriental and Australasian biogeographical regions. However, Neboiss and Wells (1997) questioned the validity of the three Triaenodes subgenera in the Australian fauna, because of their difficulty to recognize homologies among the diverse male genitalia. When describing 44 new Australian species, instead of assigning their new species to subgenera, Neboiss and Wells (1998) placed the Australian species in one species group, divided it into several species ‘complexes,’ and discussed the true nature of the structures associated with the inferior appendages. Andersen and Holzenthal (1999) placed Allosetodes as a synonym of Triaenodes. They stated they were unable to find characters which justify retaining Allosetodes as a separated genus and the forewing venation and the presence of a scent organ of male antenna are within the scope of Triaenodes. Andersen and Holzenthal (2001, 2002) reviewed 22 West African species; by the synapomorphies of each subgenus according to Yang and Morse (1993), they placed those species in two subgenera (Triaenodes 14 species and Triaenodella 7 species) and one incertae sedis. Holzenthal and Andersen (2004) reviewed the 24 Neotropical Triaenodes species and discussed the relationships of those species to other species within the Triaenodini, attempting to decide whether the Neotropical fauna are monophyletic unit or not. Finally, after considering the wing venation identity and the weak characters used by Glover (1996) to separate the larvae of Ylodes and Triaenodes, they synonymized Ylodes as a subgenus of Triaenodes. Manuel et al. (2005) discussed the phylogeny of the 24 Nearctic Triaenodes species based on 49 morphological characters. Malicky (2005) described 19 new species from the Oriental region.

When McLachlan (1865b) created the name Triaenodes (replacing preoccupied Triaena McLachlan 1865a), he included only two British species: "Triaenodes bicolor" Curtis and "Triaenodes conspersa" Rambur." The Latin word "bicolor" (meaning "of two colors") is a third declension adjective of two terminations, such that masculine and feminine gender forms are spelled identically. However, "conspersa" (meaning "sprinkled") is the first declension feminine
form of the adjective "conspersus, -a, -um." According to the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999, Article 30.1.4.4), "A compound genus-group name ending in the suffix . . . -odes . . . is to be treated as masculine unless its author, when establishing the name, stated that it had another gender or treated it as such by combining it with an adjectival species-group name in another gender form" (italics added here). Because McLachlan selected the feminine form of "conspersa," I will consider the genus feminine in the following discussion, despite its frequent use as masculine (e.g., by Fischer, 1965).
Morphological Terminology

In the descriptions, the terminology used for wing venation follows that of Morse (1975) and Yang and Morse (2000). Terminology for male genitalia generally follows Nielsen (1957) and Morse (1975), with additions for specializations as proposed by Neboiss and Wells (1997), except as noted below. An illustration of male genitalia of a generalized *Triaenodes* species is given on Fig. 1.2. Abbreviations are indicated with the text and illustrations to designate the following structures:

Males:

- **a.lo** = apicomesal lobe of an inferior appendage
- **ba.pl** = basal plate of the inferior appendages
- **ba.su** = basal chitinous support (paired)
- **inf.app** = inferior appendage (paired)
- **IX** = abdominal segment IX
- **l.pr** = laterodorsal process of an inferior appendage
- **lb.pr** = lateral subbasodorsal process of an inferior appendage
- **lo.pt.X** = lower part of tergum X
- **l.ri** = lateral ridge of phallus
- **m.pr** = mesodorsal process of an inferior appendage
- **mb.pr** = mesal basodorsal process of an inferior appendage
- **par** = paramere
- **phb** = phallobase
ph.sc = phallothremal sclerite
pr.app = preanal appendage (paired; “superior appendages” of Nielsen, 1957)
rec.pr = recurved, rod-like basal process of an inferior appendage (paired)
rec.ph.sp = recurved phallotheca spine
scl.st = sclerotized strip (often paired) of phallic shield
up.pt.X = upper part of tergum X
X = abdominal segment X

Wings:
longitudinal veins, anterior to posterior:

C = costal vein
SC = subcostal vein
R = radial vein
S₁ = first sectoral vein
S₂ = second sectoral vein
S₃ = third sectoral vein
S₄ + MA = fourth sectoral vein and anterior median vein
MP = anterior median vein
Cu₁ = first cubital vein
Cu₂ = second cubital vein
P = plical vein
E = empusal vein
1A = first anal vein
2A = second anal vein
JB = jugal bar

Forks, anterior to posterior:

Fork 1 = fork of $S_1$ and $S_2$
Fork 2 = fork of $S_3$ and $S_4$
Fork 3 = fork of $M_1$ and $M_2$ (absent in *Triaenodes* and many other Leptoceridae)
Fork 4 = fork of $M_3$ and $M_4$ (absent in Leptoceridae)
Fork 5 = fork of $Cu_1$ and $Cu_2$.

crossveins, anterior to posterior:

$h$ = humeral crossvein, connecting $C$ with $SC$ near base
$s$ = sectoral crossvein, connecting $S_{1+2}$ with $S_3$
$m-cu$ = medio-cubital crossvein, connecting $M$ with $Cu_1$ (in Leptoceridae present only in forewing)
anastomosis = alignment of $s$, base of $S_4$, $m$, $m-cu$, and sometimes $Cu_1$ and arculus (also = “cord”; present only in forewing)

special cells, anterior to posterior:

stigma = cell behind $SC$ and apicad of $sc-r$
discoidal = cell behind $R_{1+2}$ and basad of $s$ (also = “discal”)
thyridial = cell behind $M$ stem and basad of $m-cu$

special landmark:

nigma = opaque thickened spot in membrane of Fork 2
Specimen Examination

Specimens were examined under a Meiji RZ stereomicroscope equipped with a grid eyepiece. To observe internal and external structures of the male genitalia, abdomens were removed and placed in small glass vials containing 10-12% potassium hydroxide (KOH) at room temperature, following the standard method outlined by Ross (1944). After 6-12 hours, the small glass vials were placed in a beaker of water and the beaker was heated until the water boiled (although the KOH solution did not). After about 5 minutes, the specimens were placed in distilled water in a watch glass. A small-bore tuberculin syringe (3/10 cc) was used to flush macerated internal tissues forcefully from the abdomen; additional tissue was teased from the abdomen with fine-tipped forceps. Cleared genitalia were stored in genitalia microvials, either pinned through the vial’s stopper below the pinned specimen, or closed with cotton and returned to the vial containing the remaining body parts if the specimen was preserved in alcohol. For study, the cleared genitalia were placed in a watch glass containing glycerin and a small piece of insect pin to hold the specimen in a desired position to be examined and illustrated in exact dorsal, lateral, or ventral position. Genitalia structures were drawn in pencil at a magnification of 10-75X, depending on the size of the species. Final illustrations were prepared with black India ink on vellum or tracing paper by tracing pencil sketches on a light box. Inked illustrations were scanned in black-and-white mode with 600 psi resolution and edited in Adobe Photoshop 7.0. Final plates were organized and labeled in Photoshop. Because of copyright concerns, some published illustrations were redrawn. For the redrawings, the original illustrations were photocopied at 100-250% magnification, depending on the illustration size, then the above inking methods were implemented.

Specimens Studied
Specimens used in this research were examined from the following institutions either during a personal visit or by loan. In the remainder of this work, the following acronyms are used to indicate the collections in which specimen are deposited:

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<td>BMNH</td>
<td>The Natural History Museum, London, England</td>
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<td>CNC</td>
<td>The Canadian National Collection, Ontario, Canada</td>
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<td>CUAC</td>
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<td>NMV</td>
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<td>QM</td>
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Phylogenetic Methodology and Classification

According to Hennig (1966), evolutionary novelties can be observed in descendant lineages. Therefore, groups possessing “synapomorphies” (= homologues, = uniquely shared characters) are monophyletic groups, in his view, monophyletic groups, recognized by one or more synapomorphies, are the only useful units of classification. According to Ruppert (1982), homologues are characters recognized, in practice, by unique resemblance because of (a) correspondence in external features of similar structure and position related to space-time connections, (b) correspondence in internal features of similar structure and position related to space-time connections, and (c) similarity by these criteria with intermediate characters in other organisms or ontogenetic or paleontologic stages. Any two or more intrinsic, genetically regulated characters may be homologous, including those of anatomy, physiology, biochemistry, behavior, genetics, and development. The homology criteria most commonly used for determining synapomorphies in my research were (a) and (b).

The two hundred and three species constituted the ingroup genus *Triaenodes* for this study, broadly defined to include *Allosetodes, Austrotriaena, Triaenodella, and Ylodes* (but not *Erotesis*). Thirteen species *incertae sedis* (of uncertain placement) and 10 *nomina dubia* (doubtful names, referring to species of uncertain identity) were excluded from this analysis, and the 15 species of *Ylodes* were not studied in detail to confirm their monophyly.

The out-group of the genus *Triaenodes* was the sister lineage *Adicella*, the two genera constituting a monophyletic tribe Triaenodini with the following synapomorphies: (1) Fork 5 of
hindwing absent and (2) male genitalia with upper part of tergum X trifid (Yang and Morse, 1993).

The characters used in the analysis were found on the male antennae, wing venation, and male genitalia (Tables 1.1). Female, larval, and pupal characters are unknown for most species, and were excluded from the analysis. Using Hennigian logic (1966), I worked from least inclusive to most inclusive groups of species. Specifically, starting with a single species, I attempted a “search for the sister group” (Hennig, 1966), searching the ingroup for one or more species that shared one or more characteristics uniquely with it. Upon finding a sister species or group of species that shares one or more inferred synapomorphies, I treated the newly inferred group as a monophyletic lineage. I then proceeded to search for one or more species that shared other synapomorphies with the first monophyletic group. Continuing in this manner, I built a hierarchically nested pattern of relationships among the 203 species of my ingroup. For the resulting synapomorphies, I constructed a character matrix with 69 binary characters (Table 1.2).

The phylogenetic analysis was then quantified with PAUP 4.0b10 (Swofford, 2003). A heuristic search was conducted with TBR branch-swapping to obtain the optimal tree(s). All characters were treated as ordered and equally weighted. Bootstrap values were estimated from 1000 replicates.

Formation of Species Descriptions

Species are arranged phylogenetically in the order provided in the “Checklist and Classification of World Triaenodes” section at the end of Chapter III. Formal names of the genera, subgenera, and species recognized here are regulated by the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999). The names of informal species
groups are not regulated by the Code; however, in each case, the name used is that of the oldest included species.

Complete bibliographies, including synonyms, of each species described before 1961 can be found in Fischer’s *Trichopterorum Catalogues* (1965, 1966, 1972). Additional bibliographic data covering literature published during 1961-1970 are available from Nimmo’s *Bibliographia Trichopterorum* (1996). No attempt will be made here to complete these bibliographies to the present except that all species described since 1960, as well as new synonyms and significant redescriptions, are included in synonymies. Synonyms listed by Fischer are not repeated here unless a new opinion has been reported.

“Type material” information includes the kind of primary type and its gender, the country from which the type was collected and the relevant province or state, the collection date (dd-mm-yyyy), the collector, and the museum in which the type material is deposited.

“Description” usually contains information concerning wing venation and general structures of the species excluding genitalia.

“Male genitalia” usually contains relevant portions of the original description and some additional observations of my own, discussed in the following order: segment IX, segment X, preanal appendages, inferior appendages, and phallus.

“Female and immature stages” usually contain information (author and year) of the original descriptions for these stages.

“Length of forewing” measured longitudinally, if the specimen is available. If specimens are not available, these data are recorded directly from cited literature.
“Material examined” does not always include the type. In most case, illustrations were prepared by examining the indicated available specimen and were compared with the type to confirm the identity of the species. If specimens were not available, redrawn illustrations are provided from the original and some supplementary descriptions.

An “Etymology” is given for each new species. Feminine gender names are chosen, as explained above. The etymology shows the root language and meaning of the name and the reason for choosing the name.

“Diagnosis” is an abbreviation of a key, telling the easiest way to separate this species from similar species.

“Remarks” are given for additional explanations and the personal opinion about the species.

“Phylogeny” discusses with the relationships with sister species and other closely related species and the synapomorphies that provide evidence for those relationships.

“Distribution” indicates the areas or countries in which the species has been found.

“Biogeographic region” indicated the areas’ or countries’ biogeographic locations.
CHAPTER III
PHYLOGENY AND CLASSIFICATION OF
THE TRIAENODES OF THE WORLD

Phylogeny of Genus Triaenodes

One phylogeny resulted from this analysis with length 72, consistency index (CI) = 0.958, retention index (RI) = 0.996, and rescaled consistency index (RC) = 0.955 (Figs. 2.1-2.7). In the following discussion, the character numbers and the bootstrap values (enclosed in parentheses) correspond with those shown in Table 1.1 and the cladograms (Figs. 2.1-2.7). These results were not unexpected because my method of character selection specifically identified synapomorphies for each clade in the hierarchy and ignored characters that were equivocal or not clearly informative.

The genus Triaenodes is a monophyletic group as indicated by the following synapomorphies: (1) the M stem in the forewing is always incomplete (Fig. 1.1A); (2) Fork 2 in the forewing is usually sub-triangular (Fig. 1.1A); (3) the sclerotized connection of the basal plate of the inferior appendages is very short and is not connected with the phallus (Fig. 1.2); and (4) the inferior appendages have a pair of recurved processes (Fig. 1.2).

The following synapomorphies are provided as evidence for the monophyly of each of seven subgenera (Fig. 2.1). The male of the subgenus Nototriaena has (5) a sickle-shaped recurved process on the basal plate of the inferior appendages (Fig. 3.1A) and (6) a large laterodorsal process of each inferior appendage (Fig. 3.1A). The male of the subgenus Ylodes has (7) a recurved phallotheca spine on the phallobase (Fig. 3.3D), (8) the recurved processes on the basal
plate of the inferior appendages are short and laterally compressed (Fig. 3.3E); (9) the recurved process of each inferior appendage is hidden in the lateral view; and (10) the main body of each inferior appendage has a large oval concavity on the apical edge (Fig. 3.3A). The male of the new subgenus *Neotriaena* has (11) the phallus dorsally positioned with a pair of the basal chitinous supports which apparently represent a transformation of the phallic shield (Fig. 4.4A). The male of the subgenus *Austrotriaena* has (12) the fingerlike mesal basodorsal process of each inferior appendage evenly curved and positioned close to the main body of the inferior appendage (Fig. 3.21A). The male of the subgenus *Triaenodella* has (13) the mesal basodorsal process of each inferior appendage is capitate, with the head divided (Fig. 3.63A) or otherwise modified. The male of the new subgenus *Microtriaena* has (14) a short recurved process of each inferior appendage (Fig. 3.71A). The male of the subgenus *Triaenodes* has (15) distinctive lateral ridges on the phallus for resting or guiding the recurved processes of the inferior appendages (Fig. 4.24A) and (16) the recurved process on the basal plate of the inferior appendages is long and slender, extending well beyond the inferior appendages (Fig. 4.1A).

A synapomorphy for the subgenera *Austrotriaena* and *Triaenodella* is (17) the mesal basodorsal processes on the basal plate of the inferior appendages are curved caudad and ventrad (Figs. 3.29A, 3.33A). These two subgenera plus the new subgenus *Neotriaena* share a synapomorphy in (18) the secondary absence of recurved processes of the inferior appendages (Figs. 3.4A, 3.25A, 3.27A). A synapomorphy of these three subgenera plus the new subgenus *Microtriaena* is (19) the weak basal plate of the inferior appendages (Fig. 3.72A). These four subgenera plus the subgenus *Triaenodes* share the synapomorphies that (20) the male antennal scapes each has a hairy scent organ under a sclerotized flap (organ or flap absent independently in a few lineages) (Fig. 1.3), (21) the phallicata is absent (Fig. 4.55A), and (22) a mesal basodorsal process of each inferior appendage is present (Fig. 4.1A). A synapomorphy for six subgenera *Neotriaena*,
Austrotriaena, Triaenodella, Microtriaena, Triaenodes, and Ylodes (i.e., all subgenera except the subgenus Nototriaena) is that (23) the phallus does not have parameres (Fig. 4.22A).

In my study, four monophyletic species groups have been recognized within the subgenus Triaenodes (Nototriaena) (Fig. 2.2). The species of this subgenus are distributed in only the Neotropical region. The species of the T. (Nototriaena) hornitos Group share the synapomorphy that (24) the phallus has three parameres (Holzenthal and Andersen, 2004, fig. 16D). The species of the T. (Nototriaena) guadaloupe Group (only one species) share the synapomorphy that (25) the phallus has one paramere (Holzenthal and Andersen, 2004, fig. 14D). The species of the T. (Nototriaena) anomalala Group share the synapomorphy of (28) a long distal part of each inferior appendage (Holzenthal and Andersen, 2004, fig. 6A). The species of the T. (Nototriaena) clauseni Group share the synapomorphy of (29) a basoventral projection on each preanal appendage (Holzenthal and Andersen, 2004, figs. 9B, 27B).

A phylogeny of the species in subgenus Triaenodes (Ylodes) was not inferred in this research.

Three monophyletic species groups have been recognized within the subgenus T. (Neotriaena) (Fig. 2.3). The species of this subgenus are confined to the Australasian region. The species of the T. (Neotriaena) volda Group share the synapomorphy that (32) the preanal appendages are vestigial (Fig. 3.5A). The species of the T. (Neotriaena) barbae Group share a synapomorphy in (34) that each inferior appendage has an upturned and strongly sclerotized subapicomesal process (Figs. 3.10A, 3.11A). The species of the T. (Neotriaena) theiophora Group share a synapomorphy in (35) the very long and slender mesal basodorsal process located at the lateral corner on each inferior appendage (Fig. 3.8A).
One monophyletic species group has been recognized within the subgenus *Triaenodes* (*Austrotriaena*) (Fig. 2.4). The species of this subgenus are confined to the Australasian and Oriental regions. The species of the *T. (Austrotriaena) boettcheri* Group share the synapomorphy that (36) the abdominal segment IX has a pair of long and parallel spines (Fig. 3.21A).

Six monophyletic species groups have been recognized within the subgenus *Triaenodes* (*Triaenodella*) (Fig. 2.5). This subgenus is largely divided into two lineages: the first lineage, including *T. (Triaenodella) forficata* Group, *T. (Triaenodella) lurideola* Group, and *T. (Triaenodella) serrata* Group share the synapomorphy of (40) a dorsally humped mesal basodorsal process of each inferior appendage (Fig. 3.31A); the second lineage, including *T. (Triaenodella) ataloma* Group, *T. (Triaenodella) moselyi* Group, and *T. (Triaenodella) nesiotina* Group share the synapomorphy in that (46) the mesal basodorsal process of each inferior appendage is deeply divided at an acute angle (Figs. 3.46A, 3.48A, 3.50A). In the first lineage, the species of the *T. (Triaenodella) forficata* Group share the synapomorphies that (41) the lateral subbasodorsal process of each inferior appendage has a pair of long apical setae (Fig. 3.30A) and (42) the upper part of tergum X is bilobed (Figs. 3.31B, 3.34B). The species of the *T. (Triaenodella) lurideola* Group and the species of the *T. (Triaenodella) serrata* Group share a synapomorphy in (43) the upper part of tergum X is inconspicuous (Figs. 3.37B, 3.40B). The species of the *T. (Triaenodella) lurideola* Group share a synapomorphy in that (44) the distal part of each inferior appendage is obliquely truncated in ventral view (Fig. 3.37C). The species of the *T. (Triaenodella) serrata* Group share a synapomorphy in that (45) the lower part of tergum X has a recurved spine-like process (Figs. 3.40A, 3.41A). In the second lineage, the species of the *T. (Triaenodella) nesiotina* Group share a synapomorphy in that (47) the mesal basodorsal process of each inferior appendage comprises a long curved branch [upper branch] with a beak-shaped apex and a triangular branch [lower branch] towards the base (Fig. 3.45A). The species of the *T. (Triaenodella) moselyi* Group share a synapomorphy in that (48) the mesal basodorsal process of
each inferior appendage is divided into two slender branches (Fig. 3.49A). The species of the *T. (Triaenodella) ataloma* Group share a synapomorphy in that (49) the mesal basodorsal process of each inferior appendage is divided into a down-turned lower branch and a slender curved upper branch (Figs. 3.50A, 3.53A).

One monophyletic species group has been recognized within the subgenus *Triaenodes (Microtriaena)* (Fig. 2.6). The species of this subgenus are confined to the Afrotopical, Nearctic, and Oriental regions. The species of the *T. (Microtriaena) africana* Group share a synapomorphy in (51) the club-shaped recurved process of each inferior appendage (Fig. 3.70E).

Nine monophyletic species groups have been recognized within the subgenus *Triaenodes (Triaenodes)* (Fig. 2.7). This subgenus is largely divided into three lineages: the first lineage including the *T. (Triaenodes) imakus* Group, the second lineage including the *T. (Triaenodes) allax* Group, and the third lineage including the *T. (Triaenodes) mondoana* Group, *T. (Triaenodes) elegantula* Group, *T. (Triaenodes) excisa* Group, *T. (Triaenodes) cumberlandensis* Group, *T. (Triaenodes) injusta* Group, *T. (Triaenodes) dipsia* Group, and *T. (Triaenodes) aba* Group. In the first lineage, the species of the *T. (Triaenodes) imakus* Group share the synapomorphies of (43) the upper part of tergum X is inconspicuous (Fig. 4.1B) and (52) an obliquely truncated apex of the mesal basodorsal process of each inferior appendage (Fig. 4.2A). In the second lineage, the species of the *T. (Triaenodes) allax* Group share the synapomorphy of (54) an apically trifid upper part of tergum X (Figs. 4.10B, 4.14B).

The Groups of the third lineage share the synapomorphy that (56) the mesal basodorsal process of each inferior appendage is secondarily absent (Figs. 4.18A, 4.20A, 4.23A). This lineage is divided into three sublineages: the first sublineage, including the *T. (Triaenodes) mondoana* Group, the *T. (Triaenodes) elegantula* Group, the *T. (Triaenodes) excisa* Group, the *T. (Triaenodes) injusta* Group, and the *T. (Triaenodes) cumberlandensis* Group, share the
synapomorphy of (57) the absence of a apicomesal lobe of each inferior appendage (Figs. 4.18A, 4.23A). The second sublineage consists of the T. (Triagenodes) dipsia Group and the third sublineage consists of the T. (Triagenodes) aba Group. A synapomorphy of species of the T. (Triagenodes) mondoana Group is that (64) the recurved processes are asymmetrical, with the left side always small (Fig. 4.16A). A synapomorphy of species of the T. (Triagenodes) elegantula Group is that (65) each inferior appendage has a rounded posterodorsal apex (Andersen and Holzenthal, 2002, p. 69, fig. 19). A synapomorphy of species of the T. (Triagenodes) excisa Group is that (66) the lower part of tergum X is deeply excavated (Fig. 4.19B). A synapomorphy of species of the T. (Triagenodes) injusta Group is that (67) the upper part of tergum X is divided into two thick processes and their apex is truncate (Fig. 4.22B). A synapomorphy of species of the T. (Triagenodes) cumberlandensis Group is that (68) the upper part of tergum X is centrally inflated (Fig. 4.24B). A synapomorphy of species of the T. (Triagenodes) dipsia Group is that (58) the recurved process of each inferior appendage extends anterad well into the phallocrypt (Fig. 4.47A). Synapomorphies of species of the T. (Triagenodes) aba Group are that (59) the recurved process of each inferior appendage has a hook at an anterior angle (Fig. 4.51A), (60) it also has a small spine patch near that angle (Fig. 4.52A), and (61) the recurved processes each has a guide laterally on the lower part of tergum X (Fig. 4.50A).

Key to Males of Subgenera of Triagenodes

1. Inferior appendages each with pair of recurved processes (Fig. 3.2A) ........................................ 2
1’. Inferior appendages without recurved processes (Fig. 3.61A) .................................................... 5
2(1). Recurved process on each inferior appendage sickle-shaped (Fig. 3.1A); inferior appendages each with laterodorsal process (Fig. 3.1A) ........................................

.................................................................................................................................................... Subgenus Nototriaena, p. 69.

2’. Recurved processes on inferior appendages not sickle-shaped, inferior appendages without laterodorsal processes (Fig. 4.2A) ....................................................... 3
3(2'). Recurved process on each inferior appendage short, may be compressed and hidden in lateral view (Figs. 3.69A, 3.3E); phallus without distinctive lateral ridges (Figs. 3.3A, 3.69A) .................................................................................................. 4

3'. Recurved process on each inferior appendage long and slender, extending well beyond inferior appendages (Fig. 4.1A); phallus with lateral ridges, sometimes indistinct (Fig. 4.24A)...................................................................Subgenus Triaenodes, p. 223.

4(3). Recurved phallothecal spine present (Fig. 3.3D); recurred process of each inferior appendage compressed and hidden in lateral view (Fig. 3.3E); inferior appendages each with large oval excision on apical edge (Fig. 3.3A) .................
.................................................................................................................. Subgenus Ylodes.

4'. Recurved phallothecal spine absent (Fig. 3.69A); recurred process of each inferior appendage not compressed and not hidden in lateral view (Fig. 3.69A); inferior appendages without large oval excisions on apical edges (Fig. 3.69C)......
.................................................................................................................. Subgenus Microtriaena, p. 214.

5(1'). Phallus positioned dorsally in phallo crypt and supported with pair of near-vertical basal chitinous strips (Figs. 3.4A, 3.7A)..................Subgenus Neotriaena, p. 100.

5'. Phallus positioned ventrally in phallocrypt, with pair of more-or-less horizontal basal phallic strips (Figs. 3.22A, 3.36A) ............................................................................ 6

6(5'). Mesal basodorsal process of each inferior appendage present (Figs. 3.26A, 3.30A, 3.49A, 3.61A) .............................................................................................................. 7

6'. Mesal basodorsal process of each inferior appendage absent (Figs. 4.61A, 4.62A) ...................................................................................... Triaenodes incertae sedis, p. 340.

7(6). Mesal basodorsal process of each inferior appendage fingerlike, evenly curved, positioned close to main body of inferior appendage (Fig. 3.26A) .................
..................................................................................................................Subgenus Austrotriaena, p. 125.
7'. Mesal basodorsal process of each inferior appendage not fingerlike, more nearly erect, sometimes subdivided into two branches (Figs. 3.49A, 3.61A).................................

.......................................................................................................................... Subgenus *Triaenodella*, p. 139.

Key to Males of the *Triaenodes* (*Nototriaena*) Species

Holzenthal and Andersen (2004, pp. 39-41) provided a key for males of this subgenus.

Key to Males of the *Triaenodes* (*Neotriaena*) Species

1. Preanal appendages absent (Figs. 3.4A, 3.4B)................................................................. 2
1'. Preanal appendages present (Fig. 3.8B)............................................................................. 5

2(1). Distal part of each inferior appendage strongly incurved, forming concavity on inner margin (Figs. 3.4C, 3.5C)...................................................................................... 3
2'. Distal part of each inferior appendage not strongly incurved (Figs. 3.6C, 3.7C)............. 4

3(2). Upper part of tergum X thick (Fig. 3.4B); concavity on inner margin of each inferior appendage short and shallow in ventral view (Fig. 3.4C)...........................


3'. Upper part of tergum X slender (Fig. 3.5B); concavity on inner margin of each inferior appendage wide and deep in ventral view (Fig. 3.5C).................................

....................................................................................................................... *T. volda* Neboiss and Wells, p. 102.

4(2'). Lower part of tergum X simple plate (Fig. 3.6B); inferior appendages stout, less than twice as long as basal width in ventral view (Fig. 3.6C) .................

..................................................................................................................... *T. jubata* Neboiss and Wells, p. 103.

4'. Lower part of tergum X forked (Fig. 3.7B); inferior appendages long, slender, and bent mesad in ventral view (Fig. 3.7C).........................................................

..................................................................................................................... *T. mataranka* Neboiss and Wells, p. 105.
5(1’). Mesal basodorsal process of each inferior appendage forming long, recurved spine (Fig. 3.8A; Neboiss and Wells, 1998, p. 109, fig. 58)................................................................. 6

5’. Mesal basodorsal process of each inferior appendage slender, apically setose filament, not spine-like (Figs. 3.10A, 3.17A)........................................................................................................ 8

6(5). Mesal basodorsal process of each inferior appendage especially long, moderately sclerotized (Figs. 3.8A, 3.9A)............................................................................................. 7

6’. Mesal basodorsal process of each inferior appendage moderately long, strongly sclerotized (Neboiss and Wells, 1998, p. 109, fig. 58)......................................................

.................................................................................................................. *T. reclusa* Neboiss and Wells, p. 122.

7(6). Lower part of tergum X apically rounded (Fig. 3.8B); inferior appendages abruptly contstricted at two-thirds length in ventral view (Fig. 3.8C)......................

................................................................................................. *T. theiophora* Neboiss and Wells, p. 106.

7’. Lower part of tergum X apically concave (Fig. 3.9B); inferior appendages tapered toward apex in ventral view (Figs. 3.9C)..............................................................................

.................................................................................................................. *T. toxeres* Neboiss and Wells, p. 107.

8(5’). Inferior appendages asymmetrical in ventral view (Fig. 3.13C)................................. 9

8’. Inferior appendages symmetrical in ventral view (Fig. 3.11C)........................................ 10

9(8). Left inferior appendage with dorsally twisted, long, slender, subapicomesal process and without lateral subbasodorsal process (Figs. 3.13A, 3.13C).............

.................................................................................................................. *T. rutella* Neboiss and Wells, p. 113.

9’. Left inferior appendage without subapicomesal process and with strongly sclerotized lateral subbasodorsal process (Figs. 3.19A, 3.19C).................................

.................................................................................................................. *T. etheira* Neboiss and Wells, p. 120.

10(8’). Lower part of tergum X broad, apically truncated in dorsal view (Figs. 3.17B, 3.18B)............................................................................................................................... 11

10’. Lower part of tergum X elongate, apically tapered in dorsal view (Fig. 3.10B)........... 12
11(10). Lower part of tergum X with distal margin bumpy (Fig. 3.17B); each inferior appendage not recurved in lateral view (Fig. 3.17B) .................................................................
......................................................................................................................T. dibolia Neboiss and Wells, p. 118.

11’. Lower part of tergum X with distal margin slightly notched (Fig. 3.18B); each inferior appendage strongly and evenly recurved in lateral view (Fig. 3.18B)........
......................................................................................................................T. drepana Neboiss and Wells, p. 119.

12(10’). Inferior appendages each with single process (Fig. XX) or with additional strap-like subapicomesal process (Figs. 3.15A, 3.11A) ......................................................... 13

12’. Inferior appendages each with two or more processes in lateral view, neither of which is strap-like (Figs. 3.10A, 3.12A) ................................................................. 15

13(12). Inferior appendages each with stout and upwardly curved mesal basodorsal process and with strap-like subapicomesal process on inner margin (Fig. 3.11A)..
......................................................................................................................T. camura Neboiss and Wells, p. 110.

13’. Inferior appendages each with slender, apically setose, filamentous mesal basodorsal process and without strap-like subapicomesal process (Figs. 3.15A, 3.20A)
......................................................................................................................14

14(13’). Inferior appendages with apices rounded (Fig. 3.15C); lower part of tergum X slightly concave mid-apically (Fig. 3.15B) .........................................................

14’. Inferior appendages with apices pointed (Fig. 3.20C); lower part of tergum X broad mesally, tapered in distal half and cleft apically (Fig. 3.20B) .................
......................................................................................................................T. stipulosa Neboiss and Wells, p. 123.

15(12’). Inferior appendages expanded distally in ventral view, without subapicomesal processes (Figs. 3.16C, 3.16A) .........................................................T. copelata Neboiss and Wells, p. 117.

15’. Inferior appendages not expanded distally in ventral view, but with subapicomesal process (Figs. 3.10C, 3.12C, 3.14C) ......................................................... 16
16(15'). Inferior appendages each with bifid subapicomesal process (Fig. 3.10A) .............

16'. Inferior appendages each with dorsally curved subapicomesal process (Figs. 3.12A, 3.14A) ................................................................................................................... 17

17(16'). Prenal appendages long, slender (Fig. 3.14A); lower part of tergum X forming pair of long spines (Fig. 3.14B) ...................................................... T. virgula Neboiss and Wells, p. 114.

17'. Preanal appendage short, oval (Fig. 3.12A); lower part of tergum X forming broad plate (Fig. 3.12B) .............................................................. T. gibberosa Neboiss and Wells, p. 112.

Key to Males of the Triaenodes (Austrotriaena) Species

1. Abdominal segment IX with pair of long and parallel spines (Figs. 3.21A, 3.23A) .......... 2

1'. Abdominal segment IX without a pair of long and parallel spines (Figs. 3.25A, 3.27A) ........................................................................................................................................ 5

2(1). Phallus with sclerotized dorsal process from phallobase (Figs. 3.23A, 3.24A)............. 3

2'. Phallus without sclerotized dorsal process from phallobase (Figs. 3.22A, 3.25A) ............ 4

3(2). Sclerotized dorsal process from phallobase thick, beak-shaped in lateral view (Fig. 3.23A); mesal basodorsal process of each inferior appendage not twisted at middle (Fig. 3.23A) ................................................................. T. hybos Mey, p. 129.

3’. Sclerotized dorsal process from phallobase slender, pointed in lateral view (Fig. 3.24A); mesal basodorsal process of each inferior appendage twisted at middle (Fig. 3.24A) ............................................................................................................. T. virgata Mey, p. 130.

4(2'). Pair of long and parallel spines of abdominal segment IX extremely long (Fig. 3.21B); phallus S-shaped in lateral view (Fig. 3.21A) .............. T. boettcheri Ulmer, p. 126.

4’. Pair of long and parallel spines of abdominal segment IX moderately long (Fig. 3.22B); phallus rectangular in lateral view (Fig. 3.22A) .............. T. hauseri Mey, p. 127.
5(1'). Phallus with dorsal flange (Fig. 3.25A); inferior appendages with apices upturned in lateral view (Fig. 3.25A).................................................................................. T. bernaysae Korboot, p. 131.

5'. Phallus without dorsal flange (Fig. 3.26A); inferior appendage apices not upturned in lateral view (Fig. 3.29A).................................................................................... 6

6(5'). Upper part of tergum X reduced (Malicky, 2005, p. 45, pl. 5, dorsal view of T. zetes).......................................................................................... T. zetes Malicky, p. 137.

6'. Upper part of tergum single, median lobe (Figs. 3.27B, 3.29B).............................................................................. 7

7(6'). Lower part of tergum X forming broad, hood-like plate (Figs. 3.27A, 3.27B) ........................................ T. lanceolata Kimmins, p. 134.

7'. Lower part of tergum X forming pair of long spines (Figs. 3.26B, 3.29B)......................... 8

8(7'). Preanal appendages short, digitate (Fig. 3.29B) ............ T. trifida Kimmins, p. 136.

8'. Preanal appendages long, slender (Figs. 3.26A, 3.28A).......................................................................... 9

9(8'). Pair of long spines of lower part of tergum X asymmetrical (Fig. 3.26B); phallus large, deeply divided apically (Fig. 3.26A) ....................... T. fijiana Mosely, p. 132.

9' Pair of long spines of lower part of tergum X symmetrical (Fig. 3.28A); phallus slender, not divided apically (Fig. 3.28A) .................................. T. manni Banks, p. 135.

Key to Males of the Triaenodes (Triaenodella) Species

(The males of T. palpalis are yet unknown; those of T. clavata aequa Statzner is insufficient to identify between T. clavata clavata Mosely with confidence)

1. Mesal basodorsal process of each inferior appendage not subdivided, either clavate or digitate (Mosely, 1939b, p.18, fig. 29; Andersen and Holzenthal, 2001, p. 241, fig. 31; Fig. 3.68A) ........................................................................................................ 2

1'. Mesal basodorsal process of each inferior appendage subdivided (Figs. 3.30A, 3.39A, 3.46A) .................................................................................. 13
2(1). Mesal basodorsal process of each inferior appendage clavate (Andersen and Holzenthal, 2001, p. 241, fig. 31) ................................................................................................................................. 3

2’. Mesal basodorsal process of each inferior appendage digitate (Fig. 3.68A) .................. 7

3(2). Upper part of tergum X reduced (Dakki, 1980, p. 44, fig. 1; Mosely, 1939b, p.18, fig. 29); phallus without a paramere ventrally (Dakki, 1980, p. 44, fig. 2; Mosely, 1939b, p.18, fig. 29)............................................................................................................. 4

3’. Upper part of tergum X long, slender, single lobe (Andersen and Holzenthal, 2001, p. 241, fig. 32); phallus with a paramere ventrally (Andersen and Holzenthal, 2001, p. 241, fig. 32, 36) ................................................................................................................................. T. proszynskii (Marlier and Botosaneanu), p. 207.

4(3). Lower part of tergum X inconspicuous (Mey, 2003, p. 449, fig. 74) .....................
................................................................................................................................. T. intecta Mey, p. 211.

4’. Lower part of tergum X conspicuous (Dakki, 1980, p. 44, fig. 1; Mosely, 1939b, p.18, fig. 28).................................................................................................................................................... 5

5(4’). Lower part of tergum X forming pair of sclerotized spines, each with three stiff hairs at midlength (Dakki, 1980, p. 44, fig. 1)................................. T. laamii Dakki, p. 203.

5’. Lower part of tergum X forming long, single, black spine, without stiff hairs at midlength (Mosely, 1939b, p.18, fig. 28; Schmid, 1958, pl. 26, fig. 4)................................. 6

6. Mesal basodorsal process of each inferior appendage with short stem, directed dorsad (Mosely, 1939b, p.18, fig. 29); distal part of each inferior appendage short (Mosely, 1939b, p.18, fig. 29) ........................................................................................................ T. kimila Mosely, p. 202.

6’. Mesal basodorsal process of each inferior appendage with long stem, directed ventrad (Schmid, 1958, pl. 26, fig. 4); distal part of each inferior appendage long (Schmid, 1958, pl. 26, fig. 4) ........................................................................................................ T. ornata Ulmer, p. 204.
7(2'). Mesal basodorsal process of each inferior appendage long, slender, arching dorsad and posterad, slightly expanded near base and bearing several hairs (Yang and Morse, 2000, p. 242, fig. 125A; Fig. 3.69A)....................................................................................8

7'. Mesal basodorsal process of each inferior appendage projecting posterodorsad, slender, and long or short, without hairs near base (Fig. 3.68A; Neboiss and Wells, 1998, p. 123, fig. 109) ...............................................................................................................9

8(7). Upper part of tergum X forming pair of long, thick processes, each with apex divided into two sharp spines (Yang and Morse, 2000, p. 242, fig. 125B); apex of mesal basodorsal process of each inferior appendage slender, long (Yang and Morse, 2000, p. 242, fig. 125A)...................................................T. pellecata Ulmer, p. 206.

8'. Upper part of tergum X slender, unequally bilobed about midway (Fig. 3.67B); apex of mesal basodorsal process of each inferior appendage rather thick, rounded (Fig. 3.69A).............................................T.verberata Neboiss and Wells, p. 210.


9'. Inferior appendages each with long, slender mesal basodorsal process, without mesodorsal process, and without stout spur-like setae on subapical margin (Fig. 3.66A; Holzenthal and Andersen, 2001, p. 230, fig. 8) .................................................................10

10(9'). Upper part of tergum X reduced, lower part of tergum X pair of sclerotized spines in dorsal view (Holzenthal and Andersen, 2001, p. 230, fig. 9); inferior appendages each with long, pointed distal part (Holzenthal and Andersen, 2001, p. 230, figs. 8, 10).................................................T. akosua Holzenthal and Andersen, p. 199.

10'. Upper part of tergum X forming long, slender lobe, sometimes with lateral processes, lower part of tergum X hood-like membranous plate in dorsal view (Figs. 3.68B; Marlier, 1965, p. 67, fig. 33a; Marlier, 1978, p. 43, fig. 6); inferior
appendages each with short distal part (Figs. 3.68A; Marlier, 1965, p. 67, fig. 33b; Marlier, 1978, p. 43, fig. 5).............................................................................................................. 11

11(10’). Upper part of tergum X with beak-shaped apex in lateral view, without pair of lateral processes (Fig. 3.68B); inferior appendages each with apicomesal lobe (Figs. 3.68A, 3.68C) .............................................................................................. T. corallina Kimmins, p. 201.

11’. Upper part of tergum X with clavate apex in dorsal view, with pair of lateral processes (Marlier, 1965, p. 67, fig. 33a; Marlier, 1978, p. 43, fig. 6); inferior appendages each without apicomesal lobe (Marlier, 1965, p. 67, fig. 33b; Marlier, 1978, p. 43, fig. 5)................................................................................................ 12

12(11’). Apex of lower part of tergum X curved to left in dorsal view (Marlier, 1965, p. 67, fig. 33a)............................................................................. T. aberrans Marlier, p. 198.

12’. Apex of lower part of tergum X recurved to right in dorsal view (Marlier, 1978, p. 43, fig. 6)...................................................................................... T. botosaneanui Marlier, p. 200.

13(1’). Mesal basodorsal process of each inferior appendage divided into upper branch and lower branch, not dorsally humped (Figs. 3.63A, 3.65A).................................................................................. 14

13’. Mesal basodorsal process of each inferior appendage not divided into upper branch and lower branch, dorsally humped (Fig. 3.30A) .................................................................................. 41

14(13). Mesal basodorsal process of each inferior appendage shallowly and obliquely divided into upper branch and lower branch (Figs. 3.63A, 3.65A) ........................................... 15

14’. Mesal basodorsal process of each inferior appendage deeply divided at acute angle into upper branch and lower branch (Fig. 3.51A) ....................................................... 17

15(14). Lower part of tergum X forming symmetrical pair of spines (Figs. 3.63A, 3.64A); mesal basodorsal process of each inferior appendage divided into short, rounded upper and lower branches (Figs. 3.63A, 3.64A) .............................................................. 16
15'. Lower part of tergum X forming asymmetrical pair of spines (Figs. 3.65A-B); mesal basodorsal process of each inferior appendage divided into short, rounded upper lobe and triangular lower branches (Figs. 3.65A-B) .................................................................
...........................................................................................................................................T. clavata clavata Mosely, p. 194.

16(15). Upper part of tergum X with small conical, lateral protuberances (Figs. 3.63A) .................
...........................................................................................................................................T. chelifera chelifera Mosely, p. 191.

16'. Upper part of tergum X without small conical, lateral protuberances (Figs. 3.64A) ...................
...........................................................................................................................................T. chelifera gibbera Statzner, p. 192.

17(14'). Upper part of tergum X reduced (Figs. 3.45B, 3.60B) .................................................... 18

17'. Upper part of tergum X single median lobe (Fig. 3.47B), sometimes with pair of lateral lobes (Fig. 3.58B), or pair of membranous lobes (Neboiss and Wells, 1998, p. 128, fig. 125) ........................................................................................................................................ 29

18. Lower part of tergum X inconspicuous (Fig. 3.61A) ..............T. spoliata Mey, p. 188.

18'. Lower part of tergum X conspicuous (Figs. 3.60B, 3.62B) ................................................... 19

19(18'). Lower part of tergum X forming pair of sclerotized spines (Figs. 3.45B, 3.62B) .......... 20

19'. Lower part of tergum X forming single slender process (Fig. 3.59A; Andersen and Holzenthal, 2001, p. 231, fig. 13) or single semimembranous plate (Fig. 3.60) ........................................................................................................................................ 24

20(19). Pair of sclerotized spines of lower part of tergum X coiled 360° at midlength (Fig. 3.62A) .................................................................................................................. T. triaenodiformis (Ulmer), p. 189.

20'. Pair of sclerotized spines of lower part of tergum X not coiled (Figs. 3.46B, 3.55A) ........................................................................................................................................ 21

21(20'). Upper branch of mesal basodorsal process of each inferior appendage with beak-shaped apex (Figs. 3.45A, 3.46A); each inferior appendage with apicom esal lobe (Figs. 3.45A, 3.47A) ........................................................................................................................................ 22
21’. Upper branch of mesal basodorsal process of each inferior appendage with balloon-like apex (Fig. 3.55A); each inferior appendage without apicomesal lobe (Fig. 3.55A). ................................................................. *T. apicomaculata* Mey, p. 178.

22(21). Mesal basodorsal process of each inferior appendage deeply divided into upper and lower branches (Fig. 3.47A); each inferior appendage with long, slender lateral subbasodorsal process (Fig. 3.47A). .................................................................

............................................................................................... *T. uvida* Neboiss and Wells, p. 165.

22’. Mesal basodorsal process of each inferior appendage expanded in distal half and divided into upper and lower branches (Figs. 3.45A, 3.46A); each inferior appendage with thum-like lateral subbasodorsal process (Figs. 3.45A, 3.46A) ............. 23

23(22’). Pair of spines of lower part of tergum X crossing distally (Fig. 3.45B); main body of each inferior appendage triangular in ventral view (Fig. 3.45C) .................................................................

............................................................................................... *T. nymphaea* Neboiss and Wells, p. 163.

23’. Pair of spines of lower part of tergum X not crossing distally (Fig. 3.46B); main body of each inferior appendage transversely rectangular in ventral view (Fig. 3.46C) ................................................................. *T. torresiana* Neboiss and Wells, p. 164.

24(19’). Lower part of tergum X forming single slender process (Fig. 3.59A; Andersen and Holzenthal, 2001, p. 231, fig. 13) ................................................................. 25

24’. Lower part of tergum X forming single semimembranous plate (Fig. 3.60B; Mey, 2003, p. 449, fig. 76; Malicky, 2005, p. 44, pl. 4, dorsal view of *T. proserpina*) ............... 26

25(24). Phallus apically with group of strong, spine-like setae (Fig. 3.59A) .................................................................

............................................................................................... *T. ghana* Kimmins, p. 183.

25’. Phallus without group of strong, spine-like setae (Andersen and Holzenthal, 2001, p. 231, fig. 15) ................................................................. *T. amma* Andersen and Holzenthal, p. 176.

26(24’). Phallus without pair of long spines from phallobase in lateral view (Fig. 3.49A; Malicky, 2005, p. 44, pl. 4, phallus of *T. proserpina*) ................................................................. 27
26’. Phallus with pair of long spines from phallobase in lateral view (Fig. 3.60A; Mey, 2003, p. 449, fig. 76) .............................................................................................................................................. 28

27(26). Mesal basodorsal process of each inferior appendage divided into slender upper and lower branches (Fig. 3.49A); each inferior appendage with small triangular lobe about midway (Fig. 3.49A)...................... T. nigrolineata Kimmins, p. 168.

27’. Mesal basodorsal process of each inferior appendage divided into mushroom-shaped upper branch and slender lower branch (Malicky, 2005, p. 44, pl. 4, lateral view of T. proserpina); each inferior appendage without small triangular lobe (Malicky, 2005, p. 44, pl. 4, lateral view of T. proserpina)..............................
................................................................................................................................. T. proserpina Malicky, p. 186.

28(27’). Apex of long spine from phallobase clavate and pointed; in dorsal view, phallus with pair of sclerotized spots and without cornuti (Fig. 3.60A)..............................
........................................................................................................................................... T. calamintella Mey, p. 184.

28’. Apex of long spine from phallobase rounded; in dorsal view, phallus without spots and with pair of strongly curved cornuti (Mey, 2003, p. 449, fig. 76)........
.............................................................................................................................................. T. sertata Mey, p. 185.

29(17’). Upper part of tergum X forming single median lobe (Figs. 3.48B, 3.57B), sometimes with pair of lateral lobes (Fig. 3.58B); each inferior appendage without apicomesal lobe (Figs. 3.50A, 3.57A)................................................................. 30


30(29). Upper part of tergum X with clavate or hatchet-shaped apex (Figs. 3.52B, 3.57B)....... 31

30’. Upper part of tergum X with trifid apex (Fig. 3.67B)....................................................... T. conjugata Neboiss and Wells, p. 196.
31(30). Upper part of tergum X with clavate apex ................................................................. 32
31’. Upper part of tergum X with hatchet-shaped apex bearing short stout setae (Fig. 3.57A) ................................................................. T. dolabrata Gibbs, p. 180.

32(31). Lower part of tergum X forming pair of spines (Fig. 3.50B) or two pairs of spines (Fig. 3.51B) ......................................................................................................................................................... 33
32’. Lower part of tergum X forming single, long, blade-like, curved spine (Fig. 3.48B) ................................................................. T. moselyi Kimmins, p. 167.

33(32). Lower part of tergum X forming pair of spines (Fig. 3.50B) ........................................... 34
33’. Lower part of tergum X forming two pairs of spines (Fig. 3.51B) .......................... ......................................................................................................................................................................................... T. laciniata Neboiss and Wells, p. 171.

34(33). Pair of spines of lower part of tergum X asymmetrical (Figs. 3.56A, 3.58B) ................ 35
34’. Pair of spines of lower part of tergum X symmetrical (Figs. 3.50B, 3.52B) .................... 37

35(34). Inferior appendages each without lateral subbasodorsal process and apicomesal lobe (Figs. 3.56A, 3.58B) ......................................................................................................................................................... 36
35’. Inferior appendages each with lateral subbasodorsal process and apicomesal lobe (Yang and Morse, 2000, p. 242, fig. 126A) ...................... T. rufescens Martynov, p. 187.

36(35). Upper part of tergum X with unequal paired lateral lobes (Fig. 3.58B) ................. 39

36’. Upper part of tergum X without paired lateral lobes (Fig. 3.56B) ......................... ......................................................................................................................................................................................... T. hickini Kimmins, p. 181.

37(34’). Each spine of lower part of tergum X without recurved subapical branch (Figs. 3.52A, 3.53A) ......................................................................................................................................................... 38
37’. Each spine of lower part of tergum X with recurved subapical branch (Fig. 3.54A) ................................................................................................. T. tenerata Neboiss and Wells, p. 175.

38(37). Abdominal segment IX without concertina-like membranous area (Figs. 3.50A, 3.53A) ......................................................................................................................................................... 39
38’. Abdominal segment IX with concertina-like membranous area (Fig. 3.52A)..........
.................................................................................................................. *T. ataloma* Neboiss and Wells, p. 173.

40(39). Lower branch of mesal basodorsal process of each inferior appendage subdivided
(Fig. 3.50A); main body of each inferior appendage elliptical in ventral view (fig. 3.50C) .................................................. *T. doryphora* Neboiss and Wells, p. 170.

40’. Lower branch of mesal basodorsal process of each inferior appendage not
subdivided (Fig. 3.53A); main body of each inferior appendage triangular in
ventral view (Fig. 3.53C)................................................. *T. empheira* Neboiss and Wells, p. 174.

41(13’). Upper part of tergum X usually pair of processes (Figs. 3.30A, 3.31B; Malicky, 2005, p. 43, pl. 3, dorsal view of *T. kalydon*), but may have only single process
(Fig. 3.35B); inferior appendages each with lateral subbasodorsal process (Figs. 3.30A, 3.31A, 3.35A; Malicky, 2005, p. 43, pl. 3, lateral view of *T. kalydon*) ................. 42

41’. Upper part of tergum X inconspicuous (Figs. 3.36B, 3.39A); inferior appendages
each with or without lateral subbasodorsal processes (Figs. 3.36B, 3.39A).............. 48

42(41). Upper part of tergum X forming single lobe (Fig. 3.35B); inferior appendages
each with mesodorsal process (Figs. 3.35A, 3.35C)......................................................
.................................................................................................................. *T. cuspiosa* Neboiss and Wells, p. 159.

42’. Upper part of tergum X forming pair of processes (Fig. 3.31B; Malicky, 2005, p. 43, pl. 3, dorsal view of *T. kalydon*); inferior appendages without mesodorsal
processes (Fig. 3.31A; Malicky, 2005, p. 43, pl. 3, lateral view of *T. kalydon*) .......... 43

43(42’). Upper part of tergum X forming pair of strongly sclerotized and distinctively
long processes (Malicky, 2005, p. 43, pl. 3, dorsal view of *T. kalydon*); lateral
subbasodorsal process on each inferior appendage without pair of long apical
setae (Malicky, 2005, p. 43, pl. 3, lateral view of *T. kalydon*).................................
.................................................................................................................. *T. kalydon* Malicky, p. 160.
43’. Upper part of tergum X forming pair of semimembranous and short processes
(Figs. 3.31B, 3.32B); lateral subbasodorsal process on each inferior appendage
with pair of long apical setae (Figs. 3.31A, 3.32A) ......................................................... 44

44(43’). Inferior appendages broadly rounded in ventral view, blunt distally, each with
dark spur on apical inner margin (Fig. 3.32C) ....... T. probolia Neboiss and Wells, p. 143.

44’. Inferior appendages triangular in ventral view, pointed distally, without dark
spurs on apical inner margin (Figs. 3.30C, 3.31C) ......................................................... 45

45(44’). Inferior appendages each elongate distally, mesal basodorsal process with distal
hook longer than height of hump (Fig. 3.30A) ....... T. forficata Neboiss and Wells, p. 140.

45’. Inferior appendages each short distally, mesal basodorsal process with distal
hook no longer than height of hump (Figs. 3.31A, 3.33A) .................................................. 46

46(45’). Mesal basodorsal process on each inferior appendage with median swelling even,
not forming distinct hump in lateral view (Fig. 3.33A) .................................................. 46

............................................................................................................................... T. vespertina Neboiss and Wells, p. 144.

46’. Mesal basodorsal process on inferior appendage with median swelling abrupt,
forming distinct hump in lateral view (Figs. 3.31A, 3.34A) .............................................. 47

47(46’). Inferior appendages as long as sternite IX (Fig. 3.34C) ..........................................
............................................................................................................................... T. wannonensis Neboiss and Wells, p. 146.

47’. Inferior appendages twice as long as sternite IX (Fig. 3.31C) .................................... 47

............................................................................................................................... T. notalia Neboiss and Wells, p. 142.

48(41’). Lower part of tergum X with recurved spine-like process (Fig. 3.39) ..................... 49

48’. Lower part of tergum X without recurved spine-like process (Fig. 3.43B) ............... 52

49(48). Recurved spine-like process of lower part of tergum X with distal spines (Fig.
3.41A) ............................................................................................................................... 50

49. Recurved spine-like process of lower part of tergum X without distal spines (Fig.
3.40A) ............................................................................................................................... 51
50(49). Preanal appendages long (Fig. 3.41B); mesal basodorsal process of each inferior
appendage distally long, sharp (Fig. 3.41A) .............................................. T. serrata Ulmer, p. 153.

50’. Preanal appendages short (Fig. 3.42B); mesal basodorsal process of each inferior
appendage distally short, rounded (Fig. 3.42A) ..................................... T. sicula (Barnard), p. 155.

51(49’). Mesal basodorsal process on each inferior appendage with apex roundly concave
in lateral view (Fig. 3.39A) ........................................................................ T. bifida Jacquemart, p. 151.

51’. Mesal basodorsal process on inferior appendage apex without round concavity in
lateral view (Fig. 3.40A) ................................................................. T. falculata Kimmins, p. 152.

52(48’). Lower part of tergum X forming asymmetrical pair of spines (Fig. 3.43B) ........
........................................................................................................ T. corynota Neboiss and Wells, p. 156.

52’. Lower part of tergum X forming symmetrical pair of spines (Figs. 3.37B, 3.44B) .... 53

53(52’). Distal part of each inferior appendage not obliquely truncate (Fig. 3.44C), having
mesal basodorsal process with slender base, its apex broad, furcated (Fig. 3.44A)

53’. Distal part of each inferior appendage obliquely truncate (Fig. 3.37C), having
mesal basodorsal process with thick base, its apex rounded (Figs. 3.36A, 3.37A,
3.38A) ........................................................................................................ 54

54(53’). Mesal basodorsal process of each inferior appendage strongly humped (Fig.
3.37A) ................................................................................................. T. semigraphata Mey, p. 149.

54’. Mesal basodorsal process of each inferior appendage smoothly rounded (Figs.
3.36A, 3.38A) ........................................................................................... 55

55(54’). Lower part of tergum X extremely long (Fig. 3.38A); mesal basodorsal process
on each inferior appendage triangular in lateral view (Fig. 3.38A) ..............
........................................................................................................ T. transversaria Mey, p. 150.

55’. Lower part of tergum X not extremely long (Fig. 3.36A); mesal basodorsal
process on each inferior appendage not triangular in lateral view (Fig. 3.36A)......
Key to Males of the *Triaenodes* (*Microtriaena*) Species

1. Recurved process of inferior appendages with club-shaped head (Figs. 3.68E; Andersen and Holzenthal, 2002, p. 64, fig. 4) ........................................................................................................ 2

1’. Recurved process of inferior appendages without club-shaped head (Fig. 3.69A) ........................................................................................................ 3

2(1). Inferior appendage with a club-shaped mesal basodorsal process (Andersen and Holzenthal, 2002, p. 64, fig. 4) ................................................................. *T. africana* Ulmer, p. 215.

2’. Inferior appendage with a hammer-shaped mesal basodorsal process (Fig. 3.70A) ........................................................................................................ 5

3(1’). Lower part of tergum X a long, narrow spine (Andersen and Holzenthal, 2002, p. 73, fig. 26 and p. 79, fig. 43) ........................................................................ 4

3’. Lower part of tergum X a pair of long, narrow spines or a semimembranous plate (Figs. 3.69A, 3.70A) ..................................................................................... 5

4(3). Preanal appendage long and slender in dorsal view; inferior appendages with apically enlarged mesal basodorsal process (Andersen and Holzenthal, 2002, p. 79, fig. 42) ................................................................. *T. kwasi* Andersen and Holzenthal, p. 221.

4’. Preanal appendage short, triangular in dorsal view; inferior appendages without mesal basodorsal process (Andersen and Holzenthal, 2002, p. 73, figs. 25, 26) ............................... *T. kofi* Andersen and Holzenthal, p. 220.

5(3’). Lower part of tergum X a pair of long, narrow spines; recurved process thick and strongly curved backward (Fig. 3.72A) ................................................ *T. fortunio* Schmid, p. 219.

5’. Lower part of tergum X a semimembranous plate; recurved process rather short and directed dorsad (Figs. 3.71A-B) ................................................ *T. florida* Ross, p. 217.

Key to Males of the *Triaenodes* (*Triaenodes*) Species
1. Inferior appendages each with mesal basodorsal process (Fig. 3. 71A) ......................... 2
1'. Inferior appendages without mesal basodorsal processes (Fig. 4.50A) ....................... 30
2(1). Upper part of tergum X with single median lobe or pair of lobes (Figs. 4.10B, 4.57A) ................................................................................................................................. 3
2'. Upper part of tergum X inconspicuous (Fig. 4.6B) ....................................................... 18
3(2). Upper part of tergum X with pair of lobes (Figs. 4.56B, 4.57A) ......................... 4
3'. Upper part of tergum X with single median lobe, apically clavate or trifid (Figs. 4.60A, 4.10B) .................................................................................................................. .... 5
4(3). Upper part of tergum X with pair of spatulate lobes (Fig. 4.56B); lower part of tergum X with lateral projections (Fig. 4.56A); inferior appendages each with mesal basodorsal process, lateral subbasodorsal process, and apicomesal lobe in lateral view (Fig. 4.56A) ........................................................... T. new species C, p. 321.
4'. Upper part of tergum X with pair of slender lobes, apices almost crossing over each other (Fig. 4.57A); lower part of tergum X without lateral projections (Fig. 4.57A); inferior appendages each with mesal basodorsal process and apicomesal lobe in lateral view (Fig. 4.57A) ........................................................... T. taenia Ross, p. 322.
5(3'). Upper part of tergum X apically clavate (Figs. 4.59B, 4.60A) ............................ 6
5'. Upper part of tergum X apically trifid (Fig. 4.10B) ...................................................... 11
6(5). Upper part of tergum X with slender, long, single median lobe (Fig. 4.60A; Malicky, 2005, p.46, pl. 6, dorsal view of T. penelope); inferior appendages each with slender mesal basodorsal process and digitate, lateral subbasodorsal process in lateral view (Fig. 4.60A; Malicky, 2005, p.46, pl. 6, lateral view of T. penelope) ............................................................................................................................. 7
6'. Upper part of tergum X with short, single median lobe (Fig. 4.58A; Malicky, 2005, p.43, pl. 3, dorsal view of T. pelias); inferior appendages each with stout (Fig. 4.59A) or large spoon-shaped (Malicky, 2005, p.43, pl. 3, lateral view of T.
pelias) mesal basodorsal process, without lateral subbasodorsal process in lateral view (Figs. 4.58A, 4.59A; Malicky, 2005, p.43, pl. 3, lateral view of T. pelias) ............ 9

7(6). Mesal basodorsal process of each inferior appendage asymmetrical in lateral view (Malicky, 2005, p. 46, pl. 6, lateral view of T. penelope) ...........................................................

7’. Mesal basodorsal process of each inferior appendage symmetrical in lateral view (Fig. 4.60A; Neboiss and Wells, 1998, p. 116, fig. 81) ................................................................. 8

8(7’). Lower part of tergum X with strongly upturned right side (Fig. 4.60A); phallus not divided (Fig. 4.60A); distal part of each inferior appendage short, pointed in lateral view (Fig. 4.60A) .........................................................................................................................
....................................................................................................................... T. intricata Neboiss and Wells, p. 328.

8’. Lower part of tergum X with downcurved right side (Neboiss and Wells, 1998, p. 116, fig. 81); phallus deeply divided (Neboiss and Wells, 1998, p. 116, fig. 81); distal part of each inferior appendage blunt in lateral view (Neboiss and Wells, 1998, p. 116, fig. 81) ................................................................. T. mouldsi Neboiss and Wells, p. 330.

9(6’). Inferior appendage with large spoon-shaped mesal basodorsal in lateral view (Malicky, 2005, p. 43, pl. 3, lateral view of T. pelias); distal part of each inferior appendage truncated in lateral view (Malicky, 2005, p. 43, pl. 3, lateral view of T. pelias) ................................................................. T. pelias Malicky, 2005, p. 331.

9’. Inferior appendage with stout mesal basodorsal in lateral view (Figs. 4.58A, 4.59A); distal part of each inferior appendage pointed in lateral view (Figs. 4.58A, 4.59A) ................................................................................................................................. 10

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81(80). Each inferior appendage with diagonal lateral carina in lateral view (Fig. 4.38A; Yang and Morse, 2000, p. 241, fig. 122A) ............................................................................................................. 82

81'. Inferior appendages without diagonal lateral carinae in lateral view (Yang and Morse, 2000, p. 240, fig. 120A) ............................................................................................................................................. 83

82(81). Upper part of tergum X as long as lower part of tergum X in lateral view (Fig. 4.38A); distal margin of each inferior appendage narrow and nearly acute in ventral view (Fig. 4.38C).............................................................................. T. unanimis McLachlan, p. 293.
82’. Upper part of tergum X longer than lower part of tergum X in lateral view (Yang and Morse, 2000, p. 241, fig. 122A); distal margin of each inferior appendage broad and obliquely truncate in ventral view (Yang and Morse, 2000, p. 241, fig. 122C) .......................................................................................... *T. qinlingensis* Yang and Morse, p. 292.

83(81’). Lower part of tergum X with truncated apex in dorsal view (Figs. 4.37B, 4.44B)........... 86

83’. Lower part of tergum X with rounded apex in dorsal view (Yang and Morse, 2000, p. 240, fig. 120B; Malicky, 2005, p. 41, pl. 1, dorsal views of *T. pentheus* and *T. menestheus*)............................................................................................................ 84

84(83’). Preanal appendages four-fifths as long as upper part of tergum X in dorsal view (Yang and Morse, 2000, p. 240, fig. 120B); main body of each inferior appendage semicircular in lateral view (Yang and Morse, 2000, p. 240, fig. 120A).......................................................................................... *T. foliformis* Yang and Morse, p. 286.

84’. Preanal appendages half as long as upper part of tergum X in dorsal view (Malicky, 2005, p. 41, pl. 1, dorsal views of *T. pentheus* and *T. menestheus*); main body of each inferior appendage irregularly rectangular or rounded-triangular in lateral view (Malicky, 2005, p. 41, pl. 1, dorsal views of *T. pentheus* and *T. menestheus*)............................................................................................................ 85

85(84’). Main body of each inferior appendage irregularly rectangular in lateral view, without caudal edge (Malicky, 2005, p. 41, pl. 1, lateral view of *T. pentheus*)....... .................................................................................................................................................. *T. pentheus* Malicky, p. 291.

85’. Main body of each inferior appendage rounded-triangular in lateral view, with caudal edge (Malicky, 2005, p. 41, pl. 1, dorsal view of *T. menestheus*)............

.................................................................................................................................................. *T. menestheus* Malicky, p. 287.

86(83). Preanal appendages each with lateral broad base, slightly bilobate in lateral view (Figs. 4.36B); recurved process of each inferior appendage stout, strongly curved posterodorsad in lateral view (Figs. 4.36A, 4.37A)................................................................................. 87
86’. Preanal appendages generally narrow, not bilobate in lateral view (Fig. 4.44B); recurved process of each inferior appendage slender, well recurved into abdominal segment IX in lateral view (Fig. 4.44A) .............. *T. teuthras* Malicky, p. 303.

87(86). Apex of upper part of tergum X truncated, slightly concave in dorsal view (Fig. 4.37B) ........................................................................................................... *T. ochreella lefkas* Malicky, p. 290.

87’. Apex of upper part of tergum X slightly dilated, tapered in dorsal view (Fig. 4.36B) ..................................................................................... *T. ochreella ochreella* McLachlan, p. 288.

Key to Males of the *Triaenodes* species *Incertae sedis*

(The males of *T. niwai* Iwata are yet unknown;
those of *T. insulana* are insufficiently described to key here.)

1. Inferior appendages each with lateral subbasodorsal process (Fig. 4.61A; Malicky, 2005, p. 46, pl. 6, lateral view of *T. iphis*).......................... 2

1’. Inferior appendages without long lateral subbasodorsal processes (Fig. 4.62A)........ 5

2(1’). Lateral subbasodorsal process of each inferior appendage short in lateral view (Malicky, 2005, p. 46, pl. 6, lateral view of *T. iphis*) ................... *T. iphis* Malicky, p. 346.

2’. Lateral subbasodorsal process of each inferior appendage long in lateral view (Fig. 4.61A)........................................................................................................... 3

3(2’). Pair of parameres of phallus long (Neboiss and Wells, 1998, p. 126, figs. 122; Fig. 4.62A)........................................................................................................... 4


4(3). Lateral subbasodorsal process of each inferior appendage with small triangular lobe about midway (Neboiss and Wells, 1998, p. 126, figs. 121, 123) .................
4’. Lateral subbasodorsal process of each inferior appendage without small triangular lobe (Figs. 4.61B, 4.61C) ........................................... T. costalis Kimmins, p. 340.

5(1’). Phallus very long, spiniform in lateral view (Fig. 4.62A) .............................................

...................................................................................................................... T. longispina Kimmins, p. 348.

5’. Phallus long, not spiniform in lateral view (Schmid, 1994, p. 7, fig. 9; Andersen and Holzenthal, 2001, p. 244, fig. 55; Marlier, 1957; p 288, fig. 4a; Malicky, 2005: p. 44, pl. 4, phallus figure of T. minos) ................................................................. 6

6(5’). Preanal appendages short (Andersen and Holzenthal, 2001, p. 244, fig. 53); phallus with two pairs of spines (Andersen and Holzenthal, 2001, p. 244, fig. 55)

...................................................................................................................... T. kwadwo Andersen and Holzenthal, p. 347.

6’. Preanal appendages long (Schmid, 1994, p. 7, fig. 9; Marlier, 1957; p 288, fig. 4a); Phallus without any spines (Schmid, 1994, p. 7, fig. 9; Marlier, 1957; p 288, fig. 4a) ....................................................................................................................... 7

7(6’). Upper part of tergum X reduced (Schmid, 1994, p. 7, fig. 9); lower part of tergum X single, long spine (Schmid, 1994, p. 7, fig. 9) ....................... T. eximia Schmid, p. 343.

7’. Upper part of tergum X single median process (Malicky, 2005: p. 44, pl. 4; Marlier, 1957, p. 288, fig. 4a; Malicky, 2005: p. 45, pl. 5, dorsal view of T. proteus); lower part of tergum X single semimembranous plate or pair of processes (Malicky, 2005, p. 44, pl. 4; Marlier, 1957, p. 288, fig. 4a; Malicky, 2005, p. 45, pl. 5, dorsal view of T. proteus) ................................................................. 8

8(7’). Lower part of tergum X with single semimembranous plate (Malicky, 2005, p. 44-45, pl. 4, dorsal view of T. minos and pl. 5, dorsal view of T. proteus) ............................... 9

8’. Lower part of tergum X with pair of processes (Marlier, 1957, p. 288, fig. 4a; Malicky, 2005, p. 45, pl. 5, dorsal view of T. xanthos) ................................................... 10
9(8’). Lower part of tergum X with mushroom-shaped plate, without apical excision (Malicky, 2005, p. 44, pl. 4, dorsal view of *T. minos*).................. *T. minos* Malicky, p. 350.

9’. Lower part of tergum X with subtriangular plate, with apical excision (Malicky, 2005, p. 45, pl. 5, dorsal view of *T. proteus*)....................... *T. proteus* Malicky, p. 353.

10(9’). Pair of processes of lower part of tergum X asymmetrical (Marlier, 1957, p. 288, fig. 4a)............................................................................. *T. polystachya* (Marlier), p. 352.


Checklist and Classification of World *Triaenodes* Species

*Triaenodes* (*Nototriaena*) NEW SUBGENUS; Chapter IV, pages 69-99., Figs. 3.1-3.2.

*Triaenodes* (*Nototriaena*) hornitos Group

* *Triaenodes hornitos* Holzenthal and Andersen 2004; Panama; p. 70.

* *Triaenodes moncho* Holzenthal and Andersen 2004; Costa Rica; p. 71.

* *Triaenodes morai* Holzenthal and Andersen 2004; Costa Rica; p. 73.

* *Triaenodes oaxacensis* Holzenthal and Andersen 2004; Mexico; p. 74.

* *Triaenodes talamancai* Holzenthal and Andersen 2004; Costa Rica; p. 75.

* *Triaenodes tapanti* Holzenthal and Andersen 2004; Costa Rica; p. 76.

*Triaenodes* (*Nototriaena*) guadaloupe Group

* *Triaenodes guadaloupe* Holzenthal and Andersen 2004; Panama; p. 77.

*Triaenodes* (*Nototriaena*) anomal Group

* *Triaenodes flintorum* Holzenthal and Andersen 2004; Mexico; p. 79.

* *Triaenodes mexicana* Holzenthal and Andersen 2004; Mexico; p. 80.

* *Triaenodes acantha* Holzenthal and Andersen 2004; Mexico; p. 81.
*Triaenodes anomala* Flint 1967; Mexico; p. 82.

*Triaenodes tuxtlensis* Holzenthal and Andersen 2004; Mexico; p. 84.

*Triaenodes abrupta* Flint, 1991; Colombia; p. 85, Fig. 3.1.

*Triaenodes chirripo* Holzenthal and Andersen 2004; Costa Rica; p. 86.

*Triaenodes cuyotenango* Holzenthal and Andersen 2004; Guatemala; p. 87.

*Triaenodes (Nototriaena) clauseni* Group

*Triaenodes clauseni* Holzenthal and Andersen 2004; Costa Rica; p. 89.

*Triaenodes tico* Holzenthal and Andersen 2004; Costa Rica; p. 90.

*Triaenodes (Nototriaena) species Incertae sedis

*Triaenodes delicata* Navás 1924; Costa Rica; p. 91.

*Triaenodes hodgesi* Holzenthal and Andersen 2004; Ecuador; p. 92.

*Triaenodes kilambe* Holzenthal and Andersen 2004; Nicaragua; p. 94.

*Triaenodes nicaraguensis* Holzenthal and Andersen 2004; Nicaragua; p. 95.

*Triaenodes peruana* Flint and Reyes, 1991; Peru; p. 96, Fig. 3.2.

*Triaenodes tajo* Holzenthal and Andersen 2004; Costa Rica; p. 97.

*Triaenodes woldai* Holzenthal and Andersen 2004; Panama; p. 98.

*Triaenodes (Ylodes) Milne, 1934

*Triaenodes albicornis* Ulmer, 1905; Algeria.

*Triaenodes calcarata* Martynov, 1928; Kazakhstan.

*Triaenodes cana* Navas, 1933; Spain.

*Triaenodes conspersa* (Rambur, 1842); France.

*Triaenodes detruncata* Martynov, 1924; Russia (North West).

*Triaenodes dubia* Mosely, 1934; Fiji Islands.

*Triaenodes frontalís* Banks, 1907; United States of America.

*Triaenodes interna* McLachlan, 1875; Uzbekistan.
Triaenodes jakutana Martynov, 1910; Russia (central Siberia).

Triaenodes kawraiskii Martynov, 1909; Georgia.

Triaenodes levanidovae (Morse and Vshivkova, 1997); Russia.

Triaenodes reuteri McLachlan, 1880; Sweden, Finland.

Triaenodes schmid (Manuel and Nimmo, 1984); Canada.

Triaenodes simulana Tjeder, 1929; Sweden.

Triaenodes zarudnyi Martynov, 1928; Iran.

Triaenodes (Neotriaena) NEW SUBGENUS; Chapter V, pages 100-124, Figs. 3.4-3.20.

Triaenodes (Neotriaena) volda Group

Triaenodes dysmica Neboiss and Wells, 1998; Australia; p. 101, Fig. 3.4.

Triaenodes volda Mosely, 1953; Australia; p. 102, Fig. 3.5.

Triaenodes jubata Neboiss, 1982; Australia; p. 103, Fig. 3.6.

Triaenodes mataranka Neboiss and Wells, 1998; Australia; p. 105, Fig. 3.7.

Triaenodes (Neotriaena) theiophora Group

Triaenodes theiophora Neboiss and Wells, 1998; Australia; p. 106, Fig. 3.8.

Triaenodes toxeres Neboiss and Wells, 1998; Australia; p. 107, Fig. 3.9.

Triaenodes (Neotriaena) barbarae Group

Triaenodes barbarae Neboiss and Wells, 1998; Australia; p. 109, Fig. 3.10.

Triaenodes camura Neboiss and Wells, 1998; Australia; p. 110, Fig. 3.11.

Triaenodes gibberosa Neboiss and Wells, 1998; Australia; p. 112, Fig. 3.12.

Triaenodes rutella Neboiss and Wells, 1998; Australia; p. 113, Fig. 3.13.

Triaenodes virgula Neboiss and Wells, 1998; Australia; p. 114, Fig. 3.14.

Triaenodes (Neotriaena) species Incertae sedis

Triaenodes celata Neboiss and Wells, 1998; Australia; p. 116, Fig. 3.15.

Triaenodes copelata Neboiss and Wells, 1998; Australia; p. 117, Fig. 3.16.
Triaenodes dibolia Neboiss and Wells, 1998; Australia; p. 118, Fig. 3.17.

Triaenodes drepana Neboiss and Wells, 1998; Australia; p. 119, Fig. 3.18.

Triaenodes etheira Neboiss and Wells, 1998; Australia; p. 120, Fig. 3.19.

Triaenodes reclusa Neboiss and Wells, 1998; Australia; p. 122.

Triaenodes stipulosa Neboiss and Wells, 1998; Australia; p. 123, Fig. 3.20.

Triaenodes (Austrotriaena) Yang and Morse, 1993; Chapter VI, pages 125-138, Figs. 3.21-3.29.

Triaenodes (Austrotriaena) boettcheri Group

Triaenodes boettcheri Ulmer, 1930b; Philippine; p. 126, Fig. 3.21.

Triaenodes hauseri Mey, 1998; Philippine; p. 127, Fig. 3.22.

Triaenodes hybos Mey, 1998; Philippine; p. 129, Fig. 3.23.

Triaenodes virgata Mey, 1998; Philippine; p. 130, Fig. 3.24.

Triaenodes (Austrotriaena) species Incertae sedis

Triaenodes bernaysae Korboot, 1964; Australia; p. 131, Fig. 3.25.

Triaenodes fijiana Mosely, 1941; Fiji Islands; p. 132, Fig. 3.26.

Triaenodes lanceolata Kimmins, 1957a; Guadalcanal Islands; p. 134, Fig. 3.27.

Triaenodes manni Banks, 1936; Fiji Islands; p. 135, Fig. 3.28.

Triaenodes trifida Kimmins, 1957a; Guadalcanal Islands; p. 136, Fig. 3.29.

*Triaenodes zetes Malicky, 2005; Papua New Guinea; p. 137.

Triaenodes (Triaenodella) Mosely, 1932a; Chapter VII, pages 139-213, Figs. 3.30-3.67.

Triaenodes (Triaenodella) forficata Group

Triaenodes forficata Neboiss and Wells, 1998; Australia; p. 140, Fig. 3.30.

Triaenodes notalia Neboiss and Wells, 1998; Australia; p. 142, Fig. 3.31.

Triaenodes probolia Neboiss and Wells, 1998; Australia; p. 143, Fig. 3.32.

Triaenodes vespertina Neboiss and Wells, 1998; Australia; p. 144, Fig. 3.33.
*Triaenodes wannonensis* Neboiss and Wells, 1998; Australia; p. 146, Fig. 3.34.

*Triaenodes (Triaenodella) lurideola* Group

*Triaenodes lurideola* Mey, 1990; Philippines; p. 147, Fig. 3.36.

*Triaenodes semigraphata* Mey, 1990; Malaysia; p. 149, Fig. 3.37.

*Triaenodes transversaria* Mey, 1990; Philippines; p. 150, Fig. 3.38.

*Triaenodes (Triaenodella) serrata* Group

*Triaenodes bifida* Jacquemart, 1966; Democratic Republic of the Congo; p. 151, Fig. 3.39.

*Triaenodes falculata* Kimmins, 1956; Republic of South Africa; p. 152, Fig. 3.40.

*Triaenodes serrata* Ulmer, 1912; Sudan; p. 153, Fig. 3.41.

*Triaenodes sicula* Barnard, 1934; Namibia; p. 155, Fig. 3.42.

Species *incertae sedis* near *T. (Triaenodella) lurideola* and *T. (Triaenodella) serrata* Groups

*Triaenodes corynotra* Neboiss and Wells, 1998; Australia; p. 156, Fig. 3.43.

*Triaenodes legona* Mosely, 1939a; Kenya; p. 157, Fig. 3.44.

Species *incertae sedis* near *T. (Triaenodella) forficate*, *T. (Triaenodella) lurideola* and *T. (Triaenodella) serrata* Groups

*Triaenodes cuspiosa* Neboiss and Wells, 1998; Australia; p. 159, Fig. 3.25.

*Triaenodes kalydon* Malicky, 2005; Indonesia; p. 160.

*Triaenodes (Triaenodella) nesiotina* Group

*Triaenodes nesiotina* Neboiss and Wells, 1998; Australia; p. 161.

*Triaenodes nymphaea* Neboiss and Wells, 1998; Australia; p. 163, Fig. 3.45.

*Triaenodes torresiana* Neboiss and Wells, 1998; Australia; p. 164, Fig. 3.46.

*Triaenodes uvida* Neboiss and Wells, 1998; Australia; p. 165, Fig. 3.47.

*Triaenodes (Triaenodella) moselyi* Group

*Triaenodes moselyi* Kimmins, 1962b; Uganda; p. 167, Fig. 3.48.

*Triaenodes nigrolineata* Kimmins, 1962a; Papua New Guinea; p. 168, Fig. 3.49.

*Triaenodes (Triaenodella) ataloma* Group
**Triaenodes doryphora** Neboiss and Wells, 1998; Australia; p. 170, Fig. 3.50.

**Triaenodes laciniata** Neboiss and Wells, 1998; Australia; p. 171, Fig. 3.51.

**Triaenodes ataloma** Neboiss and Wells, 1998; Australia; p. 173, Fig. 3.52.

**Triaenodes empheira** Neboiss and Wells, 1998; Australia; p. 174, Fig. 3.53.

**Triaenodes tenerata** Neboiss and Wells, 1998; Australia; p. 175, Fig. 3.54.

Species *incertae sedis* near *T. (Triaenodella) nesiotina*

*T. (Triaenodella) moselyi* and *T. (Triaenodella) ataloma* Groups

*Triaenodes amma* Andersen and Holzenthal, 2001; Ghana; p. 176.

**Triaenodes apicomaculata** Mey, 1990; Philippines; p. 178, Fig. 3.55.

**Triaenodes difformis** Mosely, 1932b; Uganda; p. 179, Fig. 3.56.

**Triaenodes dolabrata** Gibbs, 1973; Ghana; p. 180, Fig. 3.57.

**Triaenodes hickini** Kimmins, 1957b; Kenya; p. 181, Fig. 3.58.

**Triaenodes ghana** Kimmins, 1957b; Republic of South Africa; p. 183, Fig. 3.59.

**Triaenodes calamintella** Mey, 1995; Philippines; p. 1844, Fig. 3.60.

*Triaenodes sertata* Mey, 2003; Philippines; p. 185.

*Triaenodes proserpina* Malicky, 2005; Papua New Guinea; p. 186.

*Triaenodes rufescens* Martynov, 1935; Russia; p. 187.

**Triaenodes spoliata** Mey, 1998; Philippines; p. 188, Fig. 3.61.

**Triaenodes triaenodiformis** (Ulmer, 1930a); Ethiopia; p. 189, Fig. 3.60.

Species *incertae sedis* near *T. (Triaenodella) forficata, T. (Triaenodella) lurideola, T. (Triaenodella) serrata, T. (Triaenodella) nesiotina, T. (Triaenodella) moselyi* and *T. (Triaenodella) ataloma* Groups

**Triaenodes chelifera chelifera** Mosely, 1932a; Uganda; p. 191, Fig. 3.63.

**Triaenodes chelifera gibbera** Statzner, 1976; Democratic Republic of the Congo; p. 192, Fig. 3.64.

**Triaenodes clavata clavata** Mosely, 1932a; Tanganyika; p. 194, Fig. 3.65.

**Triaenodes clavata aequa** Statzner, 1976; Democratic Republic of the Congo; p. 195, Fig. 3.66.

**Triaenodes conjugata** Neboiss and Wells, 1998; Australia; p. 196, Fig. 3.67.
*Triaenodes* (Triadenodella) species *Incertae sedis*

* *Triaenodes aberrans* (Marlier, 1965); Angola; p. 198.

* *Triaenodes akosua* Andersen and Holzenthal, 2001; Ghana; p. 199.

* *Triaenodes botosaneanui* Marlier, 1978; Gabon; p. 200.

*Triaenodes corallina* Kimmins, 1962a; Papua New Guinea; p. 201, Fig. 3.68.


* *Triaenodes laamii* Dakki, 1980; Morocco; p. 203.

* *Triaenodes ornata* Ulmer, 1915; Sri Lanka; p. 204.

* *Triaenodes pellucta* Ulmer, 1908; Japan; p. 206.

* *Triaenodes proszynskii* Marlier and Botosanueanu, 1968; Ivory Coast; p. 207.

*Triaenodes triquetra* Neboiss and Wells, 1998; Australia; p. 209.

*Triaenodes verberata* Neboiss and Wells, 1998; Australia; p. 210, Fig. 3.69.

* *Triaenodes intecta* Mey, 2003; Philippines; p. 211.

* *Triaenodes palpalis* Banks, 1920; Cameroons; p. 212.

* *Triaenodes* (Microtriaena) NEW SUBGENUS; Chapter VIII, pages 214-222, Figs. 3.70-3.72

*Triaenodes* (Microtriaena) contartus Group

* *Triaenodes africana* Ulmer, 1965; Angola; p. 215.

* *Triaenodes contartus* Jacquemart and Statzner, 1981; Democratic Republic of the Congo; p. 216, Fig. 3.70.

*Triaenodes* (Microtriaena) species *Incertae sedis*

*Triaenodes florida* Ross, 1941; North America; p. 217, Fig. 3.71.

*Triaenodes fortunio* Schmid, 1994; India; p. 219, Fig. 3.72.

* *Triaenodes kofi* Andersen and Holzenthal, 2002; Ghana; p. 220.

* *Triaenodes kwasi* Andersen and Holzenthal, 2002; Ghana; p. 221.
Triaenodes (Triaenodes) McLachlan, 1865b; Chapter IX, pages 223-340, Figs. 4.1-4.60.

Triaenodes (Triaenodes) imakus Group

Triaenodes imakus Gibbs, 1973; Ghana; p. 224, Fig. 4.1.

*Triaenodes kwaku Andersen and Holzenthal, 2002; Ghana; p. 226.

*Triaenodes longipina Jacquemart, 1966; Democratic Republic of the Congo; p. 227, Fig. 4.2.

*Triaenodes tanzanica Olah, 1986; Tanzania; p. 228, Fig. 4.3.

*Triaenodes uncatata Kimmins, 1962b; Uganda; p. 229, Fig. 4.4.

Triaenodes clara Jacquemart, 1961a; Democratic Republic of the Congo; p. 231, Fig. 4.5.

*Triaenodes kwame Andersen and Holzenthal, 2002; Ghana; p. 232.

Triaenodes wambana Mosely, 1939a; Uganda; p. 233, Fig. 4.6.

Triaenodes dafurica Mosely, 1936; Sudan; p. 234, Fig. 4.7.

*Triaenodes hirsuta Jacquemart, 1966a; Democratic Republic of the Congo; p. 235, Fig. 4.8.

Triaenodes (Triaenodes) allax Group

Triaenodes allax Neboiss and Wells, 1998; Australia; p. 237, Fig. 4.9.

Triaenodes cymulosa Neboiss and Wells, 1998; Australia; p. 238, Fig. 4.10.

Triaenodes implexa Neboiss and Wells, 1998; Australia; p. 239, Fig. 4.11.

Triaenodes perissotes Neboiss and Wells, 1998; Australia; p. 240, Fig. 4.12.

Triaenodes resima Neboiss and Wells, 1998; Australia; p. 241, Fig. 4.13.

*Triaenodes odysseus Malicky, 2005; Papua New Guinea; p. 243, Fig. 4.14.

*Triaenodes telefominica Kumanski, 1979; Papua New Guinea; p. 244, Fig. 4.15.

Triaenodes (Triaenodes) mondoana Group

Triaenodes agrophe, NEW SPECIES; Indonesia; p. 246, Fig. 4.16.

Triaenodes tribulosa NEW SPECIES; Australia; p. 247, Fig. 4.17.

Triaenodes mondoana Kimmins, 1962a; Australia; p. 248, Fig. 4.18.

*Triaenodes columbica Ulmer, 1909; Colombia; p. 250.
*Triaenodes narkissos* Malicky, 2005; Thailand; p. 251.

*Triaenodes (Triaenodes) elegantula* Group

*Triaenodes assimilis* Banks, 1937; Philippines; p. 252.

* *Triaenodes bulupendek* Andersen and Holzenthal, 1999; Malaysia; p. 253.

*Triaenodes plutonis* Banks, 1931; Sri Lanka; p. 255.

* *Triaenodes aku* Andersen and Holzenthal, 2002; Ghana; p. 256.

*Triaenodes troubati* Gibon, 1982; Ivory Coast; p. 257.

* *Triaenodes elegantula* Ulmer, 1908; Tanzania; p. 258.

*Triaenodes (Triaenodes) excisa* Group

*Triaenodes excisa* Kimmins, 1957a; Guadalcanal Island; p. 259, Fig. 4.19.

*Triaenodes picea* Kimmins, 1957a; Guadalcanal Island; p. 260, Fig. 4.20.

* *Triaenodes kwabena* Andersen and Holzenthal, 2002; Ghana; p. 261.

* *Triaenodes silvanus* Malicky, 2005; Papua New Guinea; p. 262, Fig. 4.21.

* *Triaenodes thespios* Malicky, 2005; Papua New Guinea; p. 263.

*Triaenodes (Triaenodes) injusta* Group

*Triaenodes furcella* Ross, 1959; North America; p. 265, Fig. 4.22.

*Triaenodes injusta* (Hagen 1861); Canada; p. 266, Fig. 4.23.

*Triaenodes (Triaenodes) cumberlandensis* Group

*Triaenodes cumberlandensis* Etnier and Way, 1973; North America; p. 267, Fig. 4.24.

*Triaenodes marginata* Sibley, 1926; North America; p. 269, Fig. 4.25.

*Triaenodes inflexa* Morse, 1971; North America; p. 270, Fig. 4.26.

*Triaenodes baris* Ross, 1938b; North America; p. 272, Fig. 4.27.

*Triaenodes flavescens* Banks, 1900; North America; p. 273, Fig. 4.28.

*Triaenodes phalacris* Ross, 1938b; North America; p. 274, Fig. 4.29.

*Triaenodes smithi* Ross, 1959; North America; p. 275, Fig. 4.30.

*Triaenodes tarda* Milne, 1934; Canada; p. 277, Fig. 4.31.
Species incertae sedis near *T. (Triazenodes) unjusta* and *T. (Triazenodes) cumberlandensis* Groups

*Triazenodes ignita* (Walker, 1852); North America; p. 278, Fig. 4.32.

*Triazenodes oidiplus* Malicky, 2005; Indonesia; p. 280.

Species incertae sedis near *T. (Triazenodes) mondoana*, *T. (Triazenodes) elegantula*, *T. (Triazenodes) excisa*, *T. (Triazenodes) injusta*, and *T. (Triazenodes) cumberlandensis* Groups

*Triazenodes adelophe* NEW SPECIES; Australia; p. 281, Fig. 4.33.

*Triazenodes rhopalota* NEW SPECIES; Australia; p. 282, Fig. 4.34.

*Triazenodes aurea* Kimmins, 1962a; Papua New Guinea; p. 283, Fig. 4.35.

*Triazenodes bilobata* Yang and Morse, 2000; China; p. 285.

*Triazenodes foliformis* Yang and Morse, 2000; China; p. 286.

*Triazenodes menestheus* Malicky, 2005; Thailand; p. 287.

*Triazenodes ochreella ochreella* McLachlan, 1877; France; p. 288, Fig. 4.36.

*Triazenodes ochreella lefkas* Malicky, 1974; Greece; p. 290, Fig. 4.37.

*Triazenodes pentheus* Malicky, 2005; Thailand; p. 291.

*Triazenodes qinglingensis* Yang and Morse, 2000; China; p. 292.

*Triazenodes unanimis* McLachlan, 1877; Finland; p. 293, Fig. 4.38.

*Triazenodes eumekes* NEW SPECIES; Australia; p. 294, Fig. 4.39.

*Triazenodes gazella* (Hagen, 1859); Sri Lanka; p. 296, Fig. 4.40.

*Triazenodes helo* Milne, 1934; North America; p. 297, Fig. 4.41.

*Triazenodes perna* Ross, 1938a; North America; p. 298, Fig. 4.42.

*Triazenodes scottae* Gibon, 1982; Ivory Coast; p. 299.

*Triazenodes tafana* Kimmins, 1962a; Papua New Guinea; p. 300, Fig. 4.43.

*Triazenodes teresis* Neboiss and Wells, 1998; Australia; p. 302.

*Triazenodes teuthtras* Malicky, 2005; India; p. 303, Fig. 4.44.

*Triazenodes tofana* Gibbs, 1973; Ghana; p. 304, Fig. 4.45.
Triaenodes (Triaenodes) dipsia Group

Triaenodes dipsia Ross, 1938b; North America; p. 305, Fig. 4.46.

Triaenodes melaca Ross, 1947; North America; p. 306, Fig. 4.47.

Triaenodes ochracea Betten and Mosely, 1940; North America; p. 308, Fig. 4.48.

Triaenodes (Triaenodes) aba Group

Triaenodes aba Milne, 1935; North America; p. 310, Fig. 4.49.

Triaenodes nox Ross, 1941; North America; p. 311, Fig. 4.50.

Triaenodes new species A; North America; p. 312, Fig. 4.51.

Species incertae sedis within T. (Triaenodes) mondoana,
T. (Triaenodes) elegantula, T. (Triaenodes) excisa,
T. (Triaenodes) injusta, T. (Triaenodes) cumberlandensis
T. (Triaenodes) dipsia, and T. (Triaenodes) aba Groups

*Triaenodes lankarama Schmid, 1958; Sri Lanka; p. 314.

Triaenodes tridonta Ross, 1938a; North America; p. 315, Fig. 4.52.

Triaenodes socolopia NEW SPECIES; Australia; p. 316, Fig. 4.53.

Triaenodes ustulata Kimmins, 1962a; Papua New Guinea; p. 318, Fig. 4.54.

Triaenodes grifo Malicky, 2005; Thailnd; p. 319.

Triaenodes (Triaenodes) Species Incertae sedis

Triaenodes bicolor Curtis, 1834; Britain; p. 320, Fig. 4.55.

Triaenodes new species C; North America; p. 321, Fig. 4.56.

Triaenodes taenia Ross, 1938a; North America; p. 322, Fig. 4.57.

Triaenodes fantasio Schmid, 1994; India; p. 324, Fig. 4.58.

Triaenodes trivucio Schmid, 1994; India; p. 325, Fig. 4.59.

Triaenodes fuscinula Neboiss and Wells, 1998; Australia; p. 326.

*Triaenodes hastata Ulmer, 1908; Tanzania; p. 327.

Triaenodes intricata Neboiss and Wells, 1998; Australia; p. 328, Fig. 4.60.

Triaenodes mouldsi Neboiss and Wells, 1998; Australia; p. 330.
*Triaenodes pelias* Malicky, 2005; Indonesia; p. 331.

*Triaenodes penelope* Malicky, 2005; Indonesia; p. 332.

*Triaenodes yaw* Andersen and Holzenthal, 2002; Ghana; p. 333.

*Triaenodes dusra* Schmid, 1965; China; p. 334.

*Triaenodes hoenei* Schmid, 1959; China; p. 335.

*Triaenodes indica* Martynov, 1936; India; p. 337.

*Triaenodes sinica* Ulmer, 1923; China; p. 338.

*Triaenodes* species *Incerate sedis*; Chapter X, pages 340-355., Figs. 4.61-4.64.

*Triaenodes costalis* Kimmins, 1962a; Papua New Guinea; p. 340, Fig. 4.61.

*Triaenodes melanopeza* Neboiss and Wells, 1998; Australia; p. 341.

*Triaenodes sinis* Malicky, 2005; Papua New Guinea; p. 343.

*Triaenodes eximia* Schmid, 1994; India; p. 343.

*Triaenodes insulana* Ulmer, 1951; Indonesia; p. 345.

*Triaenodes iphis* Malicky, 2005; Thailand; p. 346.

* Triaenodes kwadwo* Andersen and Holzenthal 2001; Ghana; p. 347.

*Triaenodes longispina* Kimmins 1962a; Papua New Guinea; p. 348, Fig. 4.62.


* Triaenodes niwai* Iwata, 1927; Japan; p. 351.

*Triaenodes polystachya* (Marlier, 1957); Democratic Republic of the Congo; .p 352.

*Triaenodes proteus* Malicky, 2005; Papua New Guinea; p. 353.


*Triaenodes* species Nomina Dubia; Chapter XI, pages 356-363.

* Triaenodes apicata* Navás, 1933.
* Triaenodes bifasciata Navás, 1933.

* Triaenodes borealis Banks, 1900.

* Triaenodes cloe (Hagen, 1859).

* Triaenodes esakii Tsuda, 1941.

* Triaenodes fulva Navás, 1931.

* Triaenodes insularis Navás, 1935a.

* Triaenodes jacquemarti (Hur and Morse, 2006).

* Triaenodes loriai Navás, 1932.

* Triaenodes sericea (Navás, 1935b).

Non- *Triaenodes* species

*Triaenodes demoulini* = *Parasetodes demoulini*

* no specimens examined.
CHAPTER IV

SUBGENUS *NOTOTRIAENA*, NEW SUBGENUS

Type species: *Triaenodes peruana* Flint and Reyes, 1991

There have been 24 species of this subgenus found only in the Neotropical region. In the Neotropics, *Triaenodes* occur from southern Mexico to Peru (Holzenthal and Andersen 2004). Holzenthal and Andersen (2004) described 20 new species and reviewed 4 previously described species. They diagnosed the Neotropical *Triaenodes* species; however, they refrained from establishing a subgenus and referred to the clade as the Neotropical *Triaenodes* whose relationship with other members of *Triaenodes* is unresolved. In this work, we define the Neotropical *Triaenodes* species as the new subgenus *Nototriaena*. The relationships of this and other subgenera are discussed in Chapter III (Fig. 2.1).

Males of this subgenus share two synapomorphies (Figs. 2.1, 3.1A): (5) a sickle-shaped recurved process on the basal plate of the inferior appendages and (6) a large laterodorsal process on each inferior appendage. This laterodorsal process was called an “apicomesal lobe” by Holzenthal and Andersen (2004). However, I think this process is not the same as the “apicomesal lobe” of Yang and Morse (1993, fig. 17) because this process is dorsally located on the main body of each inferior appendage and directed laterad. Four monophyletic species groups have been recognized in this subgenus (Fig. 2.2), but no synapomorphies are known by which their tetrachotomy may be resolved.
Subgenus *Nototriaena* adult males are distinguishable from other subgenera by the following characters: (1) the male antennal scapes are without scent organs; (2) the preanal appendages are short and broad; (3) the male inferior appendages each have a laterodorsal process; (4) the male phallus has one, two, or three long and slender paramere spines; and (5) the apex of the phallicata of some species (*T. hornitos*, *T. talamanca*, *T. guadalupe*, *T. kilambe* and *T. (Nototriaena) anomala*) Group species except *T. abrupta*) has a cleft.

*Triaenodes (Nototriaena) hornitos* Group

The *T. (Nototriaena) hornitos* Group includes six species. Their synapomorphy is that (24) the phallus has three parameres (Holzenthal and Andersen, 2004, fig. 16D). Some diagnostic characters include the following:

(1) the distal part of each inferior appendage is blunt in the lateral view and

(2) the apex of the lower part of tergum X is slightly excavated medially (except *T. tapanti*).

*Triaenodes (Nototriaena) hornitos* Holzenthal and Andersen, 2004

*Triaenodes hornitos* Holzenthal and Andersen, 2004; p. 25-26, figs. 16A-D (male).

**TYPE MATERIAL:** Holotype, male: PANAMA: Chiriqui, Fortuna Dam Site nr. Hornitos, 08°55’00”N, 082°16’00”W, 1050 m, 14-20.xii.1977, H. Wolda (UMSP000083372) (NMNH).

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=4). Forewing length 4.9–5.1 mm, hind wing length 4.0–4.4, 4.2 mm. Eye 0.32–0.34, 0.33 mm wide. Antennal scapes 0.39–0.42, 0.40 mm long. Maxillary palp segment lengths (in mm): 0.24–0.27, 0.26; 0.29–0.34, 0.31; 0.39–0.40; 0.22–0.23; 0.47–0.49. Forewing pale yellow, denuded.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin nearly straight; pleural region membranous, sparsely setose (or not evident): tergum IX, in dorsal view, with posterior margin triangular, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin rounded. Preanal appendage setose, at least
twice as long as wide, broad basally, apex round. Dorsomesal process [upper part] of tergum X bifid, originating subapically, short, less than half length of tergum X, with apical setae; tergum X [lower part of tergum X], in dorsal view, with lateral margins subtriangular, apex slightly excavate medially; in lateral view, triangular, apex truncate, slightly upturned, apicolateral margins without microtrichia (or not evident). Inferior appendage round basally setose without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, broad along basal 2/3, apex attenuate, with medial flange; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided, apex curved caudad. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres subequal, long, straight, tapering, third shorter, more needlelike; phalicata troughlike, gently curved, widest medially, tapering apically, apex with very slight cleft, phallothremal sclerite not evident."

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is distinguished from the other species of this Group by (1) the bifid upper part of tergum X and (2) the apex of the laterodorsal process of each inferior appendage curved caudad.

**PHYLOGENY:** The phylogenetic relationships among the six species of this Group are unknown. This species, *T. moncho*, and *T. morai* have the same combination of phallic paramere synapomorphies, including two parameres that are subequal and long, and the third paramere that is short. It is inferred that this is an intermediate condition in a transformation series toward three subequal parameres. Strong synapomorphies have not been discovered at this time. Additional study is needed for inferring the phylogenetic relationships.

**DISTRIBUTION:** Panama

**BIOGEOGRAPHIC REGION:** Neotropical region

*Triadenodes (Nototriaena) moncho* Holzenthal and Andersen, 2004

*Triadenodes moncho* Holzenthal and Andersen, 2004; p. 28, figs. 19A-D (male).

DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=1). Forewing length 5.0 mm, hind wing length 3.9 mm. Eye 0.31 mm wide. Antennal scapes 0.34 mm long. Maxillary palp segment lengths (in mm): 0.23, 0.29, 0.34, 021, segment V missing. Forewing pale yellow, denuded.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin nearly straight; pleural region membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with posterior margin rounded, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin strongly sinuate. Preanal appendage setose, at least twice as long as wide, broad basally, apex rounded. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, less than half length of tergum X [lower part of tergum X]; tergum X, in dorsal view, with lateral margins sinuate, narrow apically, apex slightly excavate medially; in lateral view, triangular, tapering to apex, with broad lateral flange, apicolateral margins without microtrichia (or not evident). Inferior appendage rounded basally, heavily setose, especially apically, without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, broad, flat throughout length, apex attenuate, hooklike, with subbasal flange; apicomeral lobe [laterodorsal process] heavily setose, elongate, irregularly elliptical. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres subequal, long, thin, subapically curved, third shorter, straight, very needlelike; phallicata troughlike, straight, narrow throughout length, apex rounded, phallothremal sclerite not evident.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species differs from the other species of this Group in that (1) the base of each inferior appendage is especially heavily sclerotized and setose, (2) the laterodorsal process shape of each inferior appendage is more irregular elliptical, (3) the recurved process of each inferior appendage is broader and distinctly flat, and (4) a pair of parameres is long, thin and subapically curved.

PHYLOGENY: See the discussion for T. hornitos, above.

DISTRIBUTION: Costa Rica.

BIOGEOGRAPHIC REGION: Neotropical region.
**Triaenodes (Nototriaena) morai** Holzenthal and Andersen, 2004

*Triaenodes morai* Holzenthal and Andersen, 2004; p. 29, figs. 20A-D (male).

**TYPE MATERIAL:** Holotype, male: COSTA RICA: Alajuela, Reserva Forestal San Ramón, Río San Lorencito and tributaries, 10°12’58”N, 084°36’25”W, 980 m, 6-10.iii.1991, Holzenthal, Muñoz, and Huisman (UMSP000093728) (UMSP)

**DESCRIPTION** Holzenthal and Andersen (2004): "Adult (male: n=5). Forewing length 5.0–5.5, 5.3 mm, hind wing length 4.0–4.6, 4.3 mm. Eye 0.34–0.37, 0.35 mm wide. Antennal scapes 0.37–0.39, 0.38 mm long. Maxillary palp segment lengths (in mm): 0.19–0.24, 0.21; 0.26–0.32, 0.29; 0.35–0.43, 0.39; 0.16–0.21; 0.35–0.45. Forewing dark golden.”

**MALE GENITALIA** Holzenthal and Andersen (2004): "Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally; pleural region membranous, heavily setose; tergum IX, in dorsal view, with posterior margin rounded, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, at least twice as long as wide, broad basally, apex rounded. Dorsomesal process [upper part] of tergum X spatulate, originating medially, short, about half length of tergum X [lower part of tergum X], with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subparallel, apex excavate medially; in lateral view, triangular, apex rounded, apicolateral margins with microtrichia. Inferior appendage rounded basally, setose, without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, narrow, tapering throughout length, apex sharply attenuate, with subbasal flange; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres subequal, long, curved, tapering, third paramere short, thin; phalicata troughlike, gently curved, narrow throughout length, apex very thin, acute, phalothremal sclerite not evident.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species differs from the other species of this Group as follows: in dorsal view, the lateral margins of the lower part of tergum X are subparallel and the apex is more deeply excavated.

**PHYLOGENY:** See the discussion for *T. hornitos*, above.

**DISTRIBUTION:** Costa Rica.

**BIOGEOGRAPHIC REGION:** Neotropical region.
Triaenodes (Nototriaena) oaxacensis Holzenthal and Andersen, 2004

Triaenodes oaxacensis Holzenthal and Andersen, 2004; p. 30-31, figs. 22A-D (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Oaxaca, 1 mi. NE of Ixtlan de Juarez, 13.viii.1967, O.S. Flint (UMSP000083651) (NMNH).

**DESCRIPTION** Holzenthal and Andersen (2004):
“Adult (male: n=7). Forewing length 7.7–8.3, 8.0 mm, hind wing length 6.1–6.4, 6.3 mm. Eye 0.42–0.47, 0.43 mm wide. Antennal scapes 0.50–0.56, 0.53 mm long. Maxillary palp segment lengths (in mm): 0.32–0.40, 0.35; 0.42–0.47, 0.45; 0.58–0.64, 0.61; 0.27–0.35, 0.31; 0.55–0.60, 0.57. Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region very lightly sclerotized, setose; tergum IX, in dorsal view, with posteromesal margin rounded, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin slightly sinuate. Preanal appendage setose, at least twice as long as wide, broad basally, apex rounded. Dorsomesal process [upper part] of tergum X digitate, originating basally, short, less than half length of tergum X [lower part of tergum X], with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins sinuate, narrowing apically, apex slightly excavate medially, slightly upturned; in lateral view, parallel side, apex rounded, apicolateral margins with microtrichia. Inferior appendage rounded basally, setose, without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, narrow, tapering throughout length, but constricted subapically, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres short, stout, third longer, straight, all heavily striate; phalicata troughlike, strongly curved, widest medially, abruptly tapering apically, apex very thin, acute, phallothremal selerite not evident.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species differs from the other species of this Group by having a pair of short and stout parameres and a long and straight third paramere.

**PHYLOGENY:** This species has two short parameres and a long third paramere. It is inferred that this is an autapomorphic condition from the Group's synapomorphic presence of a short third paramere spine, in which one of the two plesiomorphic paramere spines also is short.
Strong synapomorphies have not been discovered at this time. Additional study is needed for inferring the phylogenetic relationships.

**DISTRIBUTION:** Mexico.

**BIOGEOGRAPHIC REGION:** Neotropical region.

_Triaenodes (Nototriaena) talamancai_ Holzenthal and Andersen, 2004

_Triaenodes talamancai_ Holzenthal and Andersen, 2004; p. 33-34, figs. 25A-D (male).

**TYPE MATERIAL:** Holotype, male: COSTA RICA: Puntarenas, Rio Guineal, ca 1 km (air) E Finca Helechales, 09°04’34”N, 083°05’31”W, 840 m, 4.viii.1987, Holzenthal, Morse, and Clausen (UMSP000027130) (UMSP)

**DESCRIPTION** Holzenthal and Andersen (2004):
“Adult (male: n=1). Forewing length 4.7 mm, hind wing length 3.5 mm. Eye 0.32 mm wide. Antennal scapes 0.29 mm long. Maxillary palp segment lengths (in mm): 0.15, 0.26, 0.27, 0.16, 032. Forewing pale yellow, denuded.”

**MALE GENITALIA** Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin broadly rounded, produced anteroventrally; pleural region very lightly sclerotized, sparsely setose (or not evident); tergum IX, in dorsal view, with posteromesal margin rounded, with pair of minute dorsomesal papillae; sternum IX in lateral view with posterior margin rounded. Preanal appendage setose, about as long as wide, broad basally, apex rounded. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, about half length of tergum X [lower part of tergum X], with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins broadly rounded, apex slightly excavate medially; in lateral view, triangular, apex truncate, slightly upturned, apicolateral margins without microtrichia (or not evident). Inferior appendage rounded basally, setose, without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicomeral lobe [laterodorsal process] heavily setose, elongate, narrow, slightly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres subequal, gently curved, tapering, with microtrichia, third, long, curved, tapering, without microtrichia; phallicata troughlike, gently curved, widest medially, tapering apically, apex with shallow cleft, phalothemal sclerite not evident.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.
**DIAGNOSIS:** This species is distinguished from the other species of this Group by the relatively short preanal appendages, the somewhat long upper part of tergum X, and in dorsal view, the very broadly rounded lower part of tergum X with its apex slightly excavated medially.

**PHYLOGENY:** The males of this species suggest that it is the sister species of *T. tapanti*, having three subequal parameres. Strong synapomorphies have not been discovered at this time. Additional study is needed for inferring the phylogenetic relationships.

**DISTRIBUTION:** Costa Rica.

**BIOGEOGRAPHIC REGION:** Neotropical region.

_Triaenodes (Nototriaena) tapanti_ Holzenthal and Andersen, 2004

_Triaenodes tapanti_ Holzenthal and Andersen, 2004; p. 34-35, figs. 26A-D, 37A-C (male, female).

**TYPE MATERIAL:** Holotype, male: COSTA RICA: Cartago, Reserva Tapanti, unnamed tributaries [Quebrada Palmitos and falls], ca. 9 km (road) NW tunnel, 09°43′12″N, 083°46′48″W, 1400 m, 8-9.vi.1988, C and O Flint and Holzenthal (UMSP000083697) (UMSP)

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=10, female: n=4). Forewing length 5.6–6.5, 5.9 mm (male), 6.1–6.6, 6.3 mm (female), hind wing length 4.3–4.9, 4.6 mm (male), 4.8–4.9, 4.9 mm (female). Eye 0.27–0.34, 0.30 mm wide (male), 0.32–0.34, 0.33 mm wide (female). Antennal scapes 0.31–0.39, 0.36 mm long (male), 0.34–0.40, 0.37 mm long (female). Maxillary palp segment lengths (in mm): 0.19–0.23, 0.22; 0.31–0.35, 0.33; 0.35–0.39, 0.37; 0.21–0.23, 0.21; 0.44–0.45, 0.47 (male); 0.21–0.23, 0.22; 0.35–0.39, 0.37; 0.44–0.47, 0.45; 0.19–0.24, 0.22; 0.45–0.50, 0.49 (female). Forewing dark golden.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin broadly rounded, produced anteroventrally; pleural region very lightly sclerotized, heavily setose; tergum IX, in dorsal view, with posteromesal margin rounded, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin rounded. Preanal appendage setose, shorter than wide, broad basally, apex rounded. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, about half length of tergum X [lower part of tergum X], with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins sinuate, narrowing apically; in lateral view, narrowly triangular, apex acute, strongly upturned, apicolateral margins with microtrichia. Inferior appendage rounded basally, setose, without apicoventral projection [distal part blunt in lateral view]; recurved process gradually downturned, narrow, tapering throughout length, but broadest medially,
apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with three parameres, two parameres subequal, long, straight, tapering, third straight, very slender; phalicata troughlike, strongly curved, narrow throughout length, apex rounded, irregularly serrate, phallothremal sclerite not evident.”

**FEMALE:** A description and illustrations were provided by Holzenthal and Andersen (2004).

**IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Apparently this is the only species of this Group for which the male has a strongly upturned and acute apex of the lower part of tergum X.

**PHYLOGENY:** Three subequal parameres in the males of this species suggest that it is the sister species of *T. talamanca*.

**DISTRIBUTION:** Costa Rica.

**BIOGEOGRAPHIC REGION:** Neotropical region.

*Triaenodes* (*Nototriaena*) *guadaloupe* Group

The *T. (Nototriaena) guadaloupe* Group has one species. The autapomorphy is that (25) the phallus has only one paramere (Holzenthal and Andersen, 2004, fig. 14D) instead two or three parameres. An additional diagnostic character is that the distal part of each inferior appendage is blunt in lateral view.

*Triaenodes* (*Nototriaena*) *guadaloupe* Holzenthal and Andersen, 2004

*Triaenodes guadaloupe* Holzenthal and Andersen, 2004; p. 24, figs. 14A-D (male).

**TYPE MATERIAL:** Holotype, male: PANAMA: Chiriquí, Guadalupe Arriba, 08°52’26”N, 082°33’13”W, 19-25.vi.1985, H Wolda (UMSP000027216) (NMNH).
DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=1). Forewing length 7.4 mm, hind wing length 5.4 mm. Eye 0.38
mm wide. Antennal scapes 0.38 mm long. Maxillary palp segment lengths (in
mm): 0.26, 0.35, 0.50, 0.27, 0.65. Forewing pale yellow, denuded.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin nearly straight; pleural region
membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with
posteromesal margin rounded, dorsomesal papillae not evident; sternum IX in
lateral view with posterior margin slightly sinuate. Preanal appendage setose,
shorter than wide, broad basally, apex rounded. Dorsomesal process [upper part]
of tergum X spatulate, originating medially, short, extending to apex of tergum
X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral
margins sinuate, apex slightly excavate medially; in lateral view, parallel sided,
apex truncate, apicolateral margins without microtrichia (or not evident). Inferior
appendage rounded basally, setose, with sharp apicolateral flange, without
apicoventral projection [distal part blunt in lateral view]; recurved process
abruptly downturned subapically, narrow, tapering throughout length, apex
sharply attenuate, with subbasal flange; apicoventral lobe [laterodorsal process]
heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular,
endothecal membranes prominent, highly convoluted, with single, curved
paramere; phallicata troughlike, strongly curved, narrow throughout length, apex
with very slight eleft, phallothremal sclerite not evident.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species has a spatulate upper part of tergum X and one paramere.

PHYLOGENY: The synapomorphy is indicated above.

DISTRIBUTION: Panama.

BIOGEOGRAPHIC REGION: Neotropical region.

T. (Nototriaena) anomalala Group and T. (Nototriaena) clauseni Group

The T. (Nototriaena) anomalala and T. (Nototriaena) clauseni Groups share the following
synapomorphies: (26) the distal part of each inferior appendage is tapered (Holzenthal and
Andersen, 2004, figs. 6A, 9A) and (27) the preanal appendages have basoventral angles
(Holzenthal and Andersen, 2004, figs. 18B, 27B).

Triaenodes (Nototriaena) anomalala Group
The *T. (Nototriaena) anomal*a Group includes eight species. Their synapomorphy is having (28) the distal part of each inferior appendage very long (Holzenthal and Andersen, 2004, fig. 7A). In this Group, *T. acantha, T. anomal*a, *T. tuxtlensis, T. flintorum*, and *T. mexicana* share the synapomorphy that (30) the apex of the phallus has a deep cleft (Holzenthal and Andersen 2004, figs. 6F, 18E). Also, *T. flintorum* and *T. mexicana* both share (31) the more heavily sclerotized apices of their parameres than the other three species (Holzenthal and Andersen 2004, figs. 13D, 18D).

*Triaenodes (Nototriaena) flintorum* Holzenthal and Andersen, 2004

*Triaenodes flintorum* Holzenthal and Andersen, 2004; p. 23, figs. 13A-E (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Oaxaca: 8 km S Valle Nacional, 29.v.1981, C and O Flint (UMSP000083658) (NMNH).

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=1). Forewing length 5.9 mm, hind wing length 4.8 mm. Eye 0.42 mm wide. Antennal scapes 0.45 mm long. Maxillary palp segment lengths (in mm): 0.26, 0.39, 0.45, 0.23, 0.55. Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin nearly straight produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin truncate, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, extending to apex of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex slightly excavate medially; in lateral view, triangular, apex rounded, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadangular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex sharply attenuate; apicominal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, straight, tapering, apices more heavily sclerotized; phallicata troughlike, straight, narrow throughout length, apex cleft, phallothremal sclerite small, u-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.
**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is closely related to *T. mexicana* in sharing heavily sclerotized apices of its parameres. It differs in that the males of this species have a slightly excavated apex of the lower part of tergum X, while the males of *T. mexicana* have a rounded apex.

**PHYLOGENY:** The sister species of this species is *T. mexicana*. The synapomorphy is indicated above.

**DISTRIBUTION:** Mexico.

**BIOGEOGRAPHIC REGION:** Neotropical region.

*Triaenodes (Nototriaena) mexicana* Holzenthal and Andersen, 2004

*Triaenodes mexicana* Holzenthal and Andersen, 2004; p. 27-28, figs. 18A-E (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Morélos, Cuernavava, vi.1911, Godman and Salvin (UMSP000083660) (NMNH)

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=1). Forewing length 7.3 mm, hind wing length 6.5 mm. Head missing. Forewing light golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally; pleural region membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with posteromesal margin indistinct, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, about half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subparallel, apex rounded; in lateral view, parallel sided, apex rounded, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicomemal lobe [laterodorsal process] heavily setose, elongate, narrow, angularly broadened medially. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres short, stout, apices more heavily sclerotized; phalicata troughlike, straight,
narrow throughout length, apex with deep, wide cleft, phallothremal sclerite small, u-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** As discussed above, this species is very close to *T. flintorum*. Also, this species differs from the other species of this Group by the lateral margins of the lower part of tergum X being subparallel in dorsal view (Holzenthal and Andersen 2004, fig. 18B).

**PHYLOGENY:** This species is the sister species of *T. flintorum*. The synapomorphy is indicated above.

**DISTRIBUTION:** Mexico.

**BIOGEOGRAPHIC REGION:** Neotropical region.

*Triaenodes (Nototriaena) acantha* Holzenthal and Andersen, 2004

*Triaenodes acanthurus* Holzenthal and Andersen, 2004; p. 15, figs. 6A-G (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Vera cruz, Rio Jamapa, 6 km, N Coscomatepec, 29.v.1981, C and O Flint – 1 male (UMSP000067429) (NMNH)

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=2). Forewing length 6.1–6.6 mm, hind wing length 4.9–5.1 mm. Eye 0.39-0.41 mm wide. Antennal scapes 0.42–0.45 mm long. Maxillary palp segment lengths (in mm): 0.26–0.31, 0.38–0.39, 0.53–0.56, 0.23, 0.52. Forewing light brown, denuded.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin indistinct, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, short, about half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex slightly excavate subapicoventrally, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process gradually downturned, broad along basal 2/3, with subapicoventral projection, apex sharply attenuate; apicomflexal lobe [laterodorsal process] heavily setose, elongate, elliptical. Phallobase small, triangular,
endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, straight, tapering, with longitudinal striae and subapical denticle; phalicata troughlike, straight, narrow throughout length, apex deep, wide cleft, phallothremal sclerite large, u-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** According to Holzenthal and Anderson (2004), the species epithet is "from akantha the Greek word for thorn or prickle, referring to the sharp thornlike apicoventral projection on the recurved process of the inferior appendage." The Greek work akantha (latinized acantha) is a feminine noun in apposition and thus "need not agree in gender with the generic names with which it is combined." However, Holzenthal and Anderson (2004) changed the gender to masculine (in compliance with the opinion of Fischer, 1965, p. iii and 76-107), treating the word as though it is an adjective. Following that precedent, the adjectival gender ending is here changed to feminine in conformance with the opinion expressed above ("BACKGROUND OF THE TRIAENODES SPECIES ").

**DIAGNOSIS:** This species differs from the other species of this Group by having a subapicoventral projection on the recurved process of each inferior appendage in lateral view.

**PHYLOGENY:** No male adult morphological synapomorphies were found to indicate the sister species of this species. Additional study is needed for inferring the phylogenetic relationships.

**DISTRIBUTION:** Mexico.

**BIOGEOGRAPHIC REGION:** Neotropical region.

Triaenodes (Nototriaena) anomala Flint, 1967

*Triaenodes anomala* Flint, 1967; p. 16-17, fig. 71 (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Guerrero, near Chilpancingo, route 95, km 297, July15-16, 1965, Flint and Ortiz (NMNH).
DESCRIPTION Holzenthal and Andersen (2004): “Adult (male: n=6, female: n=1, palps broken). Forewing length 6.4–6.6 mm, hind wing length 5.1–5.5, 5.2 mm (male); female wings lost. Eye 0.34–0.42, 0.39 mm wide (male), 0.36 mm wide (female). Antennal scapes 0.42–0.49, 0.45 mm long (male), 0.46 mm long (female). Maxillary palp segment lengths (in mm): 0.32–0.34, 0.33; 0.4–0.47, 0.43; 0.52–0.55, 0.53; 0.31–0.32, 0.53–0.56 (male). Forewing light brown, denuded.”

MALE GENITALIA Holzenthal and Andersen (2004, p. 16-17, figs. 7A-D): “Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally; pleural region membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with posteromesal margin indistinct, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating medially, long, extending beyond apex of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subparallel, apex excavate medially; in lateral view, parallel sided, apex rounded, slightly excavate subapicodorsally, with lateral flange, apicoventral margin with microtrichia. Inferior appendage subquadranular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process abruptly downturned medially, narrow, tapering throughout length, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, angularly broadened medially. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved, tapering; phalicata troughlike, strongly curved, narrow throughout length, apex with deep, narrow cleft, phallothremal sclerite not evident.”

FEMALE: A description and illustrations were provided by Holzenthal and Andersen (2004).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: According to Holzenthal and Andersen (2004), this species differs from the other species in possessing bifid apicoventral projections on the apex of the phallicata.

PHYLOGENY: This species and *T. tuxtlensis* have a deep, narrow cleft at the apex of the phallus. It is inferred that this is an intermediate condition in a transformation series toward the deep, wide cleft at the apex of the phallus of *T. flintorum* and *T. mexicana*. These four species may be a monophyletic group.

DISTRIBUTION: Mexico.

BIOGEOGRAPHIC REGION: Neotropical region.
Triaenodes (Nototriaena) tuxtlensis Holzenthal and Andersen, 2004

Triaenodes tuxtlensis Holzenthal and Andersen, 2004; p. 37-38, figs. 28A-D (male).

**TYPE MATERIAL:** Holotype, male: MEXICO: Veracruz, Los Tuxtlas Biological Station, Los Tuxtlas area, Rio Palma, above La Palma, 7-14.v.1981, C and O Flint (UMSP000083659) (NMNH).

**DESCRIPTION** Holzenthal and Andersen (2004):
“Adult (male: n=1). Forewing length 5.8 mm, hind wing length 4.7 mm. Eye 0.42 mm wide. Antennal scapes 0.48 mm long. Maxillary palp segment lengths (in mm): 0.24, 0.34, 0.47, 0.23, 0.50. Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded slightly produced anteroventrally; pleural region membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with posteromesal margin indistinct, with pair of slender dorsomesal papillae; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating medially, long, extending beyond apex of tergum X, with apical setae, basoventral margin with minute spines; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex slightly excavate medially; in lateral view, parallel sided, apex rounded, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicominal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, straight, tapering, both bifid almost to base; phallicata troughlike, gently curved, narrow throughout length, apex cleft, phallothremal sclerite small, U-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species differs from those of the other species in the bifid parameres which are deeply divided to the base and the minute spines on the basoventral margin of the upper part of tergum X.

**PHYLOGENY:** The phylogenetic relationships of this species with *T. anomola* Group species were discussed above.

**DISTRIBUTION:** Mexico.
**BIOGEOGRAPHIC REGION:** Neotropical region.

*T. (Nototriaena) anomala* Group Species *incertae sedis*

*T. (Nototriaena) anomala* Group species *incertae sedis* include *T. abrupta*, *T. chirripo*, and *T. cuyotenoango*, for which phylogenetic relationships need further investigation.

*Triadenodes (Nototriaena) abrupta* Flint, 1991

Fig. 3.1

*Triadenodes abrupta* Flint, 1991; p. 96, fig. 363 (male).

**TYPE MATERIAL:** Holotype, male: COLOMBIA: Antioquia Quebrada La Ayura Mun. Envigado, 1750 m, 13 July 1983, U. Matthias, trap B (in alcohol), O.S. Flint Jr. (Type Number 104570, U.S.N.M.) (NMNH).

**DESCRIPTION:** Head and thorax yellowish brown; antennal scapes long with blackish annulations in their basal parts and without scent-organs, antennae longer than body length. Forewings and hind wings yellow, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin broadly rounded ventrally, tergum IX without dorsomesal papillae, sternum IX projecting caudad with tall posterior margin sinuate in lateral view. Upper part of tergum X erect, conical, apically setose; dorsal margin of lower part of tergum X transversely indented at midlength, apex pointed in lateral view, broadly rounded and slightly notched in dorsal view. Preanal appendages setose, short, about as long as broad in lateral view; inferior appendages basally subtriangular, each with distal part long, tapering, bent slightly dorsad in lateral view and slightly mesad in ventral view, laterodorsal process prominent, heavily setose, elongate, narrow, apex rounded; recurved processes bent ventrad, apex pointed. Phallus (“phalicata” of Holzenthal and Anderson, 2004) with broad, truncate mesal portion ventrally bent with pair of subequal parameres long, tapering, phallothremal sclerite not evident.
**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.2 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species differs from the other species of this Group by the erect, conical upper part of tergum X.

**PHYLOGENY:** *Triaenodes abrupta* clearly belongs in the *T. anomala* Group, but no synapomorphies were found to suggest a sister group relationship with any of the Group’s other species.

**DISTRIBUTION:** Colombia.

**BIOGEOGRAPHIC REGION:** Neotropical region.

_Triaenodes (Nototriaena) chirripo_ Holzenthal and Andersen, 2004

*Triaenodes chirripo* Holzenthal and Andersen, 2004; p. 17-18, figs. 8A-D, 31A-C (male, female).

**TYPE MATERIAL:** Holotype, male: COSTA RICA: Cartago, Quebrada Platanillo, ca. 5 km E Moravia de Chirripó, 09°49'16"N, 083°24'25"W, 1130 m, 6.viii.1987, Holzenthal, Morse and Clausen (UMSP000083712) (UMSP).

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=1, female: n=1). Forewing length 6.5 mm (male), 6.4 mm (female), hind wing length 5.1 mm (male), 5.0 mm (female). Eye 0.42 mm wide (male), 0.43 mm wide (female). Antennal scapes 0.43 mm long (male), 0.42 mm long (female). Maxillary palp segment lengths (in mm): 0.23, 0.37, 0.50, 0.27, 0.55 (male); female palps broken. Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin triangular, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X bifid, originating basally, short, less than half length of tergum X, with apical setae on papillate processes; tergum X [lower part of tergum], in dorsal view, with lateral margins subparallel, apex strongly excvate medially; in lateral view, parallel sided, apex attenuate, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose,
with long, tapering, apicoventral projection [distal part]; recurved process abruptly downturned subapically, narrow, tapering throughout length, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, slightly angularly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved, tapering, with microtrichia along length; phallicata troughlike, straight, widest subapically, abruptly tapering apically, apex with shallow cleft, phallothremal sclerite not evident."

FEMALE: A description and illustrations were provided by Holzenthal and Andersen (2004).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species differs from the other species of this Group by having a bifid upper part of tergum X, apical setae of the upper part of tergum X appearing on papillate processes, and the apex of the lower part of tergum X strongly excavated medially.

PHYLOGENY: *Triaenodes chirripo* clearly belongs in the *T. anomala* Group, but no synapomorphies were found to suggest a sister group relationship with any of the Group’s other species.

DISTRIBUTION: Costa Rica.

BIOGEOGRAPHIC REGION: Neotropical region.

*Triaenodes (Nototriaena) cuyotenango* Holzenthal and Andersen, 2004

*Triaenodes cuyotenango* Holzenthal and Andersen, 2004; p. 19-20, figs. 10A-D (male).


DESCRIPTION Holzenthal and Andersen (2004):

“Adult (male: n=2). Forewing length 5.6–6.3 mm, hind wing length 4.8–5.2 mm. Eye 0.42–0.43 mm wide. Antennal scapes 0.46–0.47 mm long. Maxillary palp segment lengths (in mm): 0.26–0.32, 0.35–0.39, 0.51–0.52, 0.27–0.29, 0.48–0.53. Forewing golden brown, with narrow lone of cream colored hairs along anal margin.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin rounded, with pair of minute dorsomesal papillae; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, extending beyond apex of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex slightly excavate medially; in lateral view, parallel sided, apex attenuate, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadruangular basally, setose, with long, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex sharply attenuate; apicomeral lobe [laterodorsal process] heavily setose, elongate, narrow, slightly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved, tapering; phalicata troughlike, straight, narrow throughout length, apex with shallow cleft, phallothremal sclerite not evident.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species differs from the other species of this Group by having the very long upper part of tergum X exceeding the length of the lower part, while the upper part of tergum X of the other species of this Group is shorter than the lower part.

**PHYLOGENY:** *Triaenodes cuyotenango* clearly belongs in the *T. anomala* Group, but no synapomorphies were found to suggest a sister group relationship with any of the Group’s other species.

**DISTRIBUTION:** Guatemala.

**BIOGEOGRAPHIC REGION:** Neotropical region.

* Triaenodes (Nototriaena) clauseni Group

The *T. (Nototriaena) clauseni* Group include two species. A synapomorphy is that (29) the preanal appendages have a basoventral projection (Holzenthal and Andersen, 2004, figs. 9B, 27B). With only two species in this Group, the phylogenetic relationship is clear: *T. clauseni* and
T. tico are sister species. A diagnostic character for the Group is that the distal part of each inferior appendage is short.

_Triaenodes (Nototriaena) clauseni_ Holzenthal and Andersen, 2004

_Triaenodes clauseni_ Holzenthal and Andersen, 2004; p. 18-19, figs. 9A-D, 32A (male, female).

**TYPE MATERIAL:** Holotype, male: COSTA RICA: Alajuela, Cerro Campana, Río Bochinche tributary, 6 km (air) NW Dos Rios, 10°56'42"N, 085°24'47"E, 600 m, 22-23.vii.1987, Holzenthal, Morse and Clausen (UMSP000083714) (UMSP)

**DESCRIPTION** Holzenthal and Andersen (2004):
“Adult (male: n=7, female: n=2). Forewing length 5.0–5.8, 5.4 mm (male), 5.7–6.2 mm (female), hind wing length 4.2–4.8, 4.5 mm (male), 4.8–5.0 mm (female). Eye 0.35–0.40, 0.38 mm wide (male), 0.37–0.41 mm wide (female). Antennal scapes 0.44–0.48, 0.46 mm long (male), 0.41–0.42 mm long (female). Maxillary palp segment lengths (in mm): 0.26–0.31, 0.28; 0.37–0.42, 0.39; 0.44–0.52, 0.48; 0.24–0.31, 0.27; 0.53–0.58, 0.56 (male); 0.31–0.33; 0.36–0.39, 0.49–0.54, segments IV and V missing (female). Forewing golden brown.”

**MALE GENITALIA** Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded; slightly produced anteroventrally; pleural region very lightly sclerotized; tergum IX, in dorsal view, with posteromesal margin rounded, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin slightly sinuate. Preanal appendage setose, at least twice as long as wide, broad basally, apex subacute. Dorsomesal process [upper part] of tergum X bifid, originating medially, short, less than half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex strongly excavate medially; in lateral view, parallel sided, apex rounded, slightly excavate subapicodorsally, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with short, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, but constricted subapically, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved; phalicata troughlike, straight, widest medially, tapering apically, apex rounded, phallothremal sclerite not evident.”

**FEMALE:** A description and illustrations were provided by Holzenthal and Andersen (2004).

**IMMATURE STAGES:** Unknown.
MATERIAL EXAMINED: None.

DIAGNOSIS: This species is very similar to *T. tico*, but it differs from it in that the upper part of tergum X is bifid and the apex of the lower part of tergum X is strongly excavated medially.

PHYLOGENY: The sister species of this species is *T. tico*, as explained above.

DISTRIBUTION: Costa Rica.

BIOGEOGRAPHIC REGION: Neotropical region.

*Triaenodes (Nototriaena) tico* Holzenthal and Andersen, 2004

*Triaenodes tico* Holzenthal and Andersen, 2004; p. 35-37, figs. 1-2, 27, 38 (male, female).

TYPE MATERIAL: Holotype, male: COSTA RICA: San José, Río Parrita Chiquito, rt 12, 6.5 km SW jct. rt. 2, 09°42’11”N, 083°58’12”W, 1990 m, 10.iv.1987, Holzenthal, Hamilton and Heyn (UMSP000083677) (UMSP).

DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=10, female: n=6). Forewing length 7.1–7.8, 7.4 mm (male), 7.4–7.9 mm (female), hind wing length 5.5–6.2, 5.9 mm (male), 6.1–6.6, 6.4 mm (female). Eye 0.42–0.47, 0.44 mm wide (male), 0.37–0.42, 0.40 mm wide (female). Antennal scapes 0.52–0.56, 0.54 mm long (male), 0.50–0.55, 0.53 mm long (female). Maxillary palp segment lengths (in mm): 0.26–0.34, 0.30; 0.40–0.47, 0.43; 0.56–0.66, 0.61; 0.29–0.37, 0.32; 0.58–0.63, 0.60 (male); 0.31–0.43, 0.35; 0.45–0.53, 0.48; 0.61–0.77, 0.68; 0.34–0.40, 0.36; 0.56–0.74, 0.65 (female), Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded; produced anteroventrally; pleural region very lightly sclerotized; tergum IX, in dorsal view, with posteromesal margin produced into digitate lobe, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin slightly sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, about half length of tergum X, with apical setae, process directed dorsad; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex strongly excavate medially; in lateral view, parallel sided, apex truncate, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with tapering apexventral projection [short distal part]; recurved process gradually downturned, narrow, tapering throughout length, but constricted subapically, apex attenuate; apicomesimal lobe [laterodorsal
process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved; phalicata troughlike, gently curved, widest medially, tapering apically, apex acute, phallothremal sclerite not evident.”

FEMALE: A description and illustrations were provided by Holzenthal and Andersen (2004).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species is very close to T. clauseni, but it differs from in that the upper part of tergum X is digitate and the basoventral projection of each preanal appendage is much more acute and longer than that of T. clauseni.

PHYLOGENY: The sister species of this species is T. clauseni, with a synapomorphy indicated above.

DISTRIBUTION: Costa Rica.

BIOGEOGRAPHIC REGION: Neotropical region.

_Triaenodes (Nototriaena) Species Incertae sedis_

_Triaenodes (Nototriaena) delicata_ Navás, 1924

_Triaenodes delicata_ Navás, 1924; p. 84-85, fig. 21 (male).


DESCRIPTION Holzenthal and Andersen (2004):

“Adult (male: n=10, female: n=10). Forewing length 4.6–5.3, 5.0 mm (male), 4.8–6.9, 6.2 mm (female), hind wing length 3.7–4.3, 4.0 mm (male), 4.1–5.3, 4.5 mm (female). Eye 0.35–0.40, 0.37 mm wide (male), 0.39–0.44, 0.41 mm wide (female). Antennal scapes 0.37–0.42, 0.40 mm long (male), 0.37–0.47, 0.44 mm long (female). Maxillary palp segment lengths (in mm): 0.26–0.32, 0.29; 0.32–0.39, 0.35; 0.39–0.47, 0.43; 0.21–0.26, 0.25; 0.39–0.47, 0.42 (male); 0.31–0.36, 0.34; 0.35–0.44, 0.40; 0.46–0.53, 0.48; 0.24–0.32, 0.28; 0.48–0.57, 0.55
(female). Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

**MALE GENITALIA** Holzenthal and Andersen (2004, p. 20, figs. 11A-C):

“Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin rounded, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, about half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex variable, truncate with slight excavation or mesal point to acute or slightly rounded; apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with tapering apicoventral projection [short distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicomemal lobe [laterodorsal process] heavily setose, elongate, narrow, slightly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, curved, tapering; with small medial denticle; phalicata troughlike, gently curved, narrow throughout length, apex acute, phallothremal sclerite not evident.”

**FEMALE:** A description and illustrations were provided by Holzenthal and Andersen (2004).

**IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species closely resembles *T. peruana*, but it differs from it by the overall shape of the lower part of tergum X, which is rounded apically and broader basally in this species.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Nototriaena* is unknown.

**DISTRIBUTION:** Costa Rica.

**BIOGEOGRAPHIC REGION:** Neotropical region.

_Triaenodes (Nototriaena) hodgesi_ Holzenthal and Andersen, 2004

_Triaenodes hodgesi_ Holzenthal and Andersen, 2004; p. 24-25, figs. 15A-C, 34A-C (male, female).

DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=2, female: n=2). Fore wing length 4.7–5.5 mm (male), 6.2–6.5 mm (female), hind wing length 3.9–4.8 mm (male), 5.1–5.4 mm (female). Eye 0.41–0.45 mm wide (male), 0.42–0.44 mm wide (female). Antennal scapes 0.39–0.44 mm long (male), 0.47–0.49 mm long (female). Maxillary palp segment lengths (in mm): 0.25–0.28, 0.30–0.33, 0.47–0.52, 0.23, 0.50 (male); 0.28–0.31, 0.38–0.40, 0.51–0.53, 0.29–0.32, 0.53–0.56 (female). Forewing light pale yellow, denuded.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin indistinct, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, short, less than half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex slightly excavate medially; in lateral view, triangular, tapering to apex, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with short, tapering, apiocoventral projection [distal part]; recurved process abruptly downturned, subapically, narrow, tapering throughout length, but constricted subapically, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, angularly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, straight, tapering; phalicata troughlike, gently curved, narrow throughout length, apex mucronate, phallothremal sclerite not evident.”

FEMALE: A description and illustrations were provided by Holzenthal and Andersen (2004).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species is quite similar to T. peruana in overall appearance. However, the males of this species can be separated from those of T. peruana by having a very shallowly excavated apex of the lower part of tergum X and a more angularly broadened subbasal portion of the laterodorsal process of each inferior appendage.

PHYLOGENY: The phylogeny of this species in the subgenus Nototriaena is unknown.

DISTRIBUTION: Ecuador.
**BIOGEOGRAPHIC REGION:** Neotropical region.

_Triaenodes (Nototriaena) kilambe_ Holzenthal and Andersen, 2004

_Triaenodes kilambe_ Holzenthal and Andersen, 2004; p. 26-27, figs. 17A-D (male).

**TYPE MATERIAL:** Holotype, male: NICARGUA: Jinotega, Cerro Kilambé, 13°34'00”N, 085°43'00”W, 1520 m, vii.1997, Maes and Hernández (UMSP000027123) (UMSP).

**DESCRIPTION** Holzenthal and Andersen (2004):

“Adult (male: n=2). Forewing length 6.1 mm, hind wing length 4.8–4.9 mm. Eye 0.34–0.39 mm wide. Antennal scapes 0.39–0.43 mm long. Maxillary palp broken. Forewing yellow, denuded.”

**MALE GENITALIA** Holzenthal and Andersen (2004):

“Abdominal segment IX anterior margin slightly rounded, produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin truncate, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin slightly sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X completely divided, originating basally, short, less than half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex strongly excavate medially; in lateral view, triangular, tapering to apex, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with short, tapering, apicoventral projection [distal part]; recurved process gradually downturned, narrow, tapering throughout length, but constricted subapically, apex sharply attenuate; apicomeral lobe [laterodorsal process] heavily setose, elongate, narrow, slightly broadened subbasally. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved, tapering, apices slightly bent; phallicate troughlike, gently curved, narrow throughout length, apex cleft, phallothremal sclerite small, u-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Males of _T. chirripo_ of the _T. anomala_ Group and of _T. clauseni_ of the _T. clauseni_ Group also have a bifid upper part of tergum X. Among these, this is the only species in which the upper part of tergum X is completely divided to its base.

**PHYLOGENY:** The phylogeny of this species in the subgenus Nototriaena is unknown.

**DISTRIBUTION:** Nicaragua.
**BIOGEOGRAPHIC REGION:** Neotropical region.

*Triaenodes (Nototriaena) nicaraguensis* Holzenthal and Andersen, 2004

*Triaenodes nicaraguensis* Holzenthal and Andersen, 2004; p. 29-30, figs. 21A-D (male).

**TYPE MATERIAL:** Holotype, male: NICARAGUA: Matagalpa, 50 km E Matagalpa, El Coyolar, 85°50′00″N, 013°07′00″W, 15.v.1991, S Hue (UMSP000027133) (NMNH).

**DESCRIPTION** Holzenthal and Andersen (2004):
“Adult (male: n=3). Forewing length 4.9–5.0 mm, hind wing length 3.9–4.0 mm. Eye 0.39–0.42 mm wide. Antennal scapes 0.37–0.40 mm long. Maxillary palp segment lengths (in mm): 0.25-0.27, 0.32-0.34, 0.43-0.45, 0.24–0.26, 0.48–0.52. Forewing pale yellow, denuded.”

**MALE GENITALIA** Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin indistinct, dorsomesal papillae not evident; sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, long, extending beyond apex of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subapartale; in lateral view, narrowly triangular, apex acute, upturned, apicolateral margins with microtrichia. Inferior appendage subquadangular basally, setose, with short, tapering, apicoventral projection [distal part]; recurved process abruptly downturned subapically, broad along basal 2/3, apex sharply attenuate; apicesmesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, long, gently curved, tapering, with small subapical denticles; phalicata troughlike, gently curved, narrow throughout length, apex acute, phallothremal sclerite not evident.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Like those of *T. tajo*, and *T. woldai*, the male of this species has an upturned lower part of tergum X. However, it differs considerably from those two by the overall shape of the lower part of tergum X and by having the longest upper part of tergum X among above these three species.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Nototriaena* is unknown.
**DISTRIBUTION:** Nicaragua.

**BIOGEOGRAPHIC REGION:** Neotropical region

*Triaenodes (Nototriaena) peruana* Flint and Reyes, 1991

Fig. 3.2

*Triaenodes peruanus* Flint and Reyes, 1991; p. 488, figs. 44-46 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly convex in lateral view, tergum IX with pair of minute dorsomesal papillae, sternum IX with posterior margin projecting caudad and slightly sinuate. Upper part of tergum X digitate, about one-third as long as lower part of tergum X, apically setose; apex of lower part of tergum X sclerotized, slightly incised apically and concave subapically in dorsal view. Preanal appendages short, projecting caudad, apical margin slightly bilobate in later view. Inferior appendages subrectangular basally in lateral view, each with distal part short, tapering, bent slightly dorsad in lateral view; laterodorsal process elongate, broad and apically blunt in lateral view, curved mesad and acute in ventral view; recurved process abruptly downturned in middle, tapering to sharp apex. Phallicata bent gradually ventrad; pair of parameres subequal, long, gently curved, each with small subapical denticle; phallothremal sclerite not evident.

**FEMALE:** A description and illustrations were provided by Holzenthal and Anderson (2004).

**IMMATURE STAGES:** Unknown.
LENGTH OF FOREWING: Male, 4.2-5.1 mm

MATERIAL EXAMINED: Holotype, male.

DIAGNOSIS: The male of this species closely resembles that of T. delicata, but it differs by having a more rounded apex of the lower part of tergum X.

PHYLOGENY: The phylogeny of this species in the subgenus Nototriaena is unknown.

DISTRIBUTION: Peru.

BIOGEOGRAPHIC REGION: Neotropical region.

_Triaenodes (Nototriaena) tajo_ Holzenthal and Andersen, 2004

_Triaenodes tajo_ Holzenthal and Andersen, 2004; p. 32-33, figs. 24A-D, 36A-C (male, female).


DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=6, female: n=3). Fore wing length 5.7–6.5, 6.0 mm (male), 6.7–7.1 mm (female), hind wing length 4.5–5.3, 4.9 mm (male), 5.4–5.7 mm (female). Eye 0.40–0.42, 0.41 mm wide (male), 0.40–0.43 mm wide (female). Antennal scapes 0.42–0.47, 0.45 mm long (male), 0.43–0.47 mm long (female). Maxillary palp segment lengths (in mm): 0.23–0.27, 0.24; 0.32–0.38, 0.35; 0.40–0.48, 0.43; 0.21–0.24, 0.22; 0.39–0.47, 0.43 (male); 0.27–0.29, 0.42–0.45, 0.50–0.53, 0.24–0.27, 0.55–0.58 (female). Forewing golden brown, with narrow line of cream colored hairs along anal margin.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin slightly rounded; pleural region membranous, setose; tergum IX, in dorsal view, with posteromesal margin indistinct, with pair of small dorsomesal papillae; sternum IX in lateral view with posterior margin slightly sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X digitate, originating basally, short, less than half length of tergum X, with apical setae; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular, apex rounded; in lateral view, triangular, apex acute, slightly upturned, with broad lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadrangular basally, setose, with tapering, apicoventral projection [short distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicomeral lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair
of parameres, parameres subequal, long, straight, tapering; phalicata troughlike, straight, narrow throughout length, apex mucronate, phallothremal sclerite not evident.”

FEMALE: A description and illustrations were provided by Holzenthal and Anderson (2004).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: Like those of T. nicaraguensis, and T. woldai; the males of this species has an upturned lower part of tergum X. However, it differs by having, in dorsal view, a broader lateral margin of the lower part of tergum X and by the fact that the upper part of tergum X of this species is less than half as long as the lower part of tergum X; the lower part of tergum X of T. nicaraguensis is more than half as long as the upper part of tergum X; the upper part of tergum X of T. woldai is a very small projection.

PHYLOGENY: The phylogeny of this species in the subgenus Nototriaena is unknown.

DISTRIBUTION: Costa Rica.

BIOGEOGRAPHIC REGION: Neotropical region.

_Triaenodes (Nototriaena) woldai_ Holzenthal and Andersen, 2004

_Triaenodes woldai_ Holzenthal and Andersen, 2004; p. 38, figs. 29A-E (male).

TYPE MATERIAL: Holotype, male: PANAMA: Bocas del Toro, Miranar, 09º00’00”N, 082°15’00”W, 26.xii.1979 – 1.i.1980, H.Wolda (UMSP000027136) (NMNH).

DESCRIPTION Holzenthal and Andersen (2004):
“Adult (male: n=6). Forewing length 4.3–5.3, 4.8 mm, hind wing length 3.3–4.2, 3.7 mm. Eye 0.35–0.37, 0.36 mm wide. Antennal scapes 0.37–0.42, 0.39 mm long. Maxillary palp segment lengths (in mm): 0.24–0.29, 0.26; 0.26–0.35, 0.31; 0.32–0.42, 0.37; 0.18–0.21, 0.19; 0.35–0.39, 0.37. Forewing pale yellow, denuded.”

MALE GENITALIA Holzenthal and Andersen (2004):
“Abdominal segment IX anterior margin nearly straight; pleural region membranous, sparsely setose (or not evident); tergum IX, in dorsal view, with posteromesal margin indistinct, with pair of bulbous dorsomesal papillae;
sternum IX in lateral view with posterior margin sinuate. Preanal appendage setose, about as long as wide, constricted basally, apex subacute. Dorsomesal process [upper part] of tergum X a small setose medial protuberance; tergum X [lower part of tergum], in dorsal view, with lateral margins subtriangular; in lateral view, narrowly triangular, apex acute, upturned, with lateral flange, apicolateral margins with microtrichia. Inferior appendage subquadangular basally, setose, with tapering, apicoventral projection [short distal part]; recurved process gradually downturned, narrow, tapering throughout length, apex attenuate; apicomesal lobe [laterodorsal process] heavily setose, elongate, narrow, parallel sided. Phallobase small, triangular, endothecal membranes prominent, highly convoluted, with pair of parameres, parameres subequal, one long, curved, tapering second shorter, gently curved, tapering, both with microtrichia; phalicata troughlike, gently curved, narrow throughout length, apex acute, irregularly serrate, phallothremal sclerite small, u-shaped.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: As discussed above, the males of this species, T. nicaraguensis, and T. tajo have an upturned lower part of tergum X. However, the male of this species differs from those of the other two species by having a more strongly upturned lower part of tergum X than the other two species.

PHYLOGENY: The phylogeny of this species in the subgenus Nototriaena is unknown.

DISTRIBUTION: Panama.

BIOGEOGRAPHIC REGION: Neotropical region.
CHAPTER V
SUBGENUS NEOTRIAENA, NEW SUBGENUS

Type species: *Triaenodes virgula* Neboiss and Wells, 1998.

There are eighteen species of this subgenus endemic to the Australasian region. Neboiss and Wells (1998) reviewed the Australian *Triaenodes* species, placing them in one species group divided into several species complexes, instead of assigning them to a subgenus. In this work, their *Triaenodes volda* Group, *T. theiophora* Complex, *T. copelata* Complex, and *T. celata* Complex constitute the new subgenus *Neotriaena*. The relationships of this subgenus and the other subgenera are discussed in Chapter III (Fig. 2.1).

Males of this subgenus share a synapomorphy (Figs. 2.1, 3.14A) that (11) the phallus is dorsally positioned with a pair of the basal chitinous supports, which are assumed to represent a transformation of the phallic shield and sclerotized strips (Morse 1975). Three monophyletic species groups have been recognized in this subgenus (Fig. 2.3), but no synapomorphies are known by which their trichotomy may be resolved.

Subgenus *Neootriaena* adult males are distinguishable from other subgenera by the following characters: (1) the preanal appendages of some species are reduced; (2) the mesal basodorsal process of each inferior appendage is filamentous, apically setose; (3) the apicomesal lobe and laterodorsal process are lacking; (4) the recurved processes of inferior appendages are absent; (5) the apex of phallus of some species has ventrally stout setae; (6) the parameres are absent; (7) the inferior appendages of some species show diverse combinations.
Triaenodes (Neotriaena) volda Group

The *T. (Neotriaena) volda* Group has four species. A synapomorphy is that (32) the preanal appendages are vestigial (Fig. 3.3B). *Triaenodes dysmica* and *T. volda* are sister species; their synapomorphy is that (33) the inferior appendages are strongly incurved subapicomesally, making their inner margins deeply concave (Figs. 3.3C, 3.4C).

*Triaenodes (Neotriaena) dysmica* Neboiss and Wells, 1998

Fig. 3.4

*Triaenodes dysmica* Neboiss and Wells, 1998; p. 96, figs. 4-6 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margins slightly convex anteriorly, posterior margins sinuous; tergum IX with posteromesal margin fused indistinguishably with tergum X; sternum IX much longer than tergum IX. Upper part of tergum X pair of sclerotized, elongate spines, tapering to their apices, crossing subapically; lower part of tergum X simple, apically rounded semimembranous lobe [upper part overlying lower part, as though these two structures fused]. Preanal appendages absent. Inferior appendages triangular in lateral view and quadrat in ventral view, distal part short and blunt in lateral view, subapicomesal margins deeply and roundly excised in ventral view, with numerous hairs mesodorsally in concavity; mesal basodorsal process (lateral subbasodorsal process of Neboiss and Wells, 1998) short, apically setose; recurved process absent. Phallus bent caudoventrad, ventrally sclerotized, dorsally membranous, expanded in distal two-thirds and bearing stout setae.
ventrally on distal one-third, with pair of basal chitinous supports from posteroventral margins of segment IX; parameres absent; phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.6 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, genitalia prep., PT-2055).

**DIAGNOSIS:** The male of this species closely resembles that of *T. volda*, but the pair of spines constituting the upper part of tergum X is much broader and, in ventral view, the distal part of each inferior appendage is much shorter than in *T. volda*.

**PHYLOGENY:** The sister species of this species is *T. volda*. The synapomorphy is indicated above.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Neotriaena) volda_ Mosely, 1953

Fig. 3.5

_Triaenodes volda_ Mosely, 1953; p. 276-278, fig. 195 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margins convex, posterior margins sinuous, tergum IX very short, sternum IX much longer than tergum. Upper part of tergum X forming pair of long, slender, acute spines curved ventrad; lower part of tergum X simple plate with margins sclerotized, about one-seventh as long as of upper part of tergum X
[upper part overlying lower part, more clearly separated than in *T. dysmica*]. Preanal appendages absent. Inferior appendages subquadrate in lateral and ventral views, each with apicodorsal projection long, subapicomesal margin deeply and roundly excised in ventral view, with numerous hairs mesodorsally in concavity; mesal basodorsal process (lateral subbasodorsal process of Neboiss and Wells, 1998) long, slender, apically setose; recurved process absent. Phallus bent caudoventrad, ventrally sclerotized, dorsally membranous, bearing stout setae ventrally on apical one-third, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by St Clair (1994).

**LENGTH OF FOREWING:** Male, 6.3–7.4 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- AUSTRALIA: SE Queensland, Glastonbury Creek, 15 km W of Gympie, 27 Oct 1980, A. Neboiss, (NMV, genitalia prep., PT-796).

**DIAGNOSIS:** This species is very close to *T. dysmica*, but the pair of spines of the upper part of tergum is much more slender and, in ventral view, the distal part of each inferior appendage is much longer than that of *T. dysmica* and the concavity is much deeper.

**PHYLOGENY:** The sister species of this species is *T. dysmica*. A synapomorphy is indicated above.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) jubata* Neboiss, 1982

Fig. 3.6

*Triaenodes jubatus* Neboiss, 1982; p. 317-319, figs. 115-120 (male, female).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX triangular in lateral view; anterolateral margins slightly convex, especially ventrally; posterolateral margins sinuous. Upper part of tergum X forming pair of elongate spines, tapering to acute apex, curved downward; lower part of tergum X simple, apically rounded semimembranous lobe (upper part overlying lower part, apparently fused). Preanal appendage absent. Inferior appendages triangular in lateral view and quadrate in ventral view, each with numerous hairs on distal half, distal part blunt in lateral view, lateral margin curved mesad in ventral view, mesal margin irregular; mesal basodorsal process (lateral subbasodorsal process of Neboiss and Wells, 1998) long, finger-like, curved dorsocaudad, setose apically; recurved process absent. Phallus bent ventrad, sclerotized ventrally, membranous dorsally, expanded in distal two-thirds, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Neboiss (1982).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6-7 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species somewhat resembles *T. dysmica* and *T. volda*, but differs in lacking a deep concavity on the inner apical margin of each inferior appendage.

**PHYLOGENY:** *Triaenodes jubata* is probably a sister species of *T. dysmica* and *T. volda*, as indicated by the short inferior appendages that are triangular in lateral view and subquadrate in ventral view.
**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Neotriaena) mataranka_ Neboiss and Wells, 1998

_Fig. 3.7_

_Triaenodes mataranka_ Neboiss and Wells, 1998; p. 96, figs. 7-9 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Northern Territory, Roper River, Mataranka homestead, M.S. Moulds, 25 Jan 1977, (NMV, T-16418).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs, distinctive numerous. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX triangular in lateral view, anterior margins straight ventrolaterally and slightly concave dorsolaterally, posterior margins diagonal and slightly concave, much longer ventrally than dorsally. Upper part of tergum X forming pair of elongate spines, tapering to apex, curved slightly downward; lower part of tergum X semimembranous, forked distally into two long branches. Preanal appendage absent. Inferior appendages elongate, slender, straight in lateral view, curved mesad in ventral view; apex slightly expanded; mesal basodorsal process (lateral subbasodorsal process of Neboiss and Wells, 1998) digitate, apically setose; recurved process absent. Phallus slender basally, expanded distally, sclerotized except apical half membranous and with longitudinally groove dorsally, with pair of basal chitinous supports from posterolateral margins of segment IX, these supports broad at ventral ends; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.9-6.8 mm
**MATERIAL EXAMINED:** Holotype male. Paratype, 1 male -- same data as for holotype, (NMV, genitalia prep. PT-769).

**DIAGNOSIS:** This species differs from the other species of this Group by the long and slender inferior appendages and the pair of long lobes of the lower part of tergum X. Also, the basal chitinous supports for the phallus are uniquely expanded at the ventral ends.

**PHYLOGENY:** Like the other species of the *T. volda* Group, this species lacks preanal appendages. It is probably basal within the Group.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) theiophora* Group

The *T. (Neotriaena) theiophora* Group has two species. Their synapomorphy is that (35) the mesal basodorsal process of each inferior appendage is a very long and slender curved spine located at each lateral corner on the appendage (Fig. 3.8A). The greatly reduced upper part of tergum X may be a synapomorphy indicating monophyly of the *T. (Neotriaena) theiophora* Group with the other groups of this subgenus below.

*Triaenodes (Neotriaena) theiophora* Neboiss and Wells, 1998

Fig. 3.8

*Triaenodes theiophora* Neboiss and Wells, 1998; p. 98, figs. 13-15 (male).

**TYPE MATERIAL:** Holotype, male: WESTERN AUSTRALIA: Fine Spring Creek between Lake Argyle village and Duncan Highway, 23 Feb 1977, J.E. Bishop, (NMV, T-16358).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.
MALE GENITALIA: Abdominal segment IX subquadrangular in lateral view, dorsally slightly shorter than ventrally; anterior margin convex, tergum IX with posteromesal margin rounded in dorsal view. Upper part of tergum X inconspicuous, lower part of tergum X short, apically rounded semimembranous plate, shorter than preanal appendages. Preanal appendages digitate, setose. Inferior appendages skittle-shaped in lateral view, each constricted at two-thirds length, in ventral view quadrate basally and abruptly reduced distally to thick, setose, finger curved mesad; mesal basodorsal process located at lateral corner of posterior margin of appendage very long, slender, strongly recurved spine initially directed anterodorsad then caudad and caudoventrad; recurved process absent. Dorsal surface of phallus membranous in distal half, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent, phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 4.1-4.4 mm

MATERIAL EXAMINED: Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, genitalia prep., PT-766).

DIAGNOSIS: The male of this species closely resembles that of T. toxeres, but is distinguished from it by having the lower part of tergum X short and apically rounded and the inferior appendages abruptly contracted at two-thirds their length in ventral view.

PHYLOGENY: The sister species of this species is T. toxeres as indicated by a synapomorphy discussed above.

DISTRIBUTION: Western Australia.

BIOGEOGRAPHIC REGION: Australasian region.

_Triaenodes (Neotriaena) toxeres_ Neboiss and Wells, 1998

Fig. 3.9

_Triaenodes toxeres_ Neboiss and Wells, 1998; p. 98, figs. 16-18 (male).
**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Queensland, Currunda Creek, tributary of Freshwater Creek, Cairns district, 30 Apr 1978, A. Wells, (NMV, T-16602).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX L-shaped in lateral view, with ventral margin nearly three times as long as dorsal margin; anterolateral margins sinuous, posterior margin concave. Upper part of tergum X inconspicuous; lower part of tergum X as long as preanal appendages, slightly tapered and apically notched plate, with margin sclerotized. Preanal appendages digitate, rather stout in dorsal view, setose. Inferior appendages pistol-shaped in lateral view, subtriangular in ventral view with distal part slightly incurved, setose; mesal basodorsal process of each inferior appendage long, slender, strongly recurved spine anterodorsad then dorsad and caudad and caudoventrad; recurved process absent. Phallus membranous dorsally in distal half, with dorsal furrows, left side of phallus with sclerotized, subrectangular flange present, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 4.6 – 5.2 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- AUSTRALIA: Queensland, Upper Freshwater Creek, Whitefield Range nr Cairns, 3 Apr 1975, M.S.Moulds, (NMV, T-16603, genitalia prep., PT-764).

**DIAGNOSIS:** This species closely resembles *T. theiophora*. However, the male of this species is distinguished by the apically notched lower part of tergum X and the much longer mesal basodorsal process of each inferior appendage, extending above the phallus, rather than lying on either side of the phallus as in *T. theiophora*. 
**PHYLOGENY:** The sister species of this species is *T. theiophora*, as indicated by the synapomorphy discussed above.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Neotriaena) barbarae_ Group

The *T. (Neotriaena) barbarae* Group has five species. A synapomorphy is that (34) each inferior appendage has the subapicomesal process upturned and strongly sclerotized (Fig. 3.11A). Even though the subapicomesal process of each inferior appendage of each species has a unique shape, its position and orientation indicate that this structure is probably homologous. The phylogenetic relationships among five species are unresolved.

_Triaenodes (Neotriaena) barbarae_ Neboiss and Wells, 1998

Fig. 3.10

_Triaenodes barbarae_ Neboiss and Wells, 1998; p. 101, figs. 25-27 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX more or less rectangular in lateral view, anterior margin rounded, posterior margin nearly straight. Upper part of tergum X slender, elongate rod; lower part of tergum X elongate, broader basally than upper part of tergum X and longer. Preanal appendages slender, shorter than upper part of tergum X, setose. Inferior appendages triangular in lateral view, narrow and long and subrectangular in ventral view with
apex tapered and blunt; lateral subbasodorsal process slender, straight, directed dorsocaudad, with two apical setae; subapicomesal processes pincer-shaped, slightly asymmetrical; each appendage with mesal basodorsal process slender, curved caudad, bearing single apical seta; recurved process absent. Phallus slender, down-turned, with distal half of dorsum membranous and with shallow groove, short and stout ventral setae apically and subapically, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.7-6.9 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16313, genitalia prep., PT-778).

**DIAGNOSIS:** This species is distinguished from the other species of this Group by having a slender, undivided upper part of tergum X and by the pincer-shaped subapicomesal process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Neotriaena) barbarae* Group are unknown.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) camura* Neboiss and Wells, 1998

Fig. 3.11

*Triaenodes camura* Neboiss and Wells, 1998; p. 104, figs. 42-44 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Northern Territory, Devil Devil Creek, 70 km SW Dapy River Mission, 23 Aug 1979, J. Blyth, (NMV, T-16486).
DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with hairy scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX subrectangular in lateral view, twice as long ventrally as dorsally; anterior margin straight, slightly produced anteroventrally, posterior margin nearly straight. Upper part of tergum X inconspicuous; lower part of tergum X deeply divided apically, forming pair of spine-like lobes with outer edges slightly convex in dorsal view. Preanal appendages slender, about half as long as lower part of tergum X, setose. Inferior appendages slender, long, curved dorsocaudad in lateral view, distally blunt in ventral view, each with strap-like subapicominal process, mesal basodorsal process slender, parallel with dorsal margin of appendage basally and then curved dorsad beside subapicominal process, with sparse setae apically; recurved process absent. Phallus slender basally, down-turned, dorsum of distal half membranous, with dorsal flange, stout ventral setae apically and subapically, with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.1-6.9 mm

MATERIAL EXAMINED: Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16487, genitalia prep., PT-774).

DIAGNOSIS: Male of this species and *T. virgula* can be separated from the other species of this Group by the deeply cleft lower part of tergum X. This species differs from the upwardly curved mesal basodorsal process and the strap-like subapicominal process of each inferior appendage.

PHYLOGENY: Although, the sister species of this species might be *T. virgula*, the phylogenetic relationships of this species in the *T. (Neotriaena) barbarae* Group are unknown.

DISTRIBUTION: Australia.
**BIOGEOGRAPHIC REGION:** Australasian region.

*Triænodes* (*Neotriaena*) *gibberosa* Neboiss and Wells, 1998

*Fig. 3.12*

*Triænodes gibberosa* Neboiss and Wells, 1998; p. 101, figs. 28-30 (male).

**TYPE MATERIAL:** Holotype, male: NW WESTERN AUSTRALIA: Barnett River Gorge, Barnett Station, 16°38’S, 126°00’E, 1 Oct 1979, J. Blyth, (NMV, T-16378).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX curved in lateral view, with convex anterior margins and concave posterior margins, longer dorsally than ventrally, tergum IX indistinct in dorsal view. Upper part of tergum X inconspicuous; lower part of tergum X broad plate with anterior half semimembranous and posterior half sclerotized, apex bulbous in lateral view, generally rounded in dorsal view. Preanal appendages short, oval, setose. Inferior appendages complicated, each with main body rather broadly elliptical in lateral view and also in ventral view, slender apex abruptly bent dorsomesad; with subapicomesal process pointed dorsad; mesal basodorsal process filamentous, apically setose; lateral subbasodorsal process elongate and slightly thicker than mesal basodorsal process, slightly clavate, with long hairs near apex; recurved process absent. Phallus short, down-curved; lower part sclerotized and upper part membranous; stout subapical setae ventrally; with pair of basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.4-6.8 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, T-16379, genitalia prep, PT-776).
**DIAGNOSIS:** This species is distinguished from the other species of this Group by the unique shape of the lower part of tergum X and the irregularly shaped distal part of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Neotriaena) barbarae* Group are unknown.

**DISTRIBUTION:** NW Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) rutella* Neboiss and Wells, 1998

Fig. 3.13

*Triaenodes rutella* Neboiss and Wells, 1998; p. 105, figs. 45-47 (male).

**TYPE MATERIAL:** Holotype, male: WESTERN AUSTRALIA: Morgan River, Theda HS, Kimberley, 14°48’S, 126°43’E, 28 Sept 1979, J. Blyth, (NMV, T-16335).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX rectangular in lateral view, longest above inferior appendages, anterior margin mostly straight, posterior margin concave in middle in lateral view. Upper part of tergum X inconspicuous; lower part of tergum X semimembranous plate expanded laterally at three-fourths length, apically rounded in dorsal view, acute in lateral view. Preanal appendages slender, parallel-sided, about two-thirds length of lower part of tergum X, setose. Inferior appendages long and parallel-sided and nearly straight in lateral view, stouter in ventral view, blunt apically in both views; asymmetrical: left inferior appendage with subapicomesal process very long and slender and twisting, curving more or less antero-dorsad; right inferior appendage with subapicomesal process shorter, stouter, slightly twisted; mesal basodorsal process filamentous, sinuous, twisted, half as long as main body of inferior
appendage, with single apical seta; curved process absent. Phallus slender and long, slightly
down-curved, lower part sclerotized and upper part membranous, stout ventral setae apically and
subapically, with pair of basal chitinous supports from posterolateral margins of segment IX;
parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.6-5.7 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for
holotype (NMV, T-16336, genitalia prep., PT-770).

**DIAGNOSIS:** This species is distinguished from the other species of this Group by the
asymmetrical subapicomesal process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Neotriaena)*
*barbarae* Group are unknown.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) virgula* Neboiss and Wells, 1998

Fig. 3.14

*Triaenodes virgula* Neboiss and Wells, 1998; p. 101, figs. 22-24 (male).

**TYPE MATERIAL:** Holotype, male: NW WESTERN AUSTRALIA: Mitchell Plateau,
Camp Creek, Crusher site, 20 Jul 1978, P. Suter, (NMV, T-16372).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with
yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with
scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX nearly triangular in lateral view, about
three times as long ventrally as dorsally, anterior margins slightly concave, posterior margins
diagonal and nearly straight. Upper part of tergum X inconspicuous; lower part of tergum X
forming pair of long spines separated nearly to base, gradually curved ventrad and curved slightly mesad near apices. Preanal appendages slender, elongate, setose. Inferior appendages elongated and slender in lateral and ventral views, curved mesad and broader and nearly truncate in ventral view, each with straight digitiform subapicomesal process directed caudodorsad; mesal basodorsal process straight, filamentous, directed caudodorsad, with single apical seta; lateral subbasodorsal process straight, filamentous, shorter than mesal basodorsal process with two apical setae; recurved processes absent. Phallus elongate, slender, arching ventrad, with pair of stout basal chitinous supports from posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.7-6.4 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- NW WESTERN AUSTRALIA: Mitchell Plateau, Camp Creek, Crusher site, 21 Jul 1978, P. Suter, (NMV, T-16373, genitalia prep., PT-775).

**DIAGNOSIS:** Male of this species and *T. camura* can be separated from the other species of this Group by the deeply cleft lower part of tergum X. This species is distinguished from the lower part of tergum X forming a pair of long spines and by the the very stout and thick basal chitinous supports at the phallus in lateral view; the supports of other species are less stout and less thick than that of this species.

**PHYLOGENY:** Although, the sister species of this species might be *T. camura*, the phylogenetic relationships of this species in the *T. (Neotriaena) barbarae* Group are unknown.

**DISTRIBUTION:** NW Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) Species Incertae sedis*
Triaenodes (Neotriaena) celata Neboiss and Wells, 1998

Fig. 3.15

Triaenodes celata Neboiss and Wells, 1998; p. 105, figs. 48-50 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: N Queensland, Alice River nr Townsville, 11 Apr 1979, A. Wells, (NMV, T-16431).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, posterior margin deeply and narrowly incised ventrolaterally, anterior margins slightly sinuate, posterior margins convex above and below incisions, heart-shaped in ventral view. Upper part of tergum X inconspicuous; lower part of tergum X forming semimembranous plate, broadly and shallowly incised apically, distal margin strongly sclerotized. Preanal appendages digitate, setose. Inferior appendages long, narrow, gradually down-curved and bent slightly mesad, apically rounded and setose; lateral subbasodorsal process filamentous, as long as main body of inferior appendage, slightly curved ventrad, apically setose; recurved processes absent. Phallus rather like inverted shoe, with anterior base mushroom-shaped, short “ankle” slender, suddenly expanded and angled at dorsal “heel,” distal half (inverted “sole”) membranous dorsally, apex (“toe”) ventrally bearing stout setae, with pair of basal chitinous supports from ventrolateral posterior margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0-5.8 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, T-16432, genitalia prep., PT-801).
**DIAGNOSIS:** This species somewhat resembles *T. dibolia* and *T. drepana* in the general form of the lower part of tergum X and the inferior appendages. However, it differs from both species in the heart-shaped sternum IX and the rounded distal part of the inferior appendages.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Neotriaena* is unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Neotriaena) copelata_ Neboiss and Wells, 1998

Fig. 3.16

_Triaenodes copelata_ Neboiss and Wells, 1998; p. 99, figs. 19-21 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX rectangular in lateral view, anterior margins convex, posterior margins nearly straight, with pair of small papillae dorsally. Upper part of tergum X inconspicuous; lower part of tergum X more than twice as long as segment IX, slender, tapering to acute apex in doral and lateral views, lateral margins sclerotized in distal half. Preanal appendages about half as long as lower part of tergum X, digitate, setose. Inferior appendages abruptly incurved and capitate in ventral view, narrow, slender and gradually upturned in lateral view; each with mesal basodorsal process clubbed, slightly shorter than lateral subbasodorsal process, apically setose; lateral subbasodorsal process filamentous, nearly straight, apically setose; recurved process absent. Phallus ventrally sclerotized, stout ventral setae subapically, dorsal surface membranous, with pair of basal chitinous supports from posterolateral ventral margins of segment IX; parameres absent; phallothremal sclerite evident.
**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0-5.7 mm


**DIAGNOSIS:** This species differs from the other species in that the inferior appendages are distally expanded and the distal margin is bumpy in ventral view.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Neotriaena* is unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) dibolia* Neboiss and Wells, 1998

Fig. 3.17

*Triaenodes dibolia* Neboiss and Wells, 1998; p. 107, figs. 51-53 (male).

**TYPE MATERIAL:** Holotype, male: NW WESTERN AUSTRALIA: Mitchell Plateau, Camp Creek, 31 Jan 1978, J.E. Bishop, (NMV, T-16426).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, about three times longer ventrally than dorsally, anterior margins mostly convex and diagonal, posterior margins almost straight and vertical, deeply incised ventrolaterally, rectangular in ventral view. Upper part of tergum X inconspicuous; lower part of tergum X forming broad, semimembranous plate, obliquely truncate apically, with distal margin bumpy and strongly sclerotized. Preanal appendages digitate, setose, about as long as lower part of tergum X. Inferior appendages long, slender, tapering to acute apices in lateral and ventral views, covered with short
setae on dorsomesal margins; each with lateral subbasodorsal process filamentous, slightly clavate, about two-thirds length of inferior appendage, curved caudad and slightly ventrad, apically setose; recurved processes absent. Phallus ventrally sclerotized, stout, membranous dorsally, with pair of basal chitinous supports from ventral posterolateral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.1-5.3 mm

**MATERIAL EXAMINED:** Holotype, male, Paratype, 1 male -- same data as for holotype (NMV, T-16427, genitalia prep., PT-768).

**DIAGNOSIS:** This species mostly close resembles *T. drepana* in the general form of the male genitalia, but it differs from by the lanceolate and nearly straight shape of the inferior appendages, while the inferior appendages of *T. drepana* are slender and strongly curved dorsad.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Neotriaena* is unknown.

**DISTRIBUTION:** NW Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Neotriaena) drepana* Neboiss and Wells, 1998

Fig. 3.18

*Triaenodes drepana* Neboiss and Wells, 1998; p. 107-108, figs. 54-56 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts. Presence of scent-organs not sure. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX almost triangular in lateral view, about twice as long ventrally as dorsally, anterior margins slightly convex and diagonal, very slightly
produced anteroventrally, posteromesal margin subtriangular in dorsal view, posterior margins mostly concave in lateral view, broadly rectangular in ventral view. Upper part of tergum X inconspicuous; lower part of tergum X forming broad semimembranous plate, obliquely truncate and slightly notched apically, distal margins strongly sclerotized. Preanal appendages short, setose, shorter than lower part of tergum X. Inferior appendages long and narrow, tapering to acute apices, strongly and evenly recurved, directed initially anterodorsad, then caudad, than caudoventrad, covered with short setae on mesal margins, asymmetrical with right inferior appendage somewhat sinuous in ventral view; each with lateral subbasodorsal process filamentous, evenly curved caudad, apically setose; recurved processes absent. Phallus ventrally sclerotized, stout, angled abruptly ventrad, upper part membranous, stout ventral setae suapically, with pair of basal chitinious supports from posterolateral ventral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0-5.8 mm

**MATERIAL EXAMINED:** Holotype, male, Paratype, 1 male -- same data as for holotype (NMV, genitalia prep., PT-777).

**DIAGNOSIS:** This species most closely resembles T. dibolia. However, it is distinguished from that and other species by the distinctively recurved inferior appendages.

**PHYLOGENY:** The phylogeny of this species in the subgenus Neotriaena is unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Neotriaena) etheira_ Neboiss and Wells, 1998

Fig. 3.19

_Triaenodes etheira_ Neboiss and Wells, 1998; p. 104, figs. 36-41 (male).
**TYPE MATERIAL:** Holotype, male: WESTERN AUSTRALIA: Ord River, Kunnanurra Dam, 21 Feb 1977, J.E. Bishop, (NMV, T-16243).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs distinctive and numerous. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, anterior margins broadly convex, posterior margins nearly straight, posteromesal margin subtriangular in dorsal view, venter quadrilateral in ventral view. Upper part of tergum X inconspicuous; lower part of tergum X forming broad, semimembranous plate except sclerotized dorsally, with V-shaped cleft apicomesally, tapered distally in lateral view, with small subapical excision. Preanal appendages slender, digitate, two-thirds as long as lower part of tergum X, setose. Inferior appendages slender, nearly acute, nearly straight in lateral view, incurved in ventral view; asymmetrical, only left inferior appendage with strongly sclerotized lateral subbasodorsal process, right inferior appendage variable (Neboiss and Wells, 1998, figs. 39-41); each inferior appendage with mesal basodorsal process dilated basally, bearing several apical setae; recurved processes absent. Phallus slender proximally, greatly distended dorsal surface membranous with dorsal flanges, with pair of basal chitinous supports from posterolateral ventral margins of segment IX; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.7-6.7 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, T-16244, genitalia prep., PT-779).

**DIAGNOSIS:** This species differs from having a well-developed lateral subbasodorsal process on the left inferior appendage. This well-developed basodorsal spine could be homologous with the upturned subapicomesal processes on inferior appendages of the T.
(Neotriaena) barbarae Group. Male of this species and T. stipulosa can be separated from the other species of T. (Neotriaena) incertae sedis by the shallowly cleft lower part of tergum X.

**PHYLOGENY:** Although, the sister species of this species might be T. stipulosa, the phylogenetic relationships of this species in the subgenus Neotriaena is unknown

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

Triaenodes (Neotriaena) reclusa Neboiss and Wells, 1998

Triaenodes reclusa Neboiss and Wells, 1998; p. 108, figs. 57-59 (male).


**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under and over flap. Forewings and hind wings brown, with dense brown hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin broadly rounded, posteromesal margin triangular in dorsal view, segment IX elongate-rectangular in ventral view. Upper part of tergum X strongly sclerotized, elongate, clavate in dorsal view, rather sinuous with pair of small upwardly directed spurs in lateral view; lower part of tergum X forming semimembranous, triangular plate, lateral margins slightly sclerotized. Preanal appendages about three-fourths as long as upper part of tergum X, setose. Inferior appendages basally rounded, very short, mesal basodorsal process long recurved spine, lateral subbasodorsal process small fingerlike projection, apicominal lobe round, densely covered with stout setae, directed upward; recurved process absent; basal half of phallus sclerotized, distal half of phallus membranous dorsally, with two longitudinal sclerotized lines; parameres absent; phallothremal sclerite not evident.
FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.2 mm

MATERIAL EXAMINED: Holotype, male; tergum X of this specimen is damaged and the recurved mesal basodorsal process of the right inferior appendage is broken.

DIAGNOSIS: This species differs from the other species of the subgenus by the distinctive structure of the inferior appendages, including the long recurved mesal basodorsal process, the rounded apicomesal lobe, and the short lateral subbasodorsal process.

PHYLOGENY: The phylogeny of this species in the subgenus Neotriaena is unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

Triaenodes (Neotriaena) stipulosa Neboiss and Wells, 1998

Fig. 3.20

Triaenodes stipulosa Neboiss and Wells, 1998; p. 103, figs. 31-35 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with numerous scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX tall and somewhat bottle-shaped in lateral view, about two times longer ventrally than dorsally, anterior and posterior margins slightly convex ventrally and slightly concave dorsally, dorsal posteromesal margin nearly straight, very weak, ventral view of segment IX nearly quadrangular. Upper part of tergum X inconspicuous; lower part of tergum X forming semimembranous plate, broad mesally, tapered in distal half, and cleft apically in dorsal view. Preanal appendages stout, about half as long as lower part of tergum X, setose. Inferior appendages broad basally, slender distally, much longer than other genital
structures, evenly bent mesad, each bearing small but strongly sclerotized apical process; mesal basodorsal process filamentous, apically setose; recurved process absent. Phallus ventrally sclerotized, short, slender proximally, slightly expanded distally, dorsal surface membranous in distal half, with pair of basal chitinous supports from posterolateral ventral margins of segment IX; parameres absent; phallothremal sclerite evident, with dorsal furrows.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.1 - 7.3 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- AUSTRALIA: Queensland, Yabba Crekk, 10 km W of Imbil, 26 Oct 1980, A. Neboiss, (NMV, T-16560, genitalia prep., PT-782).

**DIAGNOSIS:** This species differs from the slender distal part of the inferior appendages, each bearing a small, apical process. Male of this species and *T. etheira* can be separated from the other species of *T. (Neotriaena) incertae sedis* by the shallowly cleft lower part of tergum X.

**PHYLOGENY:** Although, the sister species of this species might be *T. stipulosa*, the phylogenetic relationships of this species in the subgenus *Neotriaena* is unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.
CHAPTER VI

SUBGENUS *AUSTROTRIAENA* YANG AND MORSE, 1993

Type species: *Triaenodes trifida* Kimmins 1957a

There have been ten species of this subgenus found in the Australasian and Oriental regions. Yang and Morse (1993) included the seven species; in this work, I transferred *T. tafana* to the subgenus *Trianeodes* and I excluded *T. dubia* Mosely, 1934 which might belong to the subgenus *Ylodes*, based on the recurved phallotheca spine and the structure of inferior appendages, however, it needs more study. Finally, I added four more species; *T. hauseri, T. hybos, T. virgata* and *T. zetes*. This subgenus and other subgenera relationships are discussed in Chapter III (Fig. 2.1).

Species of the subgenus share a synapomorphy (Figs. 2.1, 3.21A) that (12) the mesal basodorsal process of each inferior appendage is fingerlike, evenly curved, and positioned close to the main body of the inferior appendage. One Lineage has been recognized in this subgenus (Fig. 2.4). The rest of six species do not strong synapomorphy at this time. The phylogenetic relationships among those species need more study.

Subgenus *Austrotriaena* adult males are distinguishable from other subgenera by the following characters: (1) the abdominal segment IX of some species has a pair of long and parallel spines; (2) the male inferior appendages lack the apicomesal lobe, lateral subbasodorsal process, and laterodorsal process; (3) the recurved processes of inferior appendages are absent; (5) the phallus of some species has the dorsal sclerotized process from the phallobase; (6) the parameres are absent.
Triaenodes (Austrotriaena) boettcheri Group

The *T. (Austrotriaena) boettcheri* Group has four species. A synapomorphy is that (36) the abdominal segment IX has a pair of long and parallel spines (Fig. 3.21A). Two monophyletic lineages are recognized in this Group as follows:

**Lineage #1**

A synapomorphy of *T. boettcheri* and *T. hauseri* is that (37) the apex of the mesal basodorsal process of each inferior appendage has a concavity (Fig. 3.22C).

_Triaenodes (Austrotriaena) boettcheri_ Ulmer, 1930b

Fig. 3.21

*Triaenodes boettcheri* Ulmer, 1930b; p. 413, figs. 52-54 (male).

**TYPE MATERIAL:** Syntypes, 2 males: PHILIPPINES, Dansalan, Mindanao, 12-i-1915, leg. BOETTCHER, in Ulmer collection.

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, about two times as long ventrally as dorsally, anterior margins straight, posterior margins sinuous and diagonal, with pair of sclerotized, rod-like processes arising subdorsally and reaching beyond inferior appendages, dorsal and ventral posteromesal margins each slightly concave. Upper part of tergum X digitate, two-thirds as long as preanal appendages, apically setose; lower part of tergum X semimembranous, strongly incised medially in dorsal view. Preanal appendages half as long as lower part of tergum X, setose. Inferior appendages in lateral view each with basal half rectangular and twice as long as broad, apical half thumb-like, angled ventrad and then curved
caudad, apical half of each inferior appendage thumb-like and setose, mesal basodorsal processes more slender than apical half of either inferior appendage, curved caudoventrad, each mesal basodorsal process enlarged apically, subapicolateral concavity with short setae; recurved processes absent. Phallus sclerotized, sinuous, with dorsal angle near apex of lower part of tergum X, extending caudoventrad beyond inferior appendages; parameres absent; phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.25 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- PHILIPPINE ISLANDS: Mt. Apo. Mindanao, Mainit River, 6000 ft, Sept. 14. (MCZC).

**DIAGNOSIS:** This species very closely resembles *T. hauseri* in the structure of the upper and lower parts of tergum X and the shape of the mesal basodorsal process of each inferior appendage. However, it differs by the S-shape of the phallus; that of *T. hauseri* is shorter, rectangular, and nearly straight. Also, and the spines of abdominal segment IX are much longer than those of *T. hauseri*.

**PHYLOGENY:** This species is the sister species of *T. hauseri*, for which a synapomorphy is indicated above.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Austrotriaena) hauseri* Mey, 1998

Fig. 3.22

*Triaenodes hauseri* Mey, 1998; p. 571, figs. 136-137 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Mindanao, 1050 m, Mt. Agtuuganon, 28 May-7 June 1996, leg. MEY (ZMHB).
DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX pentagonal in lateral view, each side with straight anterior, posterodorsal, dorsal, and ventral margins, sinuous posterodorsal margin, posterodorsal sides diagonal with others, about twice as long ventrally as dorsally, with pair of sclerotized, rod-like processes reaching about four-fifths of length of inferior appendages. Upper part of tergum X clavate, apically setose; lower part of tergum X semimembranous, apex deeply and narrowly incised medially in dorsal view. Preanal appendages less than half as long as lower part of tergum X, setose. Inferior appendages longer than other genital structures, tapering to blunt apices in lateral and ventral views, each with mesal basodorsal process broad, slightly incised at middle of apex in ventral view, curved downward, apex concave, with short setae; recurved process absent. Phallus sclerotized tube, almost straight, distal one-third membranous; parameres absent; phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 5.8 mm

MATERIAL EXAMINED: Holotype, male.

DIAGNOSIS: The male of this species closely resembles that of *T. boettcheri* in the structure of the upper and lower parts of tergum X and the shape of the mesal basodorsal process of each inferior appendage. However, it differs from that species in the short rectangular-shape of the phallus; that of *T. boettcheri* is S-shaped in the lateral view. Also, the spines of abdominal segment IX are much shorter than those of *T. boettcheri*.

PHYLOGENY: This species is the sister of *T. boettcheri*, for which a synapomorphy is indicated above.

DISTRIBUTION: Philippines.

BIOGEOGRAPHIC REGION: Oriental region.
Lineage #2

A synapomorphy suggesting a sister-group relationship for *T. hybos* and *T. virgata* is that (38) the male phallus of these two species has a dorsal sclerotized process from the phallobase (Figs. 3.23A, 3.24A).

*Triaenodes (Austrotriaena) hybos* Mey, 1998

Fig. 3.23

*Triaenodes hybos* Mey, 1998; p. 569, figs. 134-135 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Mindanao, 1050 m, Mt. Agtuuganon, 28 May-7 June 1996, leg. MEY (ZMHB).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, anterior margins convex, posterior margins slightly sinuous, with pair of sclerotized, rod-like processes reaching slightly beyond preanal appendages and upper part of tergum X, their tips crossing under dorsal process of phallobase. Upper part of tergum X semimembranous, apically bifid and setose; lower part of tergum X semimembranous, deeply divided in dorsal view. Preanal appendages slender, as long as upper and lower parts of tergum X, setose. Inferior appendages irregularly shaped in lateral view, triangular with blunt apices in ventral view, fused basally; each with mesal basodorsal process strongly sclerotized, thick, curved downward, apically setose and acute; recurved process absent. Phallus sclerotized, apical one-third membranous, downcurved, with strongly sclerotized, beak-shaped dorsal process from phallobase; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.8 mm
**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species is very close to *T. virgata*, but it differs from it in that the spines of abdominal segment IX are crossed under the dorsal process of the phallobase and the apex of that dorsal process is break-shaped; these spines are convergent but not crossed in *T. virgata* and the dorsal process of the phallobase is very slender in lateral view.

**PHYLOGENY:** This species is the sister of *T. virgata*, as suggested by the synapomorphy indicated above.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

_Triaenodes (Austrotriaena) virgata_ Mey, 1998

Fig. 3.24

_Triaenodes virgata_ Mey, 1998; p. 569, figs. 132-133 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Mindanao, 1050 m, Mt. Agtuuganon, 28 May-7 June 1996, leg. MEY (ZMHB).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular, anterior margin convex, posteroventral margin sinuous, with pair of sclerotized, rod-like processes reaching beyond apices of tergum X. Upper part of tergum X semimembranous, apparently bifid (right side apparently broken), slender, apically setose; lower part of tergum X semimembranous, deeply incised, thicker than upper part of tergum X. Preanal appendages as long as upper and lower parts of tergum X, setose. Inferior appendages quadrangular in lateral view, fused basally, with obliquely truncate apices set with stout setae in ventral view; each with mesal basodorsal process capitate, margined with stout hairs, twisted at middle; recurved process absent. Phallus strongly...
sclerotized, apical one-third membranous, slightly downcurved, with slender dorsal process from phallobase slightly hooked apically; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7-8 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** The male of this species closely resembles that of *T. hybos*, but the pair of processes of abdominal segment IX are not crossed apically and the dorsal process of phallobase is much more slender.

**PHYLOGENY:** This species is the sister of *T. hybos*, as suggested by the synapomorphy indicated above.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Trienaenodes (Austrotriaena) Species Incertae sedis*

*Trienaenodes (Austrotriaena) bernaysae* Korboot, 1964

Fig. 3.25

*Trienaenodes bernaysae* Korboot, 1964; p. 50, figs. 32-51 (male, larvae).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Queensland, Cedar Creek, Tamborine Mountain, 12. ix. 1962, K. Korboot (QM, T-6169).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs and flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat triangular in lateral view, dorsally very short, anterior margins convex (almost angled in middle), posterior margins diagonal and nearly straight, long and rectangular in ventral view with anterior margin having U-
shaped excavation medially. Upper part of tergum X digitate, apically setose, two-thirds as long as preanal appendages; lower part of tergum X forming asymmetrical pair of spines, left spine less than half as long as right spine. Preanal appendages long, slender, setose. Inferior appendages somewhat rectangular basally in lateral and ventral views, inner margins of bases rounded and covered with stout setae in ventral view; each with distal part resembling profile of bent finger in lateral view, upturned in distal half; mesal basodorsal process slender, curved downward, with middorsal hump, densely covered with stout setae in lateral view; recurved process absent. Phallus semimembranous, with dorsal flange; parameres absent; phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Korboot (1964).

**LENGTH OF FOREWING:** Male, 6.5 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation). Paratype, 1 male -- same data as for holotype, (QM, Vial II); 1 male, AUSTRALIA: SE Queensland, Bulimba Creek, Brisbane, 23 Oct 1979, (no collector given), (NMV, genitalia prep., PT-721).

**DIAGNOSIS:** This species differs from the other species of *T. (Austrotriaena)* by the upturned distal part of each inferior appendage and the semimembranous phallus with the dorsal flange.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Austrotriaena* is unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Austrotriaena) fijiana* Mosely, 1941

Fig. 3.26
**Triaenodes fijiana** Mosely, 1941; p. 364, figs. 5-8 (male).

**TYPE MATERIAL:** Holotype, male: FIJI ISLANDS: Viti Levu, Suva, 2-VIII-1923, C. L. Edwards, Brit. Mus. 1923-408, (BMNH, (E) #250351).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat rectangular in lateral view, longest laterally, anterior margins sinuous, posterior margins convex. Upper part of tergum X somewhat wide and lightly sclerotized, setose lobe; lower part of tergum X forming pair of long, acute, asymmetrical spines, left spine obwed gradually mesad and dorsad, right spine bent suddenly upward and slightly to right. Preanal appendages digitate, setose. Inferior appendages subtriangular in lateral and ventral views, covered with stout setae, apically blunt; each with mesal basodorsal process clavate, curved caudoventrad, setose in apical half; recurved process absent. Phallus large, basal two-thirds of phallus sclerotized, apex semimembranous, deeply divided into thick dorsal lobe and slender ventral lobe in lateral view; parameres absent.; phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** This species differs from the other species by the asymmetrical pair of spines of the lower part of tergum X and by the large, deeply divided phallus.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Austrotriaena* is unknown.

**DISTRIBUTION:** Fiji Islands.

**BIOGEOGRAPHIC REGION:** Australasian region.
Trienodes (Austrotriaena) lanceolata Kimmins 1957a

Fig. 3.27

Trienodes lanceolata Kimmins, 1957a; p. 307-308, fig. 16 (male).

**TYPE MATERIAL:** Holotype, male: SOLOMON ISLANDS. Guadalcanal, Tapenanje, 10-15.xii.1953, J. D. Bradley, 1954-222 (BMNH, (E) # 251407 and 251408).

**DESCRIPTION:** Kimmins described the species as follows:

“General colour dark ochraceous. Fore wing membranous pale fuscous. Antennae broken, basal segment of each without scent scales. Maxillary palpi incomplete. Venation typical of genus.”

**MALE GENITALIA:** Abdominal segment IX rectangular in lateral view, anterior margins nearly straight, produced caudad ventrally, about 1.5 times as long ventrally as dorsally. Upper part of tergum X narrow, lanceolate, apicolateral margins bearing stout setae; lower part of tergum X tall, roof-like, apically notched in dorsal view, about as long as preanal appendages and upper part of tergum X. Preanal appendages nearly parallel-sided in lateral view, long-triangular in dorsal view, setose. Inferior appendages short, reaching apices of other appendages, subtriangular in lateral and ventral views, distal half slightly bent caudodorsad, outer surface covered with stout setae; mesal basodorsal process with short, slender stem, apical three-fourths suddenly thicker, sickle-shaped, curved downward; recurved process absent. Phallus short, sclerotized tube except membranous in apicodorsal one-fifth, almost straight in lateral view; parameres absent; phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 8.25 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** This species is distinguished from the other species in that the upper part of tergum X is a lancolate plate bearing stout setae and the lower part of tergum X is a very tall, roof-like plate.
PHYLOGENY: The phylogeny of this species in the subgenus Austrotriaena is unknown.

DISTRIBUTION: Guadalcanal Islands.

BIOGEOGRAPHIC REGION: Australasian region.

_Triaenodes (Austrotriaena) manni_ Banks, 1936

Fig. 3.28

_Triaenodes manni_ Banks, 1936; p. 31-32, fig 4 (male).

TYPE MATERIAL: Holotype, male: FIJI ISLANDS: Wainganitu (W. M. Mann) (MCZC, Type 22043).

DESCRIPTION: Head and thorax brownish yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings brownish yellow.

MALE GENITALIA: Abdominal segment IX somewhat triangular in lateral view, dorsum very short, venter longer than inferior appendages, anterior margin convex, posterior margin diagonal and nearly straight in dorsal two-thirds then curved 90° in ventral one-third, long ventral profile sinuous. Upper part of tergum X one long and slender lobe, apically setose; lower part of tergum X forming pair of sclerotized, slender spines, extending beyond inferior appendages, bent downward in lateral view to blunt apices. Preanal appendages two-thirds as long as lower part of tergum X, setose. Inferior appendages subquadrangular in lateral view, elliptical and divergent in ventral view, apical two-thirds (especially inner surface) covered with stout setae; mesal basodorsal process parallel with main body of inferior appendage, clavate, with stout apical setae, curved slightly downward; recurved process absent. Phallus slender, with basal three-fifths strongly sclerotized, apical two-fifths membranous, curved slightly downward; parameres absent; phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.
LENGTH OF FOREWING: Male, 6.5 mm

MATERIAL EXAMINED: Holotype, male (the upper part of tergum X of the holotype is damaged; Fig. 28A shows this structure in its probable position).

DIAGNOSIS: The male of this species most nearly resembles *T. trifida*; however, the preanal appendages are much longer in *T. manni* and the main body of each inferior appendage is shorter and more broadly rounded apically.

PHYLOGENY: The phylogeny of this species in the subgenus *Austrotriaena* is unknown.

DISTRIBUTION: Fiji Islands.

BIOGEOGRAPHIC REGION: Australasian region.

*Trienodes (Austrotriaena) trifida* Kimmins 1957a

Fig. 3.29

*Trienodes trifida* Kimmins, 1957a; p. 305-307, fig. 15 (male).


DESCRIPTION Kimmins (1957a):

“General colour ochraceous, head and thorax, rather darker. Antennae light ochraceous with darker annulations. Basal segment with a suture along its upper surface, from which can be exerted a membrane, covered with scales. In a fluid-preserved specimen theses scales can be seen as a reddish mass within the segment. Wings more acute apically than in *T. excisa*, venation much as in *T. picea* and *T. excisa*.”

MALE GENITALIA Kimmins (1957a):

“Ninth segment reduced dorsally to a narrow, transverse band. Tenth segment [upper part of tergum X] composed of a very long, slender, pale finger, arched from the side, slightly clavate and setose apically. On either side of this central process is an even longer, downwardly curved, slender spine [deeply bifid lower part of tergum X]. Cerci [preanal appendages] short, digitate. Aedagus long, moderately slender, its apex deeply bifid and membranous. Clasper [inferior appendage] about as long as ninth segment, from the side about two and a half
times as long as wide, apex terminating in a small hook. The inner basal angles are fused and produced tailward in a pair of divergent, downwardly curved blades [mesal basodorsal process], with rounded apices."

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 3.25mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species resembles that of *T. manni*; however, the preanal appendages are shorter and stouter in *T. trifida* and the main body of each of its inferior appendages is narrower and longer in lateral and ventral views. Also, the mesal basodorsal process of each inferior appendage is much longer, which means that the apex of the mesal basodorsal process extends beyond the apicoventral margin of the inferior appendage in lateral view.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Austrotriaena* is unknown.

**DISTRIBUTION:** Guadalcanal Islands.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triænodes (Austrotriaena) zetes* Malicky, 2005

*Triænodes zetes* Malicky, 2005: p. 37, pl. 5 (male).


**DESCRIPTION** Malicky (2005, translated from Gerrman):

“Dark reddish brown, forewing 5 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):
“Genitalia (Plate 5): Segment IX uniformly short, ventrally projecting very little. Segment X [lower part of tergum X] constituted as very large triangle (in lateral view) or blunt triangular body (in dorsal view). Preanal appendages oval, about half as long as segment X. Main body of each inferior appendage small and slender, with dorsal projection in middle with dorsal branch [mesal basodorsal process] projecting from it, this dorsal branch nearly straight and blunt and shorter than main body of appendage. In ventral view, inferior appendages appearing together somewhat rounded and quadrate, with deep groove in distal part of inner edge, in which blunt, straight dorsal branch projecting caudad. Phallus long and slender.

I do not know similar species. Specimens from Mussau Island have in lateral view a slightly concave anterior edge of segment IX and somewhat more slender apical finger on each inferior appendage, those from Dyaul and Lavongai have a straight edge. I do not believe that a designation of subspecies is necessary.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is distinguished from the other species by the absences of upper part of tergum X and the blunt triangular lower part of tergum X.

**PHYLOGENY:** The phylogeny of this species in the subgenus *Austrotriaena* is unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.
CHAPTER VII

SUBGENUS *TRIAENODELLA* MOSELY, 1932a

Type species: *Triaenodes chelifera chelifera* Mosely, 1932a

There have been 57 species of this subgenus found in all major biogeographic regions except the Neotropical and Antarctic regions. The relationships of this subgenus and other subgenera are discussed in Chapter III (Fig. 2.1).

Males of this subgenus share a synapomorphy (Figs. 2.1, 3.63A) that (13) the capitate mesal basodorsal process of each inferior appendage has its head often divided or otherwise modified. In this subgenus, the form of the mesal basodorsal process shows considerable variability: capitate, slightly subdivided; apex dorsally humped or with beak-shaped apex, deeply subdivided into two processes or one process reduced to leave a single process. Transition series can be seen with apparent lineages in the subgenus, but more evidence is needed to detect clear relationships.

Subgenus *Triaenodella* adult males are distinguishable from other subgenera by the following characters: (1) the preanal appendages are long, slender, and setose; (2) the upper part of tergum X is usually a long and slender median lobe or apparently reduced; (3) the median lobe of the upper part of tergum X has a pair of lateral processes at midlength or a pair of small basal papillae (probably vestiges of lateral processes of the upper part of tergum X) present at the base of the upper part of tergum X; (4) the lower part of tergum X is usually a pair of sclerotized spines; (5) the male inferior appendages lack a pair of recurved processes and each has a large
mesal basodorsal process and often a smaller lateral subbasodorsal process; (6) the male phallus usually lacks parameres, but some species have parameres or spines.

One monophyletic lineage has been recognized in this subgenus (Fig. 2.5). The synapomorphy is that (39) the mesal basodorsal process of each inferior appendage is subdivided (Figs. 3.30A, 3.39A, 3.47A). This lineage is further divided into two sublineages: sublineage #1 includes the T. (Triaenodella) forficata Group, the T. (Triaenodella) lurideola Group, and the T. (Triaenodella) serrata Group; and sublineage #2 includes the T. (Triaenodella) ataloma Group, the T. (Triaenodella) moselyi Group, and the T. (Triaenodella) nesiotina Group. The remaining phylogenetic relationships in this subgenus are mostly unresolved.

Sublineage #1

The T. (Triaenodella) forficata Group, T. (Triaenodella) lurideola Group, and T. (Triaenodella) serrata Group share a synapomorphy for (40) a dorsally humped mesal basodorsal process of each inferior appendage (Fig. 3.30A).

_Triaenodes (Triaenodella) forficata_ Group

The T. (Triaenodella) forficata Group has seven species found in the Australasian and Oriental regions. Two synapomorphies are that (41) the lateral subbasodorsal lobe of each inferior appendage has a pair of long apical setae (Fig. 3.30A) and (42) the upper part of tergum X is bilobed (Fig. 3.32B).

_Triaenodes (Triaenodella) forficata_ Neboiss and Wells, 1998

Fig. 3.30

_Triaenodes forficata_ Neboiss and Wells, 1998; p. 122, figs. 106-107 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Deddick River, half km above Snowy River junction, 13 Dec 1976, A. Neboiss, (NMV, T-16288).
**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX trapezoidal in lateral view, anterior margins broadly bent 90° just below mid-height, with lower anterior margins more or less parallel with sinuous posterior margins, posterior margins deeply incised and membranous above middle, dorsum of segment IX extremely short, venter as long as posterior margins. Upper part of tergum X forming pair of slender membranous lobes, fused in basal half in dorsal view, half as long as preanal appendages; lower part of tergum X pair of sclerotized, elongate spines, tapering to apex, asymmetrical, left side slightly shorter than right side. Preanal appendages slender, as long as lower part of tergum X, setose. Inferior appendages each quadrate basally with tapered distal part longer than base and evenly curved caudodorsad in lateral view, tapered and 3 times as long as basal width in ventral view; mesal basodorsal process strongly down-turned, apically slender, tapering to apex, middorsally with stout hump bearing several setae, lateral subbasodorsal process thumb-like with pair of strong, long apical setae; recurved process absent. Phallus down-curved, apical half membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.4-6.6 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- Victoria, Genoa River, nr Wangarabell, 18 Mar 1977, A. Neboiss, (NMV, T-16290, genitalia prep, PT-753 – the preanal appendages and the upper part of tergum X are broken).

**DIAGNOSIS:** The male of this species has the general form of genitalia of other members of this Group, but the distal part of each inferior appendage is much longer than that of the other species and the spines of the lower part of tergum X are less asymmetrical.

**PHYLOGENY:** The phylogenetic relationships among the five species in this Group are unknown.
**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) notalia* Neboiss and Wells, 1998

Fig. 3.31

*Triaenodes notalia* Neboiss and Wells, 1998; p. 119, figs. 100-102 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Yarra River, 2 km N of Wonga Park, 23 Feb 1976, A. Neboiss, (NMV, T-16219).

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings brown, with dense brown hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat triangular in lateral view; anterior margins nearly vertical and broadly convex in lower third, posterior margins diagonal and deeply incised and membranous above middle, dorsum extremely short and venter about as long as anterior margins. Upper part of tergum X pair of membranous lobes, fused in basal half in dorsal view, about half as long as preanal appendages; lower part of tergum X pair of sclerotized, elongate spines, tapering to acute apices, asymmetrical, right side longer than left side. Preanal appendages slender, as long as left spine of lower part of tergum X, setose. Inferior appendages each with main body nearly square in lateral view, with distal part about 0.8 times as long as main body; narrow triangular in ventral view, about 2.3 times as long as basal width, apically blunt; mesal basodorsal process strongly hooked, dorsomedi ally with round hump bearing several setae, tapering to apex, lateral subbasodorsal process digitate with pair of strong, long apical setae; recurved process absent. Phallus slightly down-turned, dilated in middle; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.3-6.7 mm.
**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16220, genitalia prep., PT-798).

**DIAGNOSIS:** The male of this species has the general form of genitalia of other members of this Group. This species is very similar to *T. wannonense*, but it differs from that species in the shorter upper part of tergum X and the longer inferior appendages in the ventral view.

**PHYLOGENY:** The phylogenetic relationships among the five species of this Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) probolia* Neboiss and Wells, 1998

Fig. 3.32

*Triaenodes probolia* Neboiss and Wells, 1998; p. 118, figs. 97-99 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, 16 km W Ravenshoe, 2 Jan 1975, M.S. Moulds, (NMV, T-16324, genitalia prep., PT-2040).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX triangular in lateral view; anterior margin nearly straight except rounded ventrally, posterior margin diagonal and slightly sinuous, dorsum extremely short, venter about as long as either anterior or posterior margins. Upper part of tergum X pair of membranous lobes about two-thirds as long as preanal appendages; lower part of tergum X pair of sclerotized, slender, acute spines, fused in base half, asymmetrical, spines unequal length, right side curved 90° toward left and longer than straight left side. Preanal appendages slender, as long as segment IX, setose. Inferior appendages stout, more or less square
basally in lateral view with blunt distal part about 0.3 times base; broadly elliptical in ventral view, each with dark spur on inner apical margin; mesal basodorsal process slender basally, very broad distally, dorsomedially truncate and setose, caudally truncate, ventrally rounded; lateral subbasodorsal process very short, with pair of strong, long apical setae; recurved process absent. Phallus slightly down-turned, with pair of dorsolateral flanges in middle, apical one-third membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.3 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species has the general form of genitalia of other members of this Group. This species differs from them in the broadly elliptical inferior appendages in the ventral view. Also, the dark spur on the inner apical margin of each inferior appendage is very distinctive.

**PHYLOGENY:** The phylogenetic relationships among the five species of this Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

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*Triaenodes (Triaenodella) vespertina* Neboiss and Wells, 1998

Fig. 3.33

*Triaenodes vespertina* Neboiss and Wells, 1998; p. 121, fig. 103 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Forrest, 19 Jan 1956, A. Neboiss (NMV, T-16279).

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings brown, with dense brown hairs.
**MALE GENITALIA:** Abdominal segment IX triangular-pentagonal in lateral view; anterior margins broadly convex near middle, posterior margins more diagonal and broadly convex slightly above middle and deeply incised with membrane well above middle, dorsally very short, ventrally 0.6 times as long as posterior margins. Upper part of tergum X pair of membranous lobes, fused in basal half in dorsal view, left lobe slightly longer than right lobe and about half as long as preanal appendages; lower part of tergum X pair of slender, sclerotized acute spines, asymmetrical, right side longer than left side. Preanal appendages slender, as long as left spine of lower part of tergum X, setose. Inferior appendages each trapezoidal in lateral view with ventral profile convex and twice as long as concave dorsal profile, subtriangular in ventral view, 1.6 times as long as basal width, slightly bifid apically; mesal basodorsal process much broader dorsomedially than at either end, bearing several setae, tapering to acute apex, strongly down-turned; lateral subbasodorsal process short, digitate, with pair of strong, long apical setae; recurved process absent. Phallus almost straight, slightly down-turned, dorsally membranous; parameres absent; phalotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.9 - 6.5 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16280, genitalia prep., PT-806).

**DIAGNOSIS:** The male of this species has the general form of the genitalia of other members of this Group. This species is very close to *T. wannonense*, but it differs from that species in the shorter upper part of tergum X and the smoothly rounded mesal basodorsal process of each inferior appendage in lateral view.

**PHYLOGENY:** The phylogenetic relationships among the five species of this Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.
Triaenodes (Triaenodella) wannonensis Neboiss and Wells, 1998

Fig. 3.34

Triaenodes wannonense Neboiss and Wells, 1998; p. 121, figs. 104-105 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Wannon River, 25 km S of Halls Gap, Grampians, 10 Dec 1976, J.E. Bishop, (NMV, T-16248).

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings brown, with dense brown hairs.

**MALE GENITALIA:** Abdominal segment IX triangular-pentagonal in lateral view; anterior margins broadly angled 45° near middle, posterior margins diagonal and broadly angled near middle and deeply incised and membranous in most of upper half, dorsally extremely short, ventrally as long as height of anterior margins. Upper part of tergum X pair of membranous lobes, forked at about one-third length in dorsal view, right lobe longer than left lobe and about 0.75 times as long as preanal appendages; lower part of tergum X pair of slender, sclerotized, acute spines, asymmetrical, left spine longer than right spine and other genital appendages. Preanal appendages slender, setose, about 0.75 times as long as right spine of lower part of tergum X. Inferior appendages each vaguely triangular in lateral view, 1.3 times as long as basal width; triangular in ventral view, 1.8 times as long as basal width in ventral view, apically acute in both views; mesal basodorsal process sharply hooked ventrad, stoutly humped dorsomedially and bearing several setae, acute apically; lateral subbasodorsal process short, digitate with pair of strong and long apical setae; recurved process absent. Phallus slightly down-turned, with pair of dorsolateral flanges in middle, dorsally membranous; parameres absent; phallosomal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.4 – 7.0 mm.
**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16248, genitalia prep., PT-804).

**DIAGNOSIS:** The male of this species has the general form of the genitalia of other members of this Group. This species is very similar to *T. notalia*, but it has a longer upper part of tergum X and shorter inferior appendages.

**PHYLOGENY:** The phylogenetic relationships among the five species of this Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*T.* *(Triaenodella) lurideola* Group and *T.* *(Triaenodella) serrata* Group

The *T.* *(Triaenodella) lurideola* Group and *T.* *(Triaenodella) serrata* Group have a synapomorphy in which (43) the upper part of tergum X is inconspicuous (Figs. 3.37B, 3.41B). Two species *incertae sedis* have been recognized near these Groups, by that synapomorphy 43, but lacking evident synapomorphies of either Group.

*Triaenodes (Triaenodella) lurideola* Group

The *T.* *(Triaenodella) lurideola* Group has three species found in the Oriental region. A synapomorphy indicating their monophyly is that (44) the distal part of each inferior appendage is obliquely truncated in ventral view (Fig. 3.37C).

*Triaenodes (Triaenodella) lurideola* Mey, 1990

Fig. 3.36

*Triaenodes lurideola* Mey, 1990; p. 17, figs. 41-42 (male).
**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Nord-Luzon, Ifugao, Banaue vic., 20 km N Lagawe, 1200 m, 22.IX.–16.X. 1988 (ZMHB).

**DESCRIPTION:** Head and thorax brownish yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs as short and dark brown hairs. Forewings and hind wings brownish yellow.

**MALE GENITALIA:** Abdominal segment IX almost completely divided into two parts posterolaterally by deep membranous incision; dorsal half rhomboid in lateral view, ventral half rectangular and nearly as long as height of dorsal half, anterior margin convex in middle, dorsally short. Upper part of tergum X inconspicuous; lower part of tergum X pair of slender, acute spines, widely separated basally, symmetrical, directed caudoventrad apically, longer than other appendages. Preanal appendages slender, reaching apices of inferior appendages, setose. Inferior appendages each with subbasal dorsal margin rounded and ventral profile concave and blunt apically in lateral view, slightly incurved and apically somewhat obliquely truncate in ventral view; mesal basodorsal process dorsally rounded and bearing several setae, distally sharp, directed ventrad; recurved process, lateral subbasodorsal process, and subapical process absent. Two-thirds of phallus sclerotized, apex membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 4.1 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species is very similar to those of *T. semigraphata* and *T. transversaria*, but the lower part of tergum X is shorter and the mesal basodorsal process of inferior appendages is more smoothly rounded and less humped in lateral view.

**PHYLOGENY:** The phylogenetic relationships of these three species are unresolved.

**DISTRIBUTION:** Philippines (Luzon).

**BIOGEOGRAPHIC REGION:** Oriental region.
Triaenodes (Triaenodella) semigraphata Mey, 1990

Fig. 3.37

Triaenodes semigraphata Mey, 1990; p. 17-18, figs. 37-38 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Nord-Luzon, Ifugao, Banaue vic., 20 km N Lagawe, 1200 m, 22.IX.–16.X.1988 (ZMHB).

**DESCRIPTION:** Head and thorax brownish yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs as short and dark brown hairs. Forewings and hind wings brownish yellow.

**MALE GENITALIA:** Abdominal segment IX almost divided into two parts posterolaterally by deep membranous incision; dorsal half elliptical in lateral view, ventral half triangular and 0.8 times as long as height of dorsal half, anterior margin rounded. Upper part of tergum X inconspicuous; lower part of tergum X pair of slender, acute spines, much longer than other genital appendages and recurved apically beyond all appendages, with tips directed cephalad, symmetrical. Preanal appendages slender, reaching middle of inferior appendages, setose. Inferior appendages each with main body slightly larger basally than apically, rounded apically in lateral view, rectangular in ventral view with obliquely truncate apex; mesal basodorsal process middorsally with setose hump extending well beyond acute, somewhat recurved apex of this process; recurved process absent. Two-thirds of phallus sclerotized, apex membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 4 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** This male of this species is most similar to *T. transversaria*, but the lower part of tergum X is shorter and the mesal basodorsal process of each inferior appendage is more strongly humped than that of *T. transversaria.*
PHYLOGENY: The phylogenetic relationships among these three species are unknown.

DISTRIBUTION: Philippines (Luzon).

BIOGEOGRAPHIC REGION: Oriental region.

_Triaenodes (Triaenodella) transversaria_ Mey, 1990

Fig. 3.38

_Triaenodes transversaria_ Mey, 1990; p 18, figs. 39-40 (male).


DESCRIPTION: Head and thorax brownish yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs as short and dark brown hairs. Forewings and hind wings brownish yellow.

MALE GENITALIA: Abdominal segment IX completely divided into two parts posterolaterally by deep membranous incision; dorsal half rhomboid in lateral view, ventral half triangular and 0.8 times as long as height of dorsal half, anterior margin rounded, dorsum extremely short. Upper part of tergum X inconspicuous; lower part of tergum X pair of slender, acute spines, symmetrical, extending well beyond other genital appendages and recurved anterad among them. Preanal appendages slender, extending horizontally nearly to ventral apex of segment IX, setose. Inferior appendages each with main body trapezoidal, taller than long, distal part extending straight beyond it, apically blunt and as long as ventral profile of main body, with laterally rounded base and appearing more or less rectangular with obliquely truncate apex in ventral view; mesal basodorsal process somewhat triangular in lateral view, dorsally rounded and setose, distally blunt, directed ventrad; recurved process absent. Basal one-third of phallus sclerotized, apex membranous; paramere absent; phallosomal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 4 mm.
MATERIAL EXAMINED: Holotype.

DIAGNOSIS: The male of this species closely resembles *T. semigraphata*, but the lower part of tergum X is longer and the overall shape of the mesal basodorsal process and the main body of each inferior appendage is clearly different.

PHYLOGENY: The phylogenetic relationships of these three species are unknown.

DISTRIBUTION: Philippines (Luzon).

BIOGEOGRAPHIC REGION: Oriental region.

*Triagenodes* (*Triagenodella*) *serrata* Group

The *T. (*Triagenodella*) *serrata* Group has four species found in the Afrotropical region. A synapomorphy is that (45) the lower part of tergum X has a recurved spine-like process (Figs. 3.40A, 3.41A).

*Triagenodes* (*Triagenodella*) *bifida* Jacquemart, 1966a

Fig. 3.39

*Triagenodes bifida* Jacquemart, 1966a; p. 4-6, fig. 3 (male).


DESCRIPTION Jacquemart (1966a, translated from French):

“Forewing 8.5 mm; hind wing 6 mm.
“The first antennal segment resembles those of *Triagenodella*, but the scent organ is not visible.
“MALE GENITALIA – The superior [preanal] appendages are somewhat short and slender; their upper edge is covered with a fringe of long hairs. From tergum IX arises a ribbon-like piece [lower part of tergum X]: at first straight and directed posterad, it is then curved upward like the blade of a sickle. The phallus is thick and slightly curved, it has a finger-like expansion on the upper edge. An intermediate piece arises near the base of the gonopod [inferior appendage] beginning with slender stalk then becoming broader to form the profile of a triangle [mesal basodorsal process]. The upper angle of the triangle [mesal
basodorsal process] projects in a short, rounded point bearing hairs while the lower angle has the long point which is curved ventrad and anterad.
“The gonopod, broader than long, is very convex, the angle postro-dorsally extended in a short expansion [dorsal process of the inferior appendage] with 2-3 long hairs.
“This species is close to T. falcata Kimmins but the upper part of the gonopod has a different profile: it is more finely stalked and its two angles produce longer processes.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Males of this species shows similarities to T. falcata, T. serrata, and T. sicula in the shape of the lower part of tergum X. This species and T. falcata can be separated from T. serrata and T. sicula by the recurved spine-like process which does not have the spines distally. This species differs from T. falcata in the shape of the mesal basodorsal process of the inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of these four species are unknown.

**DISTRIBUTION:** Democratic Republic of Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

_Triaenodes (Triaenodella) falculata_ Kimmins 1956

Fig. 3.40

_Triaenodes falculatus_ Kimmins, 1956; p. 122, fig. 2 (male).

**TYPE MATERIAL:** Holotype, male: SOUTH AFRICA: King William’s Town, Annshaw, McLachlan Collection 1938-674, (BMNH, (E) # 251397).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown; antennal scapes long with scent-organs; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat trapezoidal in lateral view, anterior margins very convex in middle, posterior margins diagonal, short dorsally, as long
ventrally as base of lower part of tergum X. Upper part of tergum X reduced to pair of small
dorsomesal papillae; lower part of tergum X basally slender, distally with forks abruptly angled
dorsad, left fork spine-like and recurved ventrad, right fork 0.2 times as long as left fork and
curved caudad to truncate apex. Preanal appendages slender, setose, as long as other genital
appendages. Inferior appendages nearly square in lateral view with rounded corners, quadrangular
in ventral view, distal part short; mesal basodorsal process dorsally rounded and bearing several
setae, distally sharp and pointing ventrad; lateral subbasodorsal process digitate bearing several
setae; recurved process absent. Phallus longitudinally trough-shaped, short, stout, curved ventrad,
dorsal surface membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 8.5 mm.

**MATERIAL EXAMINED:** Holotype (mounted as microscope preparation).

**DIAGNOSIS:** The male of this species shows similarities to those of *T. bifida*, *T.
serrata*, and *T. sicula* in the shape of the lower part of tergum X. This species and *T. bifida* can be
separated from *T. serrata* and *T. sicula* by the recurved spine-like process of the lower part of
tergum X which does not have spines distally. This species differs from *T. bifida* in the shape of
the mesal basodorsal process of the inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of these four species are unknown.

**DISTRIBUTION:** South Africa.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes* (*Trienodella*) *serrata* Ulmer, 1912

Fig. 3.41

*Triaenodes serrata* Ulmer, 1912; p. 110-111, fig. 38 (male).

**TYPE MATERIAL:** Holotype, male: SUDAN: Schilluk-Insel, (ZFMK).
DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX hemispherical in lateral view, with anterior margins and ventral profile continuously convex, posterior margin diagonal with small right angle in middle. Upper part of tergum X reduced to pair of small dorsomesal papillae; lower part of tergum X narrow and triangular basally with single, spine-like process abruptly angled dorsad and then recurved caudoventrad, bearing subapicoventral and apical spines. Preanal appendages slender, setose, twice as long as base of lower part of tergum X. Inferior appendages more or less trapezoidal in lateral view with distal part very short and obliquely truncate, triangular in ventral view with distal part short and pointed; mesal basodorsal process dorsally humped bearing several setae, distal portion much longer than hump, narrow and sharp; lateral subbasodorsal process digitate and bearing several setae; recurved process absent. Phallus large trough-shaped, asymmetrical, with strong spine on right side and large, rounded flange on left side, apex membranous; parameres absent; phallostremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 7 mm.

MATERIAL EXAMINED: The holotype of this species was not examined. The following specimen was examined: 1 male -- TANZANIA: Morogoro Region; Morogoro, Sokoine University, 11 Nov 1990, ZMB’s Tanzania Exp. 1990, Light trap (ZMUB).

DIAGNOSIS: The male of this species shows similarities to those of *T. bifida*, *T. falculata*, and *T. sicula* in the shape of the lower part of tergum X. This species and *T. sicula* can be separated from *T. bifida* and *T. falculata* by the recurved spine-like process having spines distally. However, this species differs from *T. sicula* in that the preanal appendages are much longer than those of *T. sicula* and the mesal basodorsal process is distally long and pointed.

PHYLOGENY: The phylogenetic relationships of these four species are unknown.
DISTRIBUTION: Sudan.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodella) sicula* (Barnard, 1934)

Fig. 3.42

*Adicella sicula* Barnard, 1934; p. 357, figs. 35 h, 35i (male).


**DESCRIPTION** Barnard (1934):

“Imago: Venation very like that of *triaenodiformis*, but stalk of fork 1 slightly longer.
Head and thorax pale ochraceous [yellow], with whitish hairs. Antennae ochraceous [yellow], with narrow dark annulations. Wings pale ochraceous [yellow].”

**MALE GENITALIA** Barnard (1934):

“9th tergite transverse, with two small projections; preanal appendages short, rod-like, setose; 10th tergite [lower part of tergum X] a narrow triangular plate, bearing at its apex a long movable semi-circularly curved process, which is apically serrate on its lower margin; penis [phallus] stout, strongly curved, with a chitinised spiniform process at base (on right side only in the single specimen) [I assume this is the same spine on the phallus of *T. serrata*]; clasper [inferior appendage] biramous [having two branched], the upper branch [mesal basodorsal process] apically furcated [forked], the lower branch [main body of inferior appendage] apically excised on upper margin.”

“REMARKS – Beside the similarity of the venation to that of the Abyssinian species there is a most remarkable likeness in the ♂ genitalia to those of *Triaenodes serrata* Ulmer (1912, p.110, fig. 38). The preanal appendages in *A. sicula* are much shorter, but the penis and claspers in lateral view are very similar. So is the 10th tergite with its large curved serrate process; but whereas here the tergite is entire and the process single, in *T. serrata* the tergite is bifid and each lobe bears a process.”

**FEMALE AND IMMATURE STAGES:** Unknown.
LENGTH OF FOREWING: Male, 7 mm.

MATERIAL EXAMINED: None.

DIAGNOSIS: Males of this species show some similarities to T. bifida, T. falculata, and T. serrata in the shape of the lower part of tergum X. This species and T. serrata can be separated from T. bifida and T. falculata by the recurved spine-like process having spines distally. However, this species differs from T. serrata in that preanal appendages are much short than that of T. serrata and the mesal basodorsal process is distally short and blunt.

PHYLOGENY: The phylogenetic relationships of these four species are unknown.

DISTRIBUTION: South West Africa.

BIOGEOGRAPHIC REGION: Afrotropical region.

Species incertae sedis near T. (Triaenodella) lurideola and T. (Triaenodella) serrata Groups
Species incertae sedis that share synapomorphy 43 with these groups include T. corynotra and T. legona.

_Triaenodes (Triaenodella) corynotra_ Neboiss and Wells, 1998

Fig. 3.43

_Triaenodes corynotra_ Neboiss and Wells, 1998; p. 118, figs. 91-93 (male).


DESCRIPTION: Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings brown, with dense brown hairs.

MALE GENITALIA: Abdominal segment IX generally trapezoidal in lateral view, anterior margins broadly rounded about 90° near middle, posterior margins deeply incised
diagonally near middle, dorsal margin very short, ventral margin about half as long as segment IX is tall. Upper part of tergum X inconspicuous, lower part of tergum X pair of slender acute spines curved slightly caudoventrad and divergent, asymmetrical, right spine 0.7 times as long as left spine, widely separated at base with short indented membranous structure between spines. Preanal appendages slender, setose, nearly as long as right spine of lower part of tergum X. Inferior appendages each parallel-sided, upturned, and apically round in lateral view, rectangular with tapered and blunt apex in ventral view. Mesal basodorsal process slender basally, hatchet-shaped distally, with tall blunt hump bearing several setae, rounded ventral apex; recurred process absent. Phallus narrow, long, curved slightly ventrad, apex membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.3 – 5.8 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- AUSTRALIA: Northern Territory, Kakadu National Park, Radon Creek, 3 Sep 1979, J. Blyth, (NMV, T-16330, genitalia prep., PT-765).

**DIAGNOSIS:** The males of this species shows similarities to those of the three species of the *T. lurideola* Group in the absence of upper part of tergum X and in the structure of the inferior appendages. However, it differs from these in that the lower part of tergum X has short indented membranous structure basally and the membranous part of sternum IX is not as distinctive as these three species whose segment IX is deeply incised laterally and filled with membrane.

**PHYLOGENY:** The phylogenetic relationships of this species are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) legona* Mosely, 1939a
Fig. 3.44

*Trichromas legona* Mosely, 1939a; p. 14, figs. 34-38 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX twice as tall as long ventrally, anterior margin mostly convex. Upper part of tergum X reduced, with pair of small dorsomesal papillae, lower part of tergum X pair of slender acute spines, basally directed downwards, bent slightly upwards about middle. Preanal appendages slender, setose, about 0.8 times as long as spines of lower part of tergum X. Inferior appendages parallel-sided, straight, blunt apically in lateral view, elliptical in ventral view. Mesal basodorsal process slender in basal half, apex broad, furcated, dorsally angled and bearing several setae, distally pointed ventrad; recurved process absent. Phallus broad, membranous apically, curved slightly caudoventrad; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype (mounted as microscope preparation).

**LENGTH OF FOREWING:** Male, 6 mm.

**DIAGNOSIS:** The male of this species shows similarities to the three species of *T. lurideola* in the absence of the upper part of tergum X and the structure of the inferior appendages. However, it differs from them in that the lower part of tergum X is shorter than the other species and the mesal basodorsal process has a more prominently angled hump.

**PHYLOGENY:** The phylogenetic relationships of this species are unknown.

**DISTRIBUTION:** Kenya.

**BIOGEOGRAPHIC REGION:** Afrotropical region.
Species incertae sedis near *T. (Triaenodella) forficata*,
*T. (Triaenodella) lurideola*, and *T. (Triaenodella) serrata* Groups

*Trienodes (Triaenodella) cusposia* Neboiss and Wells, 1998

Fig. 3.35

*Trienodes cusposia* Neboiss and Wells, 1998; p. 118, figs. 94-96 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Genoa Creek, 5 km W of Genoa, 31 Jan 1975, A. Neboiss, (NMV, T-16356, genitalia prep, PT-752).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat bean-shaped in lateral view; anterior margins rounded above middle, posterior margins sinuous and deeply incised in middle with membrane, dorsally short, ventrally 0.75 times as long as tall. Upper part of tergum X single membranous lobe slightly notched apically, nearly half as long as preanal appendages; lower part of tergum X pair of widely separated slender spines, asymmetrical, right spine shorter than left spine, both blunt apically. Preanal appendages slender, as long as right spine of lower part of tergum X, setose. Inferior appendages each triangular in lateral view, 3.0 times as long as basal height and as long as left spine of lower part of tergum X; narrow, bowed in ventral view, apically blunt; with setose mesobasal process visible only in ventral view; mesal basodorsal process foot-shaped, with slender, twisted basal “ankle,” middorsal “heel” round and bearing several setae, caudoventral “toe” blunt; lateral subbasodorsal process slender with several apical setae; recurved process absent. Phallus slender subbasally, dilated distally, apex membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.3-6.7 mm.
**MATERIAL EXAMINED**: Holotype.

**DIAGNOSIS**: The male of this species differs from the other species of this Group by having a well developed mesobasal process at the base of each inferior appendage in ventral view (Fig. 3.35C). Also, the overall shape of each inferior appendage is slender, not quadrate like that of other species in the Group and its mesal basodorsal process is greatly expanded distally like a foot and twisted subbasally.

**PHYLOGENY**: The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #1 species possessing synapomorphy 40 are unknown.

**DISTRIBUTION**: Australia.

**BIOGEOGRAPHIC REGION**: Australasian region.

*Triaenodes (Triaenodella) kalydon* Malicky, 2005

*Trienaodes kalydon* Malicky, 2005: p. 35-36, pl.3 (male).


**DESCRIPTION** Malicky (2005, translated from German):
“Dark yellow with shadow-spots on the forewings. Forewings 7 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):
“Genitalia (Plate 3): Segment 9 ventrally somewhat long but gradually shorter from there upward. Segment X consisting of pair of very long, slender nearly straight fish-bone-like structures. Barely discernible structure always around their bases either part of segment X or possibly its superior appendages [preanal appendages]. Inferior appendages large, relatively long; each with its upper part arising from it in lateral view stalked and roundish, in ventral view mesally oblique flange, mesal margin beset with stout, erect bristles, and short basal finger. Dorsal branch arising from dorsal edge directed initially dorsocaudad then bent ventrad; not slender and symmetrical like other species, but in middle in lateral view greatly widened and proceeding then gradually into sharp point. Phallus long and slender.”

**FEMALE AND IMMATURE STAGES**: Unknown.

**MATERIAL EXAMINED**: None.
**DIAGNOSIS:** This male of this species has the general form of inferior appendages of the *T. forficata* Group by having the dorsally humped mesal basodorsal process and the digitate lateral subbasodorsal process. I assume that “a pair of very long, slender nearly straight fish-bone-like structures” refers to the upper part of tergum X; the presence and structure of the lower part of tergum X and the preanal appendages are not clearly indicated in Malicky’s description and illustrations.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #1 species possessing synapomorphy 40 are unknown.

**DISTRIBUTION:** Indonesia (Sumatra).

**BIOGEOGRAPHIC REGION:** Oriental region.

Sublineage # 2

The *T. (Triaenodella) nesiotina* Group, *T. (Triaenodella) moselyi* Group, *T. (Triaenodella) ataloma* Group, and 12 species *incertae sedis* share a synapomorphy that (46) the mesal basodorsal process of the inferior appendages is deeply divided at an acute angle (Fig. 3.46A). The phylogenetic relationships among the three Groups are unresolved.

**Triaenodes (Triaenodella) nesiotina** Group

The *T. (Triaenodella) nesiotina* Group has four species [the *uvida*-complex of Neboiss and Wells (1998), except excluding their *T. melanopeza*] found in the Australasian region. The synapomorphy is that (47) the mesal basodorsal process of the inferior appendage comprise a long curved branch [upper branch] with a beak-shaped apex and a triangular branch [lower branch] towards the base (Figs. 3.45A, 3.46A).

**Triaenodes (Triaenodella) nesiotina** Neboiss and Wells, 1998

*Triaenodes nesiotina* Neboiss and Wells, 1998; p. 125, figs. 124-127 (male).
**TYPE MATERIAL:** Holotype, male: AUSTRALIA: SE Queensland, Bulimba Creek, nr Brisbane, Kimmax Street riffle Site R1, 23 Oct 1979, (no collector given), (NMV, T-16340).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX trapezoidal in lateral view, anterior margins convex below middle, posterior margins diagonal and nearly straight, dorsally very short (tergum X and preanal appendages deeply set anteriorly from posterior margins), ventrally slightly longer than subdorsal region of segment IX below preanal appendages. Upper part of tergum X pair of membranous lobes, unequal, fused in basal half, lower part of tergum X pair of sclerotized spines, unequal, left spine slightly longer than right spine, membranous plate with subtriangular apex between them. Preanal appendages slender, setose, slightly longer than membranous plate. Inferior appendages each with four processes arising from common base (mesal basodorsal process, lateral subbasodorsal process, apicomesal lobe, and distal part), subtriangular in ventral view except distal part digitate, blunt apically, bent caudomesad; mesal basodorsal process expanded in distal half and divided apically into rounded branch bearing dorsal spine basally and several setae apically and slender, down-turned, acute branch [lower branch]; lateral subbasodorsal lobe digitate, short, bearing several long hairs; apicomesal lobe subtriangular in lateral and ventral views, covered with stout setae; recurved process absent. Phallus slightly expanded distally, shallowly bifid apically; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.3 – 6.4 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16341, genitalia prep., PT-722).
**DIAGNOSIS:** The males of this species show similarities to those of *T. nymphaea*, *T. torresiana*, and *T. unvida* in the structure of the mesal basodorsal process of each inferior appendage. However, it differs from those species by having a rounded apex of the mesal basodorsal process of the inferior appendage, while the apex of the mesal basodorsal process of the other three species is beak-shaped.

**PHYLOGENY:** The phylogenetic relationships among these four species are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) nymphaea* Neboiss and Wells, 1998

**Fig. 3.45**

*Triaenodes nymphaea* Neboiss and Wells, 1998; p. 124, figs. 118-120 (male).

**TYPE MATERIAL:** Holotype, male: WESTERN AUSTRALIA: Lily Creek, 1.5 km W of Kunaurra, 22 Feb 1977, J.E. Bishop, (NMV, T-16450).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX subtrapezoidal, anterior margins broadly protruding near middle, posterior margins generally convex and diagonal, dorsally short, ventrally as long as membranous lobe of lower part of tergum X. Upper part of tergum X reduced to small, triangular lobe, lower part of tergum X pair of sclerotized spines, crossing distally, membranous plate with rounded apex between them. Preanal appendages two-thirds as long as spines of lower part of tergum X, slender, setose. Inferior appendages with main body trapezoidal in lateral view, triangular in ventral view, distal part as long as ventral margin of main body, slightly upturned, covered with stout setae; mesal basodorsal process expanded in distal half and divided apically into long curved branch with beak-shaped apex bearing several setae and down-turned triangular
branch [lower branch]; lateral subbasodorsal process stout, apically rounded, bearing long setae; recurved process absent. Phallus dilated in distal half, tapering apically; parameres absent; phalotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.4 – 5.6 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16451, genitalia prep., PT-755).

**DIAGNOSIS:** The male of this species shows similarities to those of *T. torresiana* and *T. unvida* in the structure of the mesal basodorsal process of each inferior appendage. However, it differs from in that the mesal basodorsal process is apically less deeply divided than in other two species.

**PHYLOGENY:** The phylogenetic relationships among the four species of this Group are unknown.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) torresiana* Neboiss and Wells, 1998

Fig. 3.46

*Triaenodes torresiana* Neboiss and Wells, 1998; p. 127, figs. 128-130 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: N Queensland, Lockerbie Scrub, 16 Apr 1975, M.S. and B. J. Moulds, (NMV, T-16460).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat trapezoidal in lateral view, anterior margin with broad angle near middle, posterior margin diagonal with deep diagonal
incision near middle filled with membrane, dorsally short, ventrally about half as long as tall. Upper part of tergum X inconspicuous; lower part of tergum X pair of sclerotized spines, curved caudad and slightly mesad, right spine asymmetrically curved mesad slightly more than left spine, membranous plate with rounded apex between them. Preanal appendages about half as long as spines of lower part of tergum X, slender, setose. Inferior appendages main body more or less trapezoidal in lateral view, transversely rectangular in ventral view, mesal basodorsal process expanded in distal half, divided apically into long curved branch [upper branch] with apical beak bearing several setae, down-turned triangular branch [lower branch], tapering to apex; recurved process absent; lateral subbasodorsal process thumb-like, shorter than apicomesal lobe, bearing several long apical hairs; apicomesal lobe club-shaped, directed dorsocaudad, covered with stout setae. Phallus stout, arching ventrad, apically blunt; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.2 – 5.4 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16462, genitalia prep., PT-800).

**DIAGNOSIS:** The male of this species shows similarities to those of *T. nymphaea* and *T. unvida* in the structure of the mesal basodorsal process of each inferior appendage. However, it differs from them by the transversely rectangular ventral view of the basal part of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships among the four species of this Group are unknown.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Trianeonodes (Trianeodella) vida* Neboiss and Wells, 1998
Fig. 3.47

*Triaenodes uvida* Neboiss and Wells, 1998; p. 124, figs. 115-117 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Cabbage Tree Creek, 8 Feb 1961, N. Dobroworsky, (NMV, T-16354, genitalia prep., PT-751).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX shaped similar to that of *T. torresiana* in lateral view. Upper part of tergum X reduced to small, triangular lobe; lower part of tergum X pair of sclerotized, slightly asymmetrical spines crossing distally, membranous plate with notched apex between their bases. Preanal appendages about half as long as spines of lower part of tergum X, slender, setose. Inferior appendages with irregular main body about 5 times as tall as long in lateral view, subglobular in in ventral view, recurved process absent; mesal basodorsal process expanded in distal half, deeply divided apically into very long curved upper branch with stout apical beak bearing several setae and down-turned, slender, tapered, lower branch; lateral subbasodorsal process slender, elongate, bearing several long apical hairs; apicomesal lobe clavate, directed dorsocaudad, covered with stout setae; distal part of inferior appendage as long as main body, directed caudad, setose. Phallus stout, slightly expanded in middle, apically blunt, membranous dorsally and apically; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.1 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species shows similarities to those of *T. nymphaea* and *T. torresiana* in the structure of the mesal basodorsal process of each inferior appendage. However, it differs from them in that the mesal basodorsal process of each inferior appendage is more alate
than those of the above two species, its lateral subbasodorsal process is twice as long as the apicomesal lobe, and the distal part is as long as the main body.

**PHYLOGENY:** The phylogenetic relationships among the four species of the Group are unknown.

**DISTRIBUTION:** Western Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Triaenodella) moselyi_ Group

The _T. (Triaenodella) moselyi_ Group has two species in the Afrotropical and Australasian regions. A synapomorphy is that (48) the mesal basodorsal process of inferior appendages is divided into two slender branches (Fig. 3.49A).

_Triaenodes (Triaenodella) moselyi_ Kimmins 1962b

Fig. 3.48

_Triaenodes moselyi_ Kimmins, 1962b; p. 105-107, figs. 71-75 (male, female).


**DESCRIPTION** Kimmins (1962b):
“General colour pale tawny, with golden pubescence. Antenna finely annulated with fuscous, basal segment long and slender and with a plate covering the dorsal surface, although no pencil of hairs is visible beneath it. Palpi long, sparsely pubescent. Forewing with golden pubescence and with indistinct spots of brownish pubescence in the apical half. Hind wing with sparse brownish pubescence. Fore wing rather narrow, discoidal cell long, almost twice as long as its footstalk. In hind wing, fork R₄ has short footstalk.”

**MALE GENITALIA** Kimmins (1962b):
“Ninth segment long ventrally but reduced dorsally to a narrow transverse band. Side-pieces [sternum IX] large and triangular, with rounded setose apices. Lateral margins at base of claspers extended upwards and inwards to support the base of
the aedeagus [phallus]. Median lobe of tenth segment [upper part of tergum X] inconspicuously trifid, the side branches [pair of dorsomesal papillae] very short, centre branch [middle process] slender, slightly clavate and setose at apex. Side lobes fused together beneath the median lobe to form a long, blade-like, curved spine [lower part of tergum X], with a short projection about mid-way on the left side. Cerci [preanal appendages] long and slender, of unequal length. Aedeagus arched, with a median dorsal furrow, membranous towards apex dorsally and with a membranous upper lobe on each side. Clasper [inferior appendage] about twice as long as wide, quadrate in side and ventral views, the outer apical angel, in ventral view, produced in a short, blunt, incurved process. Dorsal, apical and inner margins serrate, set with stout setae. Inner margins parallel. From the base of the left clasper, the upper margin is produced upwards in a long finer [mesal basodorsal process], which bifurcates about mid-way into two spins. The outer spine [lower branch] is directed tailward and is setose apically, the inner (and longer) spine [upper branch] is bent downwards alongside the aedeagus. In the right clasper of the type, this basal branch is either asymmetric or damaged, taking a bigger sweep basally and its apex is broken away.”

FEMALE: A description and illustration were provided by Kimmins (1962b).

IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8.5 mm.

MATERIAL EXAMINED: Holotype (mounted as microscope preparation).

DIAGNOSIS: The male of this species closely resembles that of T. nigrolineata by having two slender mesal basodorsal processes of each inferior appendage. However, it is distinguished by its clavate upper part of tergum X and the long, blade-like, and curved lower part of tergum X.

PHYLOGENY: The sister species of this species is T. nigrolineata. A synapomorphy is indicated above.

DISTRIBUTION: Uganda.

BIOGEOGRAPHIC REGION: Afrotropical region.

_Triaenodes (Triaenodella) nigrolineata_ Kimmins 1962a

Fig. 3.49

_Triaenodes nigrolineata_ Kimmins, 1962a; p. 171, figs. 58, 61 (male).
TYPE MATERIAL: Holotype, male: PAPUA: Kokoda, 1200 ft. v. 1933. L.E.

Cheesman. B. M. 1933-427, (BMNH, (E) # 251411 and # 251412).

DESCRIPTION Kimmins (1962a):
“Head tawny, with fulvous [yellowish brown] hairs. Antennae pale, annulated with fuscous, basal segment long, with a longitudinal flap covering traces of a basal tuft of hairs. Palpi fulvous. Thorax tawny, with golden pubescence. Legs luteous. Fore wing densely clothed with fulvous pubescence with scattered spots of fuscous pubescence along the posterior margin, at the anastomosis and in the apical cellules. In the costal and radial areas are two clearly-defined, jet-black streaks composed of short, broad androconia on dorsal surface of the wing. Hind wing with sparse, fuscous pubescence.

MALE GENITALIA Kimmins (1962a):
“Ninth segment narrowed above, but with the centre of the apical dorsal margin produced in a triangular plate with a bilobed apex. Cerci [preanal appendages] long and stout, digitate, slightly downcurved. Tenth segment [upper part of tergum X reduced, with pair of small dorsomesal papillae; lower part of tergum X] forming a thickened, broad plate, covering the aedeagus, apex tapered and slightly excised. From beneath the apex arise two slender processes, apices transparent and each armed with a short seta. Aedeagus [phallus] slender at base, arched downward, apex membranous. Clasper [inferior appendage] with main part slender from the side, apex slightly clavate and setose. The outer, upper margin is produced in a small, triangular lobe about midway. From beneath, the main part is broad at base, tapering to a truncate apex. On the upper surface towards the base is a transverse ridge, from which arises a pair of long, curved spines [mesal basodorsal process of the inferior appendage], the outer directed upwards and then curving caudad and inwards over the aedeagus [phallus]. The inner spine is directed upward and caudad, running closely alongside the aedeagus.”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6 mm.

MATERIAL EXAMINED: Holotype (mounted as microscope preparation).

DIAGNOSIS: There are some difficulties to interpreter the structure of male genitalia because of the single view available in the microscope preparation. The male of this species closely resembles that of T. moselyi by having the two slender branches of the mesal basodorsal processes of each inferior appendage. However, it is distinguished by the absence of the upper part of tergum X and the thickened, broad lower part of tergum X.

PHYLOGENY: The sister species of this species is T. moselyi. A synapomorphy is indicated above.
**DISTRIBUTION:** Papua.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Triaenodella) ataloma_ Group

The _T. (Triaenodella) ataloma_ Group has five species [the _doryphora_-complex of Neboiss and Wells (1998)] in the Australasian region. A synapomorphy is that (49) the mesal basodorsal process of each inferior appendage is divided into a slender curved upper branch and a down-turned lower branch of various shapes (Fig. 3.50A). _Triaenodes doryphora_ and _T. laciniata_ share a synapomorphy in which (50) the down-turned lower branch of the mesal basodorsal process of each inferior appendages is further subdivided (Figures 3.50A, 3.51A).

_Triaenodes (Triaenodella) doryphora_ Neboiss and Wells, 1998

Fig. 3.50

_Triaenodes doryphora_ Neboiss and Wells, 1998; p. 127, figs. 131-133 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, 2 km S by W Millaa Millaa, 15 May 1950, I.D. Naumann and J.C. Cardale, (ANIC, genitalia prep., PT-1122).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX generally trapezoidal in lateral view, anterior margins broadly rounded just below middle, posterior margins diagonal with deep diagonal incision near middle filled with membrane, dorsally short, ventrally half as long as segment IX is tall. Upper part of tergum X slender, elongate lobe, apically setose, slightly shorter than spines of lower part of tergum X; lower part of tergum X symmetrical pair of slender, acute spines with apically rounded semimembranous plate between their bases slightly less than half their length. Preanal appendages slender, setose, about five-sixths as long as upper and lower
parts of tergum X. Inferior appendages each with main body more or less rectangular in lateral view, ventral profile about two-thirds as long as main body is tall, elliptical in ventral view; recurred process absent; mesal basodorsal process comprising slender curved upper branch, down-turned lower branch which is again subdivided into short thumb-like upper lobe and long, tapering lower lobe visible laterally below main body of inferior appendage; lateral subbasodorsal process digitate, short bearing pair of long setae; posterior margin oblique, irregular, setose, with acute upper and lower corners. Phallus slender basally, dilated distally, apically membranous; parameres absent; phalotremal sclerite not evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.2 - 6.8 mm.

MATERIAL EXAMINED: Holotype.

DIAGNOSIS: The male of this species closely resembles that of *T. laciniata* but is distinguished by the shapes of the lower part of tergum X and the mesal basodorsal process of each inferior appendage.

PHYLOGENY: The sister species of this species is *T. laciniata*. A synapomorphy is indicated above.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes (Triaenodella) laciniata* Neboiss and Wells, 1998

Fig. 3.51

*Triaenodes laciniata* Neboiss and Wells, 1998; p. 129, fig. 134 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with
scent-organs under and over flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX similar to that of *T. doryphora* in lateral view except ventral profile about three-fifths as long as segment IX is tall. Upper part of tergum X slender, apically setose process about as long as longest spines of lower part of tergum X; lower part of tergum X pair of sclerotized spines, each divided into divergent upper spines about 0.8 times as long as slightly convergent lower spines, with short membranous plate between them. Preanal appendages slender, setose, as long as upper spines. Inferior appendages each somewhat triangular in lateral view with deeply convex ventral margin and blunt dorsal angle, elliptical in ventral view; recurved process absent; mesal basodorsal process comprising slender curved upper branch, down-turned lower branch which is again subdivided (division angle less than that of *T. doryphora*), its upper division triangular with apical setae and lower division slender, acute, visible in lateral view below main body of inferior appendage; lateral subbasodorsal process absent; distal part very small. Phallus slender in middle, apically membranous; parameres absent; phallotremal selerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 5.5 – 5.6 mm.


DIAGNOSIS: The male of this species most closely resembles *T. doryphora* but is distinguished by on the subdivision of the lower part of tergum X, the different shape of the lower branch of the mesal basodorsal process of each inferior appendage and absence of a lateral subbasodorsal process.

PHYLOGENY: The sister species of this species is *T. doryphora*. A synapomorphy is indicated above.

DISTRIBUTION: Australia.
BIOGEOGRAPHIC REGION: Australasian region.

_Triaenodes (Triaenodella) ataloma_ Neboiss and Wells, 1998

Fig. 3.52

_Triaenodes ataloma_ Neboiss and Wells, 1998; p. 130, figs. 140-142 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, Mt Spec State Forest, Birthday Creek above weir, 18°57’S, 140°10’E, 27 Jan 1994, It tr., 820 m asl, A.L. Sheldon, (NMV, T-16338).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment divided into two parts in lateral view, with anterodorsal part almost semicircular and posteroventral part triangular, the parts separated by long triangular incisions filled with concertina-like membranes. Upper part of tergum X slender, elongate, apically setose lobe; lower part of tergum X symmetrical pair of slender, acute spines bent ventrad near apex, with semimembranous plate between bases. Preanal appendages slender, setose, four-fifths as long as upper part of tergum X. Inferior appendages elongate rectangular in lateral view, triangular in ventral view, fused basally; recurved processes absent; mesal basodorsal process comprising slender curved upper branch and undivided, triangular lower branch; lateral subbasodorsal process small, digitate; distal part smaller, blunt. Phallus slender near middle, curved somewhat ventrad, with small dorsal flange, distal apex membranous; parameres absent; phallosternal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.3 – 5.9 mm.
MATERIAL EXAMINED: Holotype, male. Paratype, 1 male -- North Queensland, Birthday Creek, 3.5 km WNW Paluma, 18°59’S, 146°10’E, 7 Apr 1990, at It, R. St Clair, (NMV, T-16339, genitalia prep., PT-2021).

DIAGNOSIS: The male of this species somewhat resembles those of *T. empheira* and *T. tenerata*, but abdominal segment IX has a large concertina-like membranous area.

PHYLOGENY: The phylogenetic relationships of this species in the *T. (Triaenodella) ataloma* Group are unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes (Triaenodella) empheira* Neboiss and Wells, 1998

Fig. 3.53

*Triaenodes empheira* Neboiss and Wells, 1998; p. 129-130, figs. 138-139 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Segment IX in lateral view with anterior margins strongly convex at and below middle, posterior margins rounded and slightly diagonal with deep lateral incision above middle filled with membrane, dorsally short, ventrally about three-fifths as long as segment IX is tall. Upper part of tergum X slender, elongate lobe, with pair of small lateral processes about midway; lower part of tergum X pair of broad spines, sinuous in lateral view, with semimembranous plate with rounded apex between them. Preanal appendages slender, setose, about as long as upper part of tergum X. Inferior appendages trapezoidal in lateral view, triangular in ventral view; recurved process absent; mesal basodorsal process comprising slender
curved upper branch and much broader and slightly longer lower branch; lateral subbasodorsal process very small, digitate, bearing long setae; distal part of inferior appendage small, triangular, setose on edges; phallus slender proximally, curved somewhat downwards; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species somewhat resembles those of *T. ataloma* and *T. tenerata* but it is distinguished by having undivided and sinuous spines on the lower part of tergum X.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodella) ataloma* Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Trienodes (Triaenodella) tenerata* Neboiss and Wells, 1998

Fig. 3.54

*Trienodes tenerata* Neboiss and Wells, 1998; p. 129, figs. 135-137 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs over flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX very similar to that of *T. empheira* in lateral view. Upper part of tergum X slender, elongate, apically setose lobe; lower part of tergum
X pair of sclerotized spines each further subdivided subapically with shorter lateral branches recurved and acute beneath main spines, membranous plate with rounded apex between bases of main spines. Preanal appendages setose, somewhat stout basally, distally tapered. Inferior appendages each somewhat trapezoidal in lateral view, vaguely triangular with rounded base in ventral view; recurved process absent; mesal basodorsal process comprising slender curved upper branch, broader, acute down-turned lower branch; lateral subbasodorsal process thumb-like, short; distal part triangular in lateral and ventral views. Phallus slender basally, distal one-third membranous, parameres absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0 – 5.1 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species somewhat resembles those of *T. ataloma* and *T. empheira* but it is distinguished from those two species and other species in this Group by the uniquely bifid lower part of tergum X with recurved subapical branches.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodella) ataloma* Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

Species *incertae sedis* near *T. (Triaenodella) nesiotina,*

*T. (Triaenodella) moselyi,* and *T. (Triaenodella) ataloma* Groups

Twelve species *incertae sedis* in *Triaenodes (Triaenodella)* Lineage #2 share synapomorphy 46 with these Groups, but no other synapomorphies are evident to suggest more refined relationships.

*Triaenodes (Triaenodella) amma* Andersen and Holzenthal, 2001
*Triaenodes amma* Andersen and Holzenthal, 2001; p. 233, figs. 12-15 (male).

**TYPE MATERIAL:** Holotype, male: GHANA: Western Region: Ankasa Game Production Reserve, 16. xi. 1995, at light, NUFU-project (UMSP)

**DESCRIPTION** Andersen and Holzenthal (2001):
“Male (n=1). Forewing length 5.1 mm, hind wing length 4.1 mm. Eye 0.31 mm wide. Antenna at least 16.4 mm long, including 0.33 mm long scape; scape with well developed scent organ and brush of dark brown seta. Maxillary palp segment lengths (in mm): 0.37, 0.55, 0.31, 0.70. Colour in alcohol overall dark, reddish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2001):
“Abdominal segment IX with anterior margin broadly rounded; tergum narrow; pleura with posterior margin rounded, membranous, with few seta; sternum subtriangular, strongly produced posteriorly; in ventral view with posterior margin truncate, shallowly notched medi ally. Preanal appendage long, narrow, setose. Upper part of tergum X paired very small, triangular lobes [upper part of tergum X reduced, with pair of small dorsomesal papillae]. Lower part of tergum X long, strongly sclerotized, curved spine, pointing anteroventrad; in dorsal view slightly asymmetrical with apex pointing to the right, Inferior appendage complex; apicominal lobe clavate with triangular, setose ventral process and digitate dorsal process with strong spine-like seta mesally; basodorsal process [dorsal process] short, digitate, with few seta apically; mesal basodorsal process curved caudad, forked medially, dorsal process [upper branch] with triangular, setose apex, ventral process [lower branch] with enlarged apex, with few, curved, symmetrical, with long, rounded flange in basal two third, and membranous apex.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is somewhat similar to *T. ghana*, but it is distinguished from it by having a more complex inferior appendage with an apicominal lobe which has a triangular ventral process and a digitate dorsal process. Also, the mesal basodorsal process of this species has a triangular upper branch and a broad lower branch, while that *T. ghana* has a digitate upper branch and a very pointed lower branch.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 46 are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.
**Triaenodes (Triaenodella) apicomaculata** Mey, 1990

Fig. 3.55

*Triaenodes apicomaculata* Mey, 1990; p. 15, figs. 43-44 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Nord-Luzon, Ifugao, Banaue vic., 20 km N Lagawe, 1200 m, 22. IX. – 16. X. 1988 (ZMHB).

**DESCRIPTION:** Head and thorax brownish yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs as short and dark brown hairs. Forewings and hind wings brownish yellow.

**MALE GENITALIA:** Abdominal segment IX trapezoidal in lateral view, with broadly rounded anterior margins at and below middle, diagonal posterior margins deeply incised above middle with membrane in incision, dorsally very short, ventral margin concave and about as long as segment IX is tall. Upper part of tergum X inconspicuous; lower part of tergum X pair of long, slender, acute spines, bent ventrad from about three-quarters of length. Preanal appendages slender, setose, about two-thirds as long as spines of lower part of tergum X. Inferior appendages each somewhat bean-shaped in lateral view with irregular anterior end, subtriangular with globular base in ventral view; recurved process absent; mesal basodorsal process forked medially such that upper branch with slender basal half expanded apically like setose balloon and lower branch slender and recurved and apically blunt; lateral subbasodorsal process apparently present only as broad and rounded upper end of bean-shaped inferior appendage; distal part of inferior appendage as broad as lateral subbasodorsal process and directed caudoventrad, rounded or somewhat obliquely truncate in lateral view. Phallus bent ventrad, apical half of upper surface membranous; parameres absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 3.8 mm.

**MATERIAL EXAMINED:** Holotype.
**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. difformis*, but the branches of the mesal basodorsal process of each inferior appendage are larger than those of *T. difformis* and the general shape of each inferior appendage is vertically bean-shaped and its distal part is obliquely truncate in lateral view.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 46 are unknown.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodella) difformis* Mosely, 1932b
Fig. 3.56

*Triaenodes difformis* Mosely, 1932b; p. 133, figs. 16-18 (male).

**TYPE MATERIAL:** Holotype, male: UGANDA: Bulanbuli, 19 vii 1925, G.L.R. Hancock, (BMNH, (E) # 250344).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs over flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX tall and roughly triangular in lateral view; anterior margins with small and broad angle below middle, posterior margins somewhat scalloped and diagonal with membranous incision above middle; dorsally short and ventrally convex and about three-fifths as long as tergum IX is tall. Upper part of tergum X short, clavate, apically setose lobe, half as long as preanal appendages; lower part of tergum X pair of long, slender, acute spines, somewhat twisted, left spine about two-thirds as long as right spine, left spine curved slightly dorsad, right spine with long uniform curve ventrad from three-quarters length. Preanal appendages slender, setose, about as long as left spine of lower part of tergum X. Inferior appendages rectangular in lateral and ventral views; each with recurved process absent; mesal
basodorsal process slender basally and forked medially into two slender branches with upper branch clavate and apically setose, lower branch slender and acute and projecting further ventrad than upper branch; distal part of inferior appendage rounded in lateral view, oblique apically in ventral view not distinctly differentiated from main body of inferior appendage. Phallus very slender near base, enlarged in distal two-thirds and curved ventrad, apical half of upper surface membranous with deep longitudinal groove; parameres absent; phalnotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. moselyi*, but it is distinguished from it by having an asymmetrical lower part of tergum X and a clavate upper branch of the mesal basodorsal process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 46 are unknown.

**DISTRIBUTION:** Uganda.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) dolabrata* Gibbs, 1973

Fig. 3.57


**TYPE MATERIAL:** Holotype, male: GHANA: Kibi Hills, Sp-62 *Triaenodes* UV trap 14-V-67, Gibbs (BMNH).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organ. Forewings and hind wings yellowish brown, with dense yellow hairs.
**MALE GENITALIA:** Abdominal segment IX triangular in lateral view, anterior margins diagonal and rounded ventrally, posterior margins straight, dorsally very short, ventrally almost half as long as segment IX is tall. Upper part of tergum X long, slender, hatchet-shaped process bearing short stout setae, with paired small, dorsomesal papillae at midway; lower part of tergum X single, longer than other genitalic parts, rather flattened with asymmetrical incision apically that leaves short acute spine to one side of incision. Preanal appendages slender, setose, third-fourths as long as upper part of tergum X. Inferior appendages rather triangular in lateral view and subrectangular in ventral view, covered with many stout setae mesally and long hairs laterally; recurved process absent; mesal basodorsal lobe forked beyond short slender base, upper branch broadest about midway and bearing several stout hairs apically, lower branch projecting caudad nearly as far as tip of upper branch; other processes absent. Phallus slender subbasally, bent ventrad from before middle, apical one-third of upper surface membranous with longitudinal groove; parameres absent; phallotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species somewhat resembles that of *T. hickini*, but it differs from it in the hatchet-shape of the upper part of tergum X and the upper branch of the mesal basodorsal process of the inferior appendage is thicker than that of *T. hickini*.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 46 are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) hickini* Kimmins 1957b

Fig. 3.58
Triaenodes hickini Kimmins, 1957b; p. 22, figs. 13, 15 (male, female).

**TYPE MATERIAL:** Holotype, male: KENYA: Kipkurere River. Timboroa Forest Reserve Austins Bridge, 8500 ft. Em. 9-XI-1956, N. E. Hickin, (BMNH, (E) # 251401).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown; antennal scapes long and each with scent-organ flap covering hairs; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX triangular in lateral view, anterior margins convex, posterior margins diagonal and each with deep diagonal incision above middle, dorsum very short, venter convex and about two-thirds as long as height of segment IX. Upper part of tergum X clavate, apically setose, median lobe with unequal pair of small, lateral lobes; lower part of tergum X asymmetrical, blade-like, left spine much longer than right spine, curved ventrocaudad. Preanal appendages slender, setose, three-fourths as long as left spine of lower part of tergum X. Inferior appendages each elongate-triangular and apically blunt in lateral view, bean-shaped in ventral view with blunt apex and inner margins armed with short, stout setae; recurved process absent; mesal basodorsal process sickle-shaped and its apex deeply incised, acute upper branch shorter and broader than lower branch, lower branch slender, directed caudoventrad; lateral subbasodorsal process possibly represented by small triangular projection with two long setae. Phallus trough-shaped, curved downwards, apex incised and membranous; parameres absent; phallotremal sclerite not evident.

**FEMALE:** A description and illustration were provided by Kimmins (1957).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 10 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species is somewhat similar to *T. dolabrata*, but it differs by the shape of the upper part of tergum X which has a median process and a pair of lateral
processes and by the sickle-shaped upper branch of the mesal basodorsal process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 46 are unknown.

**DISTRIBUTION:** Kenya.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Fig. 3.59*

*Triaenodes (Triaenodella) ghana* Kimmins, 1957b

*Triaenodes ghana* Kimmins, 1957b; p. 21, figs. 13, 14 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown; antennal scapes long with scent-organs; forewings and hind wings pale yellow, with dense yellow hairs.

**MALE GENITALIA** Andersen and Holzenthal (2001, p. 234, figs. 23-25): Abdominal segment IX somewhat boot-shaped in lateral view, with posteroventral “toe,” anterior margin convex, posterior margin concave with deep diagonal incision at and above middle extending to anteroventral “heel,” dorsum as long as “heel,” ventral “sole” as long as height of segment IX. Upper part of tergum X reduced, with pair of small dorsomesal papillae; lower part of tergum X long, slender spine, slightly sinuous in dorsal view, longer than other genital appendages, slightly downcurved. Preanal appendages 0.85 times as long as spines of lower part of tergum X, slender, setose. Inferior appendages forming irregularly shaped “football” at end of segment IX “toe” in lateral view, subquadrangular in ventral view; each with recurved process absent; mesal basodorsal process forked medially, upper branch digitate and directed caudad, lower branch larger, flattened, ventrally bent, tapering to acute apex; lateral subbasodorsal process absent;
apicomesal lobe subtriangular, apex rounded bearing short setae, distal part of inferior appendage with apical small projection. Phallus curved evenly ventrad, with blunt apex, trough-shaped with asymmetrical lateral margins, right side of lateral margin bearing more spine-like setae than left side, dorsal surface membranous; parameres absent; phallotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7.5 mm.

**MATERIAL EXAMINED:** Holotype (mounted as microscope preparation).

**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. amma*, but it is easily distinguished from that species by having spine-like setae on the phallus. Also, the mesal basodorsal process of this species has a digitate upper branch and a very pointed lower branch, while that *T. amma* has a triangular upper branch and a broad lower branch.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) calamintella* Mey, 1995

Fig. 3.60

*Triaenodes calamintella* Mey, 1995; p. 207, fig. 63 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Mindoro, Calamintao, 8-10 March 1994, leg. MEY (ZMHB).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX more or less rectangular in lateral view, with anterior margins slightly concave dorsally and broadly convex ventrally, posterior margins
broadly concave, dorsum half as long as venter. Upper part of tergum X inconspicuous; lower
part of tergum X membranous plate, medially excavated with acute posterolateral corners.
Preanal appendages 0.75 times as long as lower part of tergum X, setose. Inferior appendages
rectangular in lateral view, main body about twice as long as tall in lateral view, triangular in
ventral view; recurved process absent; mesal basodorsal process bilobed with upper branch
thumb-like, setose and rounded apically, lower branch slender, directed caudoventrad, distally
acute; Phallus slender and sclerotized in basal half apical half membranous with two sclerotized
spots, pair of long spines projecting from phallobase, each spine clavate and apically attenuated,
phallotremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: Holotype.

LENGTH OF FOREWING: Male, 4 mm.

DIAGNOSIS: This species is relatively small. Its male closely resembles that of \textit{T. sertata};
however, the pair of long, clavate and attenuated spines from the phallobase and the two
sclerotized spots in the apical membranes of the phallus are distinctive.

REMARKS: The pair of long spines arising from the phallobase do not appear to be
homologous with endophallic paramere spines.

PHYLOGENY: The relationships of this species with the \textit{T. (Triaenodella) Lineage #2
species possessing synapomorphy 47 are unknown.

DISTRIBUTION: Philippines.

BIOGEOGRAPHIC REGION: Oriental region.

\textit{Triaenodes (Triaenodella) sertata} Mey, 2003

\textit{Triaenodes sertata} Mey, 2003; p. 450, figs. 76-79 (male).

TYPE MATERIAL: Holotype, male: PHILIPPINES: Luzon, Quezon province, east of
Infanta, Magasaysay, 9 IV 1997, tributary to Agos River, leg. W. MEY; type repository =
initially, the Museum für Naturkunde Berlin, alternatively the National Museum, Manila or the Natural History Museum of the UP, Los Banos, The Philippines.

**DESCRIPTION** Mey (2003):
“Length of forewing: 6 mm. Head and thorax yellow, frontal warts brown. Antennae yellow, with black articulations, scape with a black brush on the dorsal side. Legs yellow, spurs 1.2.2. Forewing yellow-brown, fork 1 as long as its stalk.”

**MALE GENITALIA** Mey (2003):
“Segment IX with a suture separating tergum and sternum. Preanal appendages long. Inferior appendage with triangular ventral branch [main body], bearing subapical spines. Median branch [mesal basodorsal process] bilobate, with dorsal and distal lobes at a right angle. Segment X [lower part of tergum X] present, platelike, without appendages. Phallic apparatus [phallus] arched, with parameres and a pair of strongly curved cornuti”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Males of this species closely resemble those of *T. calamintella*. However, it is distinguished by the rounded apex of the pair of long spines from the phallobase and the pair of strongly curved cornuti on the apex of phallus.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

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*Triaenodes (Triaenodella) proserpina* Malicky, 2005

*Triaenodes proserpina* Malicky, 2005: p. 36, pl.4 (male).

**TYPE MATERIAL:** Holotype, male: PHILIPPINES; Sibuyan, Pawala River, 18-iii to 6-iv-1987, col. Roland Mueller, (In Hans Malicky Collection).

**DESCRIPTION** Malicky (2005, translated from German):
“Dark yellow, forewing 5 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):
“Genitalia (Plate 4): Segment IX with long ventral part projecting posterad. Segment X [lower part of tergum X] formed in dorsal view as parallel-sided, distally excised plate. Superior appendages [preanal appendage] slender and straight, somewhat shorter than segment X. Inferior appendages short, main body stout with short distal finger directed posterodorsad and from mesal surface of broad base with sharp claw bearing dorsal mushroom-shaped appendage. Phallus complicated (see illustration). Similar to *T. calamintella* Mey 1995 and *T. sertata* Mey 2003, but dorsal branch [mesal basodorsal process] with mushroom-shaped appendage differently proportioned and segment IX projecting not so far. Moreover, phallus of this species built otherwise, although similarly complicated; see illustrations.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species somewhat resembles those of *T. calamintella* and *T. sertata* by the absence of the upper part of tergum X and by the shape of the mesal basodorsal process of each inferior appendage, but this species does not have a pair of long spines from the phallobase.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) rufescens* Martynov, 1935

*Triaenodes rufescens* Martynov, 1935; p. 239-240, figs. 38-40.

**TYPE MATERIAL:** Holotype, male: South Ussuri region of Russia; type repository = probably Zoological Institute, St. Peterburg.

**DESCRIPTION** Martynov (1935):
“Head brownish, clothed with yellow hairs; antennae pale yellow; basal joint longer than the head, yellow; 2nd joint of the maxillary palpi the longest, 3rd, 4th and 5th gradually shorter. Legs yellow; spurs 1.2.2. Membrane of anterior wings brownish, with dense golden-rufous pubescence; a brown dot in each apical cell; similar dot may be discerned in the dorsal part of wing; fringe brown; apical border of wing also brownish, interrupted at the ends of veins; discoidal cell broad, shorter than the apical portion of wing. Hind wings brownish; fringe yellowish. Thorax and abdomen brownish.”
**MALE GENITALIA** Yang and Morse (2000, p. 109, fig. 126):

“Dorsal part of segment IX very short, ventral part extremely long; tergum IX forming pair of sub-median tubercles posteriorly; sternum broadly excised posteriorly. Preanal appendage slender, extending to apex of sternum IX. Upper part of tergum X with slender median process two-thirds as long as preanal appendages to subequal with them, accompanied by pair of basal papillae [probably vestiges of lateral processes of upper part of tergum X]; lower part of tergum X asymmetrical with right side very long, evenly arching over phallus in lateral view, sinuous in dorsal view, left side very short, sub-triangular. Inferior appendages without basal plate and recurved processes; basodorsal branch [mesal basodorsal process] itself divided into two processes of which upper process [upper branch] slender and bifid or capitate with few apical setae and lower process [lower branch] digitate and downcurved beneath main body of appendage, basally swollen and with large ventral tooth; main body of appendage with slender apicolateral process and with broad apicomesal lobe to narrowly and deeply constricted and varying from steeply obliquely truncate to broadly rounded with dense short stout spines at apex in ventral view. Phallus supported by sclerotized strips of sternum IX from beside base of inferior appendages; highly asymmetrical, with profuse membranes and sclerotized strips of right side arching over and across otherwise trough-like left apex.”

**FEMALE:** Undescribed.

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7.1 – 8 mm.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. difformis*, but it differs in that the lower part of tergum X is asymmetrical and the upper branch of the mesal basodorsal process of each inferior appendage is apically and shallowly bifid.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Russia.

**BIOGEOGRAPHIC REGION:** East Palearctic region.

*Triaenodes (Triaenodella) spoliata* Mey, 1998

Fig. 3.61

*Triaenodes spoliata* Mey, 1998; p. 571, figs. 138-140 (male).
**TYPE MATERIAL:** Holotype, male: PHILIPPINES: Mindanao, 1050 m, Mt. Agtuuganon, 28 May-7 June 1996, leg. MEY (ZMHB).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX rectangular in lateral view, more than twice as tall as long, with anterior and posterior margins nearly straight, dorsum with small triangular projection posteriorly, venter slightly longer and with truncate projection anteriorly. Upper and lower parts of tergum X inconspicuous. Preanal appendages digitate, setose, as long as segment IX. Inferior appendages subtriangular in lateral and ventral views; each with recurved process absent; mesal basodorsal process bilobed with upper branch thick, with rounded and setose apex, lower branch slender, curved ventrad, distally pointed; distal part of each inferior appendage tapered to blunt apex. Phallus sclerotized in basal two-thirds, apical one-third membranous, downcurved; parameres absent, phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5-6.5 mm.

**MATERIAL EXAMINED:** Holotype.

**DIAGNOSIS:** The male of this species most closely resembles that of *T. intecta* in lacking the upper and lower parts of tergum X. However, it is different from that species by the bilobed mesal basodorsal process of each inferior appendage.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Philippines.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodella) triaenodiformis* (Ulmer, 1930a)
Adicella triaenodiformis Ulmer, 1930a; p. 493, figs. 16 – 17.

Triaenodes triaenodiformis (Ulmer); Kimmins, 1963, p. 143, figs. 60- 64 (male).

**TYPE MATERIAL:** Allotype, male: ETHIPOIA: Gihbe River, 260 km. from Addis Ababa, 6. v. 1961 (S. Chojnacky), (BMNH).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each scape with scent-organ; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX quadrangular in lateral view, anterior margins with ventral two-thirds convex, dorsal third concave; posterior margin diagonal and sinuous; dorsum half as long as venter. Upper part of tergum X inconspicuous; lower part of tergum X with pair of slender processes separated nearly to base, tightly coiled 360° at midlength, symmetrical, divergent, recurved anteroventrad, and acute apically. Preanal appendages slender, setose, extending beyond cils of lower part of tergum X. Inferior appendages including distal parts about twice as long as broad, rounded apically in lateral view, fused basally and subtriangular in ventral view; each with recurved process absent; mesal basodorsal lobe forked medially, upper branch hatchet-like with short “handle” and projecting posterovertrrad to acute point, lower branch clavate and subtruncate and spinose apically; distal part with short, stout spines mesally. Phallus with basal two-thirds sclerotized, downcurved, apical one-third semimembranous and membranous; parameres absent; phalrotremal sclerite not evident.

**FEMALE:** Kimmins described the female of *T. triaenodiformis* as the type specimen.

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm.

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- TANZANIA: Tanga region: W. Usambara Mts., Dule. 26-XI-90, ZMB’s Tanzania Exp., 1990, Sweep net, T. Andersen (ZMUB).
**DIAGNOSIS:** The male of this species can easily be separated from those of the other species in this Group by the distinct shape of the lower part of tergum X: a pair of slender processes coiled 360° at midlength and divided almost to base.

**PHYLOGENY:** The relationships of this species with the *T. (Triaenodella)* Lineage #2 species possessing synapomorphy 47 are unknown.

**DISTRIBUTION:** Ethiopia.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella)* Species *incertae sedis* near Lineages #1 and #2

Five species *incertae sedis* share synapomorphy 39 with lineages #1 and #2, but no other synapomorphies are evident to indicate relationships with either of them.

*Triaenodes (Triaenodella) chelifera chelifera* Mosely, 1932a

Fig. 3.63

*Triaenodes cheliferus* Mosely, 1932a; p. 310, figs. 24-26 (male).

**TYPE MATERIAL:** Holotype, male: UGANDA: Ebinambe 24-X-1926, H. Hargreaves, Dry TYPE, Presented by Imperial Institute of Entomology British Museum, 1932-8 (BMNH).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat triangular in lateral view; anterior margins mostly convex, posterior margins mostly concave, dorsum about 0.2 times as long as venter. Upper part of tergum X thick lobe with pair of small, conical, lateral protuberances, longer than height of segment IX, apex rounded, heavily setose; lower part of tergum X pair of slender, acute spines, 0.8 times as long as upper part of tergum X, curved slightly caudodorsad. Preanal appendages slender, setose, 0.75 times as long as upper part of
tergum X. Inferior appendages each with main body about 0.3 times as long as tall in lateral view, with larger distal part bulbous and blunt apically, subtriangular with inner margin rounded and covered with stout setae in ventral view and with distal part short, pointed; recurved process absent; mesal basodorsal process forked medially, upper branch clavate and setose and curved caudad to rounded apex, lower branch slightly less broad than upper branch and setose apically and directed caudoventrad to rounded apex. Phallus trough-shaped, curved ventrad, apical half of upper surface membranous; parameres absent; phallotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm.

**MATERIAL EXAMINED:** Holotype (mounted as microscope preparation).

**DIAGNOSIS:** The male of this nominate subspecies very closely resembles that of the subspecies *T. chelifera gibbera*. The most conspicuous difference is that the male of this subspecies has a pair of small conical protuberances on the upper part of tergum X. Insufficient material is available, to determine whether these two subspecies are synonymous.

**PHYLOGENY:** The species *T. chelifera*, like other species of subgenus *Triaenodella*, has synapomorphy 39, but no evidence was found for refining its relationships further.

**DISTRIBUTION:** Uganda.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) chelifera gibbera* Statzner, 1976

![Fig. 3.64](image)


**TYPE MATERIAL:** Holotype, male; DEMOCRATIC REPUBLIC OF CONGO, May, 1972 (S.-Nr. 116), (ZMHB).
**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long, each with scent-organ under flap. Forewings and hind wings yellowish brown.

**MALE GENITALIA** Statzner (1976, translated from German):

“Dorsal median process [upper part of tergum X] without dorsal-lateral, triangular points; middle projection of dorsal branch [mesal basodorsal process] of inferior appendage apically with sharp bristles; ventral branch [main body] of inferior appendage at top edge with a conspicuous hump whose apex with sharp bristle; inner margin of inferior appendages strongly divergent at apical third (ventral view).

In emergence 3 females found, which may be is this subspecies.”

To this is added the following based on the holotype specimen mounted as a microscope preparation:

Upper part of tergum X long, thick lobes, apices rounded and heavily setose in lateral view, lower part of tergum X pair of sclerotized long spines. Preanal appendages half as long as upper part of tergum X, setose. Inferior appendages subtriangular, inner margin rounded, covered with stout setae in ventral view, distal part short, pointed; recurved process absent; mesal basodorsal process forked medially, upper branch clavate, lower branch subtriangular, both branches apically setose. Phallus trough-shaped, curved ventrad, apical half of upper surface membranous; parameres absent; phallotremal selerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm.

**MATERIAL EXAMINED:** Holotype (mounted as microscope preparation).

**DIAGNOSIS:** As discussed above, this subspecies is very close to the nominate *T. chelifera chelifera*. The principal difference is that the male of this subspecies does not have two small conical protuberances on the upper part of tergum X.

**PHYLOGENY:** The species *T. chelifera*, like other species of subgenus *Triaenodella*, has synapomorphy 39, but no evidence was found for refining its relationships further.
**DISTRIBUTION:** Democratic Republic of the Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triadenodes (Triadenodella) clavata clavata* Mosely, 1932a

![Image](Fig. 3.65)

*Triadenodes clavata* Mosely, 1932a; p. 311, figs. 27-29 (male).

**TYPE MATERIAL:** Holotype, male: EAST AFRICA: New Langenburg, Tanganyika Terr.H.S., Stannus.1919-314, (BMNH, (E) # 250355).

**DESCRIPTION:** Head and thorax pale yellow, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX somewhat triangular in lateral view; anterior margins mostly convex, posterior margins diagonal with deep narrow diagonal incision below middle, dorsum very short, venter about half as long as height of segment IX. Upper part of tergum X clavate with setose club, as long as height of segment IX, with paired small, lateral processes before middle; lower part of tergum X pair of strongly sclerotized spines, fused almost to midway, asymmetrical, left side foliaceous and longer than right side. Preanal appendages slender, setose, 0.8 times as long as upper part of tergum X. Inferior appendages nearly square in lateral view, quadrangular in ventral view, mesal margins covered with strong spine-like setae; each with recurved process absent; mesal basodorsal process hastate, projecting posterodorsad and then divided into elliptical crest and acute projection directed anteroventrad, crest with its enlarged posterior margin bearing few stout setae. Phallus with basal one-third slender and sclerotized, apical two-thirds directed caudoventrad, trough-shaped, apically semimembranous, bifid; parameres absent; phalotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 8 mm.
MATERIAL EXAMINED: Holotype. Also, the following material: 1 male.

DIAGNOSIS: This subspecies is very close to T. clavata aequa. Since very little material is available, it is difficult to determine whether these two subspecies are justified. This species differs from T. chelifera chelifera and T. chelifera gibbera in the shape of the mesal basodorsal process of each inferior appendage and the asymmetrical lower part of tergum X.

PHYLOGENY: The species T. clavata, like other species of subgenus Triaenodella, has synapomorphy 39, but no evidence was found for refining its relationships further.

DISTRIBUTION: East Africa.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodella) clavata aequa* Statzner, 1976

Fig. 3.66


TYPE MATERIAL: Holotype, male; DEMOCRATIC REPUBLIC OF CONGO, May, 1972 (S.-Nr. 117), (ZMHB).

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long each with scent-organ under flap. Forewings and hind wings yellowish brown.

MALE GENITALIA Statzner (1976, translated from German):

“Processes at base of dorso-median appendage equal; diagonally dorsally directed process of dorsal branch of inferior appendage with nearly rounded apex (lateral view), on edge strongly setose; ventrally directed process of dorsal branch of inferior appendage with strong bristle on proximal margin.”

To this is added the following based on the holotype specimen mounted as a microscope preparation:
Upper part of tergum X clavate, apically setose, 1.5 times as long as height of segment IX and longer than shorter process of lower part of tergum X [lateral processes not evident in mounted view]; lower part of tergum X pair of strongly sclerotized spines, asymmetrical, left side longer than right side. Preanal appendages slender, setose, as long as height of segment IX. Inferior appendages rectangular, mesal margin covered with strong spine-like setae; each with recurved process absent; mesal basodorsal process hastate, projecting posterodorsad and then divided into elliptical crest and acute projection directed ventrad, crest with its posterior margin bearing few stout setae, acute projection with its anterior base bearing single stout seta. Phallus apically membranous, bifid, trough-shaped; parameres absent; phallotremal sclerite not evident.

**DIAGNOSIS:** The male of this subspecies is very close to the nominate *T. clavata clavata*. The parts of tergum X and preanal appendages are longer in the holotype specimen of this subspecies and the inferior appendages are slightly differently shaped, with a single stout spine present near the anterior base of the acute projection of the mesal basodorsal process (absent in the nominate subspecies). It is very difficult to see substantial differences between these two species and, with such limited material, their ranges are unknown. Therefore, it is difficult to determine whether these two subspecies are synonymous.

**PHYLOGENY:** The species *T. clavata*, like other species of subgenus *Triaenodella*, has synapomorphy 39, but no evidence was found for refining its relationships further.

**DISTRIBUTION:** Democratic Republic of the Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) conjugata* Neboiss and Wells, 1998

Fig. 3.67

*Triaenodes conjugata* Neboiss and Wells, 1998; p. 111, figs. 69-71 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Bells Clearing, 6 km S of Aberfeldy, 37°45’S, 146°23’E, 6 Feb 1977, A.A. Calder, (NMV, T-16566).
DESCRIPTION: Head and thorax brown, vertex and palpi covered with brownish hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings brown, with dense brown hairs.

MALE GENITALIA: Abdominal segment IX more or less triangular in lateral view, anterior margins very convex ventrally and slightly concave dorsally, posterior margins diagonal with short incision in middle directed ventrad, dorsum short, venter about as long as height of segment IX. Upper part of tergum X slender, with pair of short lateral processes basally, apex trifid comprising long median process, pair of short lateral process, apically setose, twice as long as height of segment IX; lower part of tergum X pair of slender, acute spines, asymmetrical, left side 0.3 times as long as right side. Preanal appendages slender, setose, about 0.6 times as long as right spine of lower part of tergum X. Inferior appendages rectangular in lateral and ventral views, truncate in lateral view, apically rounded in ventral view; each with recurved process absent; mesal basodorsal process with slender stem, medially divided into digitate and setose upper branch directed caudad and triangular and acute lower branch directed ventrad. Phallus elongate, slender throughout length, membranous in distal half; parameres absent; phallotremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.5 – 7.3 mm.

MATERIAL EXAMINED: Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16567, genitalia prep., PT-743).

DIAGNOSIS: The male of this species can be separated from those of the other species of this subgenus by having the unequal lower part of tergum X and the distinctive shape of the mesal basodorsal process of each inferior appendage.

PHYLOGENY: This species, like other species of subgenus *Triaenodella*, has synapomorphy 39, but no evidence was found for refining its relationships further.

DISTRIBUTION: Australia.
**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Triaenodella) Species Incertae sedis_

Thirteen species _incertae sedis_ share synapomorphy #13 with other species of subgenus _Triaenodella_, but no synapomorphies are evident to suggest more refined relationships.

_Triaenodes (Triaenodella) aberrans_ (Marlier, 1965)

_Triaenodella aberrans_ Marlier, 1965, p. 66-68, fig. 33 (male).


**DESCRIPTION:** Marlier (1965, translated from French):

“Material, 1 male (holotype) in alcohol, wing and genitalia in preparation

“Description. Length of forewing: 11.7 mm.

“Tegument light yellowish, reddish brown, legs and palps basal a little lighter hair whitish except on the maxillary palps the first three segments are covered with very dense, hairs. Antennae yellow, with very narrow, dark annullations; basal segment enlarged, longer than the head with a long foliaceous scale, articulated on its internal margin slender and covered with a silvery, silky tuft of hairs; second segment longer than first but very slender; third and following segments less than half as long. Epicranial suture [at vertex] without median base.

“Wings wide, venation follows that of the genus.

“Genitalia: tergum IX normally in eighth segment, dorsally very narrow, with a rounded lateral lobe and bearing on its posterior margin two preanal appendages, these appendages long and narrow and covered with very long hairs; in the middle, as for _T. clavata_ Mosely, a long appendage [upper part of tergum X] is forked to its middle into two unequal, parallel lobes, swollen into fusiform clubs with their apices reaching two-thirds of the length of the preanal appendages; beneath this appendage, and distinct from it basally long, narrow, acute process that is setiferous apically and slightly longer than the preanal appendages; tergum X [lower part of tergum X] prolonged in a very sclerotized anal tube, from the middle of the preanal appendages to its apex; its apex, on its right side, is extended straight, in a strong spine, twisted on itself. Reaching the apices of the preanal appendages; phallus broad and strongly recurved downward, forming a trough whose left edge is high and evenly rounded and the right edge is truncate preapically and of irregular shape; gonopods short, rather oval, but bearing a very slender basal branch [presumably mesal basodorsal process] which is recurved upward and caudad; its apex is ogival without teeth or appendices.”
FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: The male of this species is somewhat similar to that of *T. botosaneanui*, but the apex of lower part of tergum X is curved to the left side.

PHYLOGENY: The relationships of this species in the subgenus *Triaenodella* are unknown.

DISTRIBUTION: Angola.

BIOGEOGRAPHIC REGION: Afrotropical region.

_Triaenodes* (*Triaenodella*) _akosua_ Andersen and Holzenthal, 2001

*Triaenodes akosua* Andersen and Holzenthal, 2001; p. 229-230, 233, figs. 8-11 (male).


DESCRIPTION (Andersen and Holzenthal, 2001):
“Male (n=10). Forewing length 6.2-6.7, 6.8 mm, hind wing length 4.8-5.5, 5.1 mm. Eye 0.37-0.40, 0.38 mm wide. Antenna at least 15.9 mm long, including 0.49-0.58, 0.54 mm long scape; scape with well developed scent organ and brush of light redish-brown seta. Maxillary palp segment lengths (in mm): 0.43-0.48, 0.46; 0.52-0.61, 0.56; 0.55-0.63, 0.59; 0.35-0.40, 0.38; 0.61-0.76, 0.71. Colour in alcohol overall light, reddish-brown.”

MALE GENITALIA (Holzenthal and Andersen, 2001, figs. 8-11):
“Abdominal segment IX with rounded anterior margin; tergum narrow; pleura region broadly rounded, posterior margin setose; sternum triangular, produced posteriad. Preanal appendage long, narrow, setose. Upper part of tergum X apparently absent. Lower part of tergum X strongly sclerotized spine, slightly curved ventrad; in dorsal view divided almost to base. Inferior appendage subtriangular, with apex pointing, projecting dorsomesad, setose; apicomeral lobe triangular, dorsal margin scalloped, with strong spine-like seta mesally; lateral subbasodorsal process short, triangular, with long seta apically; mesal basodorsal process projecting posterodorsad, slightly sinuous, weakly enlarged subapically, with few strong setae along posterior margin and apically. Phallus curved, with large, symmetrical, membranous flange medially; phallothremal sclerite u-shaped; apex membranous, truncate.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.
**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. legona* (Fig. 3.44) in the absence of the upper part of tergum X and the shape of the lower part of tergum X. However, it is distinguished from the shape of the inferior appendage, especially the mesal basodorsal process has weakly enlarged apex and the apicomesal lobe is present.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) botosaneanui* Marlier, 1978

*Triaenodes botosaneanui* Marlier, 1978; p. 42-43, figs. 5-6 (male)

**TYPE MATERIAL:** Holotype, male: GABON, Franceville, 23-III-1971 (the genitalia mounted Euparal no. 77018-4); type repository = Probably, Royal Belgien Institue of Natural Science, Brussels;

**DESCRIPTION:** (Marlier, 1978, translated from French):

“Dimension: Forewing 10 mm, wingspread 22 mm.

“Forewing narrow, consistently yellowish brown with dark brown hairs, more brown at apico-anal angle. Hind wing little wide, hyaline, grayish brown hairs on margin, silvery white on anal angle.

Head and prothorax grayish brown with long, silver hairs. Two narrow, silver hairy bands over mesoscutum, long and dark brown bunch of hairs over mesoscutellum.

Abdomen grayish brown (in alcohol).

Antennae of type species broken. First segment long and thick with mobile lobe laterally and long sensory hairs like short brush scale hairs under lobe (andocorina?). This species belong to the subgenus *Triaenodella* Mosely.

Maxillary palps very long, covered with brown hairs. Wing venation normal like genus, Median stem disappeared, except little sketch line (It means the M stem incomplete).

**GENITALIA:** Tergum IX extremely reduced and sternum IX of large plate well developed. Preanal appendage slender, sinuous and acute covered with hairs. Odd (single) process of segment IX [upper part of tergum X] slender, long and stretch to preanal appendage and apex rounded covered with short hairs; two short branches [lateral processes] which are unequal, transparent and rounded at one third point of the process (like *T. proszynskii* Marlier and Botosaneanu and *T. clavata* Mosely). Tergite X [lower part of tergum X] long backward, very
sclerotized, rectangular shape with posteriorly angle left, sinuous spine directed forward.; base side of this spine straight, with short spine like teeth. Phallus large and thick downward, with large and sclerotized plaque concave and broad wing, another long and less concave plaque over another middle layer, asymmetrically pointed. Basal segment of gonopod short and compact, bearing dorsally long, slender, recurved basal spine [presumably mesal basodorsal process] which elevated backward and distal part of gonopod covered with a few fine hairs. Similarity: This species is related to *Triaenodes (Triaenodella) proszynskii* Marlier and Botosaneanu and *T. clavata* Mosely from Ghana and Tanzania.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species is somewhat similar to that of *T. aberrans*, but the apex of the lower part of tergum X is recurved to the right side.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Gabon.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodella) corallina* Kimmins, 1962a

Fig. 3.68

*Triaenodes corallina* Kimmins, 1962a; p. 175, figs. 63, 65 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX L-shaped in lateral view, anterior margins vertical and straight to rounded anteroventral corner, posterior margins deeply concave, dorsum
short, venter as long as height of segment IX. Upper part of tergum X slender lobe 1.2 times as long as height of segment IX, apical margin produced downward, beak-shaped in later view; lower part of tergum X narrow and sinuous and slightly upturned and acute in lateral view, subtriangular with broad base tapering to blunt apex in dorsal view. Preanal appendages half as long as upper part of tergum X, slender, setose. Inferior appendages triangular in lateral and ventral views, inner margin rounded basally and covered with stout setae in ventral view; each with recurved process absent; mesal basodorsal process slender, extending above parts of tergum X, acute apex directed caudad; apicomesal lobe broad, coral-like structure, directed anterodorsad, covered with stout setae; distal part of inferior appendage short, bent slightly dorsad. Phallus uniformly curved ventrad, apical half of upper surface membranous; parameres absent; phallotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.2 – 7.2 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (mounted as microscope preparation).

**DIAGNOSIS:** The male of this species can be separated from those of the other species by having a coral-like apicomesal lobe on each inferior appendage.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Papua.New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes* *(Triaenodella) kimila* Mosely, 1939b

*Triaenodes kimila* Mosely, 1939b; p.17-19, figs. 27-30 (male).

**TYPE MATERIAL:** Holotype, male: DEMOCRATIC REPUBLIC OF CONGO; Likimi, 15.x.1927 (A. Collart) (ISBN).
DESCRIPTION (Mosely, 1939b):
“The specimen was collected in alcohol and is now bleached to nearly white.”

MALE GENITALIA (Mosely, 1939b):
“The apical margin of the ninth tergite is slightly produced and rounded; beneath it is an immensely long black spine [lower part of tergum X], longer than the entire genitalia; from above it is broad at its base, narrowing to a sinuous, pointed apex directed to one side; on each side is a slender superior appendage [preanal appendage], nearly as long as the central spine; penis [phallus] large and downcurved, trough-shaped, apex excised; lower penis-cover with the lateral margins strongly elevated on each side of the penis, making a deep trough; inferior appendages branched; from the side, upper branch [mesal basodorsal process] with the apex widely dilated, apical margin serrate; from its lower margin there arises a hair-like spine, directed slightly downward; lower branch itself branched; from beneath, the appendages [main body of inferior appendage] are triangular on wide bases, with spur-like apices.”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.5 mm.

MATERIAL EXAMINED: Holotype, male (mounted as microscope preparation).

DIAGNOSIS: There are some difficulties to interpret the structure of male genitalia because the microscope preparation provides only one view. The male of this species can be separated from those of other species by the long black spine-like lower part of tergum X.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus Triaenodella are unknown.

DISTRIBUTION: Democratic Republic of Congo.

BIOGEOGRAPHIC REGION: Afrotropical region.

_Triaenodes (Triaenodella) laamii_ Dakki, 1980

_Triaenodes laamii_ Dakki, 1980; p. 43-45, figs. 1-4 (male).

TYPE MATERIAL: Holotype, male; MOROCCO, wadi Guigou between Boulmane and Skoura (Moyen Atals), upstream converged with wadi El Atchane; alt. 1304m; 26-IX-1978; type repository = Probably Museum de l'Institut Scientifique de Rabat.

DESCRIPTION (Dakki, 1980, translated from French):
“General coloration pale brown; body length: 5.5-5.8 mm.”
MALE GENITALIA Dakki (1980, translated from French):
“Segment IX long in ventral and lateral views, itself short in dorsal view; narrow tergum IX has a narrow band, with two small paddings at posterior edge; sternum IX with numerous long hairs. Segment X very long; it is distinguished, in dorsal part, pair of very long, well chitinized spines [presumably lower part of tergum X], their base large and contiguous, distal half slim and sinuous; each spine with three stiff hairs on their midway, directed toward other spines. Preanal appendage almost straight, as long as two-thirds of the spines of tergum X. Gonopod very developed; two large lobes are separated by the deep vent (notch) on their distal part; the dorsal lobe [presumably mesal basodorsal lobe] more or less flat, angled at side, upper edge rounded, very convexed, lower edge with long, narrow diverticula (sac or bag); the ventral lobe [presumably main body of inferior appendage] massive, short, covered with fine many hairs, distal side evenly low-cut, small external lobe bearing four to five long hairs and large, hairy internal lobe [presumably apicomesal lobe], inner margin covered with short stout hairs. Aedeagus [phallus] as long as gonopods; distal half ventrad, proximal half perpendicular, its base and the distal half dilated and the intermediate part narrow.

This species is close to African species: T. triaenodiformis (Ulmer), by the general morphology of the genitalia and particularly by the form of 10th segment which is a pair of long spines in dorsal view.

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: The male of this species is distinguished from those of other species in that the lower part of tergum X is a pair of sclerotized spines whose bases are large and contiguous and each spine has three stiff hairs at its middle.

PHYLOGENY: The relationships of this species in the subgenus Triaenodella are unknown.

DISTRIBUTION: Morocco.

BIOGEOGRAPHIC REGION: West Palearctic region.

Triaenodes (Triaenodella) ornata Ulmer, 1915

Triaenodes ornata Ulmer, 1915; p. 57-58, figs. 30-31 (male).

Triaenodella ornata (Ulmer); Schmid, 1958, p. 139-140, pl. 26, figs. 4-6 (male, female)
TYPE MATERIAL: Holotype, male: type repository = Museum Cambridge, the existence is in doubt; type locality = SRI LANKA; Ceylon, Peradeniya, March, April and June 1911, leg., J.C.F. Fryer.

DESCRIPTION (Schmid, 1958, translated from French):
“Certainly one of the more beautiful Trichoptera of Sri Lanka. Body entirely red; pilosity of same color, with some white areas and tufts. Antennae golden yellow and finely annulated with black on [each segment in] basal half; scapes slightly longer than head, on their inner surface relatively strongly concave, bearing large quadrangular flap longitudinal and perpendicular to concavity, edges of this flap covered with dense golden hairs. Maxillary palps densely pilose red, with white annulations.

Fore wings magnificent burnt gold color with scattered black marks, ringed with pure white; three marks distributed along postcostal edge products of dense tufts of long black hairs, arranged so that when wings folded, appearing like prominent tubercles. Apical edge of fore wing slightly concave with fringe of long and dense hairs. Venation corresponding better with drawings of Martynov than to those of Ulmer.

I give below illustrations of the genitalia of the two sexes (pl. 26, fig. 4-6).”

MALE GENITALIA (Ulmer, 1951, translated from German):
“Male genitalia (fig. 31) projecting far; preanal appendages long, rod-like, with dense and long hairs, bent somewhat ventrad. Tergite X slender, single, elongate, sclerotized rod, bent slightly dorsad apically, beneath which situated thick and apically rounded phallus. Inferior appendages very large, represented as basal piece and stalked appendage; basal piece broad basally and dorsal edge suddenly narrowed about in middle such that apical half appearing slender; stalked appendage situated on inner surface of basal piece near dorsal edge on broad part of basal piece, projecting as slender stalk and broad apical plate with inner surface weakly concave, outer edge irregularly developed and weakly crenate.

Body length: 5 mm, fore wing length: 5.5 - 6.5 mm; wingspan therefore about 13 - 15 mm.”

FEMALE: A description and illustrations were provided by Schmid (1958).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: The male of this species is somewhat similar to that of T. kimila in the absence of the upper part of tergum X, the shape of the lower part of tergum X, and the clavate mesal basodorsal process of each inferior appendage. However, the apex of the
mesal basodorsal process is much broader and the distal part of each inferior appendage is longer than that of *T. kimila*.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Sri Lanka.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodella) pellucta* Ulmer, 1908

*Triaenodes pellucta* Ulmer, 1908, p. 344-345, figs. 1-3.


*Triaenodella gracillima* Martynov; Tsuda, 1942; p. 303-304, fig. 58.

*Triaenodes gracillima* Martynov; Synonym of *T. pellucta* according to Uenishi, 1993, p. 82; Yang and Morse, 1993, p. 162; and Schmid, 1994, pp. 3-4 and figs. 1-3 and 6-8.

**TYPE MATERIAL:** Holotype, female (as a male); JAPAN; type repository = Ulmer’s collection, Hamburg, Germany.

**DESCRIPTION** Yang and Morse (2000, p. 107):

“Head and thorax yellowish, palpi covered with mixed yellowish and brownish hairs; antennae long, yellow, segments with blackish annulations in their basal parts; scape longer than head in both male and female, thick in male, with broad basal projection on its inner side, projecting bearing large tufts of long thin hairs, anteriorly these tufts covered with two triangular, thin, pale plates. Mesonotum with two short, brown stripes anteriorly at sub-mesal margin, center of notum dark brown. Forewings of males and females each with apical posterior margin characteristically excised, forming relatively acute apex (fig. 61), most of wing with faint irregular fuscus cloud (more clear in female), clothed with yellowish brown hairs; some blackish spots arranged at middle of apical cells, at base of discoidal cell, behind Cu₁ and near arculus; venation as in *Triaenodes rufescens* Martynov. Posterior wings pale, with pale yellow hairs. Abdomen completely pale yellow in male; in female, yellowish above, sternite I-IV completely darkened, sternites V and VI each darkened laterally, creamy yellow in center.”

**MALE GENITALIA** Yang and Morse (2000, p. 107, figs. 125A-125D):

“Sternum VIII slightly longer than tergum VIII. Segment IX short dorsally and laterally, in lateral view appearing as narrow sinuous ribbon mostly telescoped within segment VIII; much longer, setose, trough-like, projecting caudad ventrally, with phallus arising near middle of projection and inferior appendages
arising at apex, with narrow apical incision on meson. Preanal appendages, somewhat arcuate in lateral view, each with attenuated apex divided into two spines far beyond all other appendages; pair of short, bare, asymmetrical digitate processes variously present or absent basally; lower part of tergum X short and roof-shaped, deeply and narrowly excised at its apex, directed ventrocaudad in phallocrypt membranes. Inferior appendages with main body quadrate in lateral view, basal plate and its recurved process absent, each with basodorsal process [mesal basodorsal process] short and stout, bearing ventral hairy lobe near middle, apex long and slender; in ventral view, apicomesal corner of each appendage produced upward with mesal surface covered densely with stout setae, apicolateral corner excised. Sternum IX with triangular strips in plane of phallocrypt articulating with narrow phallic shield (fig. 125B); phallus compressed and broad basally in lateral view, tapering to slender apex, initially directed dorsocaudad, then arched ventrocaudad to apex.”

**FEMALE:** A description and illustration were provided by Yang and Morse (2000).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.5 mm.

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- KU-96-NM-043, M. Uenishi, det. 1999 (CUAC)

**DIAGNOSIS:** The male of this species can be separated from those of other species by having the lower part of tergum X directed ventrocaudad in the phallocrypt membranes and the mesal basodorsal process bearing a rounded hump near the middle.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Japan.

**BIOGEOGRAPHIC REGION:** East Palearctic region.

*Triaenodes* (*Triaenodella*) *proszynskii* Marlier and Botosaneanu, 1968

*Triaenodella* *proszynskii* Marlier and Botosaneanu, 1968; p. 13, figs. 8-9 (male).

*Triaenodes* *proszynskii* (Marlier and Botosaneanu); Gibbs, 1973, p. 399, 421.

**TYPE MATERIAL:** Holotype, male: IVORY COAST; North Ghana, Damongo, Daboya, 28-XII-1963 (ISNB).
**DESCRIPTION** (Andersen and Holzenthal, 2001, p. 241):
“Adults (male, female; n=10). Forewing length 10.5-11.5, 10.9 mm, hind wing length 8.5-9.6, 9.0 mm. Eye 0.57-0.64, 0.61 mm wide. Antenna at least 37 mm long, including 0.86-0.98, 0.93 mm long scape; male scapus with distinct scent organ and dense dark brown brush. Maxillary palp segment lengths (in mm): 1.03-1.18, 1.11; 1.06-1.27, 1.14; 1.24-1.36, 1.30; 0.55-0.70; 0.66; 1.70-1.80, 1.73; both sexes with dense dark-brown setae along dorsal and ventral margins. Colour in alcohol overall dark grayish-brown.”

**MALE GENITALIA** (Andersen and Holzenthal, 2001, p.241, figs. 31-36):
“Abdominal segment IX with anterior margin slightly rounded; tergum narrow; pleura region bluntly triangular, setose; sternum triangular, strongly produced posteriorly, in ventral view with shallow v-shaped excision apically. Preanal appendage long, narrow, setose. Upper part of tergum X long, slender, pointed apically with short setae in apical one third; with pair of short, blunt, lateral projections at basal one quarter. Lower part of tergum X heavily sclerotized, slightly sinuous, split into two asymmetrical, spine-like processes two thirds from base; right process gradually tapering, curved slightly lateroventrad; left process bent ventrad subapically, with tapering apex projecting ventrolateralad. Inferior appendage stout, subtriangular, with short, spine-like setae apicomesally; mesal basodorsal process projecting posterodorsad; base prominent, forming heavily sclerotized bridge between left and right appendages; apically broadly triangular, slightly concave, with pair of tooth-like projections anteroventrally. Phallus slender, cylindrical, curved; with strong, tapering paramere ventrally; phallotremal sclerite U-shaped.”

**FEMALE:** A description and illustration were provided by Andersen and Holzenthal (2001).

**IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** The male of this species exhibits the characters of the subgenus *Triaenodella* by the upper part of tergum X comprising one median lobe and a pair of lateral processes, the lower part of tergum X forming a pair of strongly sclerotized spines, and the mesal basodorsal process of the inferior appendage being capitate. It differs from those of other species by having a ventral paramere of the phallus.

**PHYLOGENY:** The relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Ivory Coast.

**BIOGEOGRAPHIC REGION:** Afrotropical region.
Triaenodes (Triaenodella) triquetra Neboiss and Wells, 1998

Triaenodes triquetra Neboiss and Wells, 1998; p. 122, figs. 108-114 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, Cape York Peninsula, Lockerbie Scrub, 15 Apr 1975, M.S. Moulds, (NMV, T-16209).

**REDESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX L-shaped in lateral view, anterior margin slightly sinuous, posterior margin concave and each with deep diagonal incision above middle, dorsum short, ventrer about half as long as height of segment IX. Upper part of tergum X pair of short, digitate lobes; lower part of tergum X membranous plate, as long as preanal appendages. Preanal appendages elongate, setose. Inferior appendages with L-shaped main body in lateral view, triangular in ventral view, with pair of very stout spines apically; each with recurved process absent; mesodorsal lobe thick, club-shaped, covered with stout spines apically; mesal basodorsal process slender, slightly recurved. Phallus slightly expanded distally, dorsal surface membranous in distal half; paramere absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.2 -5.7 mm.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16210, genitalia prep., PT-762).

**DIAGNOSIS:** The male of this species can be separated from those of other species by having a prominent mesodorsal process and a pair of spines on the mesal subapical margin of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus Triaenodella are unknown.

**DISTRIBUTION:** Australia.
**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodella) verberata* Neboiss and Wells, 1998

**Fig. 3.69**

*Triaenodes verberata* Neboiss and Wells, 1998; p. 117, figs. 86-88 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX trapezoidal in lateral view, anterior margins broadly convex in middle, posterior margins broadly sinuous and each with deep, narrow, diagonal incision filled with membrane from near middle, dorsum very short, venter about half as long as height of segment IX. Upper part of tergum X slender spine, divided about middle, left spine about twice as long as right spine, right spine curved to left and crossing left spine; lower part of tergum X slender, acute spine, about 1.6 times as long as height of segment IX, distally slightly twisted. Preanal appendages slender, elongate, setose. Inferior appendages rectangular and about twice as long as tall and apically rounded in lateral view, tapering and about twice as long as basal width and apically rounded in ventral view, covered with stout setae mesally; recorved processes absent; mesal basodorsal process long and thick lobe, basal half vertical with broad basal triangular setose protrusion, then angled posteroceadad, bearing several hairs dorsally. Phallus slender, dilated apically, curved downward; parameares absent; phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 3.7 mm.
MATERIAL EXAMINED: Holotype, male.

DIAGNOSIS: The male of this species can be separated from those of other species by having the unequal forks of the upper part of tergum X and the seahorse-like mesal basodorsal process of each inferior appendage.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus *Triaenodella* are unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes (Triaenodella) intecta* Mey, 2003

*Triaenodes intecta* Mey, 2003; p. 450, figs. 74-75 (male).


DESCRIPTION (Mey, 2003):
“Length of forewing: 5 mm. Head brown. Antennae yellow, with fine black articulations, scape with small hairpencil. Maxillary palpi long and yellow. Legs yellow, tibia of middle leg with a row of small, black spines. Forewing yellow, veins in the apical third becoming darker towards wing margin.”

MALE GENITALIA (Mey, 2003):
“Segment IX with an oblique and narrow membranous strip on the lateral sides. Preanal appendages present. Segment X and other appendages lacking. Inferior appendage with a triangular ventral branch [main body], bearing small spines standing subapically on the inner side, median branch [mesal basodorsal process] boomerang-like.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.
DIAGNOSIS: The male of this species most closely resembles that of *T. spoliata* in lacking the upper and lower parts of tergum X. However, it is different by the boomerang-like mesal basodorsal process of each inferior appendage.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus *Triaenodella* are unknown.

DISTRIBUTION: Philippines.

BIOGEOGRAPHIC REGION: Oriental region.

_Triaenodes (Triaenodella) palpalis_ Banks, 1920

_Triaenodes palpalis_ Banks, 1920; p. 352.

**TYPE MATERIAL:** Holotype, female; CAMEROONS, Bitze, Ja River, Oct.-Nov. (Type 10825, sex not stated, MCZC).

**DESCRIPTION** (Andersen and Holzenthal, 2001, p.237, figs. 26-30):
“Female (n=1). – Forewing length 12.9 mm; hind wing length 11.2 mm. Eye 0.83 mm wide. Antenna broken, scape 0.97 mm. Maxillary palp segment I-Iv lengths (in mm), segment V missing: 1.27, .138, .151, 0.79. Color uniformly light yellowish-brown in pinned specimen. Female genitalia. Abdominal segment VIII with sternum densely setose posteriorly; in ventral view with posterior corners rounded, medially broadly concave. Segment Ix with tergum broad, with two pairs of papillose lobes, anterior pair small, triangular; posterior pair digitate, extending caudad beyond tip of tergum X; pleuron rounded setose. Tergum X setose, with right angled dorsal corner and straight posterior margin: in ventral view with lower margin of anal opening with rounded, median projection not visible in dorsal view, Lamellae setose subrectangular with rounded posteroverentral corners, Spermathecal sclerite in ventral view with posterolateral two third subcircular, with posterolateral subtriangular projections and strongly sclerotized median structure, with two rounded lobes projecting anterad and triangle pointed projection pointing dorsolaterad: anterior one third narrowing, with weakly bilobed apex; in lateral view with dorsal part approximately one half of the length of ventral part.”

MALE AND IMMATURE STAGES: Unknown.

REMARK: Andersen and Holzenthal (2001) placed this species in the subgenus *Triaenodella* after comparing the female character states with those of the female of *T. proszynskii*. 
**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodella* are unknown.

**DISTRIBUTION:** Cameroons.

**BIOGEOGRAPHIC REGION:** Afrotropical region.
CHAPTER VIII

SUBGENUS MICROTRIAENA, NEW SUBGENUS

Type species: *Triaenodes florida* Ross, 1941

There have been six species of this subgenus found in the Afrotropical, Oriental and Nearctic regions. Andersen and Holzenthal (2002) placed four West African species which have a weak, abbreviated basal plate and a short recurved process in the subgenus *Triaenodes*. In this work, the West African species are assigned to a new subgenus *Microtriaena* and one more species from each of the Oriental and Nearctic regions. The relationships of this subgenus and other subgenera are discussed in Chapter III (Fig. 2.1).

Males of the subgenus share a synapomorphy (Figs. 2.1, 3.71A) that (14) the recurved process of the inferior appendages, derived from the weak basal plate, is short. One monophyletic species group has been recognized in this subgenus (Fig. 2.6). The relationships of the four remaining species are unknown.

Subgenus *Microtriaena* adult males are distinguishable from other subgenera by the following characters: (1) the preanal appendages are short and stout or long and slender; (2) the upper part of tergum X is reduced or a single long lobe or a single plate; (3) the male inferior appendages lack lateral subbasodorsal processes; (4) the recurved process of each inferior appendage is short; (5) the male phallus lack parameres or spines.

*Triaenodes (Microtriaena) contartus* Group
The *T. (Microtriaena) contartus* Group has two species. A synapomorphy is that (51) the recurved process of the inferior appendage has the club-shaped head (Fig. 3.70E).

*Triaenodes (Microtriaena) africana* Ulmer, 1907

*Triaenodes africana* Ulmer, 1907; p. 14, figs. 19-21 (male).

**TYPE MATERIAL:** Holotype, male: NIGER: Warri, C. P. 2-VIII-1897, Dr. Roth (RMNH).

**DESCRIPTION** Andersen and Holzenthal (2002):
“Male (n=1). Forewing length 6.0 mm, hind wing length 4.8 mm. Eye approximately 0.29 mm wide. Antenna broken; scape 0.61mm long. Maxillary palp segment lengths (in mm): 0.43, 0.61, 0.60, 0.34, 0.77. Colour reddish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2002, p. 65 and 67, figs. 4-7):
“Abdominal segment IX with anterior margin broadly rounded, with tergum narrow, pleura setose, projected medially on posterior margin; sternum subtriangular, produced posteriorly, in ventral view with weakly rounded posterior corners and truncately excavated mesally along posterior margin. Preanal appendage long, narrow, setose. Upper part of tergum X apparently absent. Lower part of tergum X long, narrow, pointed, curved ventrad; in dorsal view divided to base, both forks apically curved to the left. Inferior appendage subtriangular, setose; apicomesal lobe subrectangular, broadened distally, with rounded posterior margin and irregular dorsal margin with two, short seta-bearing knobs medially; with strong, spine-like setae mesally; mesal basodorsal process club-shaped, with row of strong, short setae mesally along dorsal and posterior margins; abbreviated basal plate weak, with short, stout, curved spine projecting caudad, with club-shaped, setose apex. Phallus long, curved, with low, dorsolateral flange in basal half and membranous apex.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is mostly close to *T. contartus* but, it differs from in that the mesal basodorsal process of the inferior appendage is club-shaped, while that of *T. contartus* is enlarged like hammerhead apically.

**PHYLOGENY:** The sister species of this species is *T. contartus*. A synapomorphy is indicated above.

**DISTRIBUTUION:** Niger.
BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Microtriaena) contartus* Jacquemart and Statzner, 1981

Fig. 3.70

*Triaenodes contartus* Jacquemart and Statzner, 1981; p. 18, pl. XII, figs. 1-4; pl. XV, fig. 13 (male).

**TYPE MATERIAL:** Holotype, male; type repository = probably, National Center for Scientific Research at Central Africa (Tervuren), type locality = DEMOCRATIC REPUBLIC OF CONGO; Kalengo, 2-III-1972

**DESCRIPTION** Jacquemart and Statzner (1981, translated from French):
“Description from imago. – Forewing length 5.5 mm; hind wing length 4.3 mm.”

**MALE GENITALIA** Jacquemart and Statzner (1981, translated from French):
“Tergum IX laterally long, dorsally strongly reduced and angled in the middle. Cerci cylindrical, very long, slightly curved ventrad, and covered with long hairs. Tergum X forming two very long spines recurved ventrad toward genitalia, sharp apically and with dorsal apophysis in middle of curve. Phallus thick, bulbous apically, phallobase clubbed, phallicata very long, extending far beyond. Inferior appendage formed of three parts. Baso-ventral part triangular in ventral view, armed with spines on inner face and thickened basolaterally. Large dorsal branch arising on inner base of that part, curved dorsad then caudad and ventrad, bulbous and rounded with its apex adorned with sharp bristles. Third part dorsal, straight, slender, but enlarged like hammerhead apically and covered with spines directed caudad.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.5 mm.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** No etymology was provided in the original description of this species and no conspicuous clues are in the description to suggest the meaning of the epithet. The word could be Latin "contus" (= "pike") and Latin "artus" (= "joint" or = "compressed, confined, close, strait, or narrow"). The first of these choices ("pike joint") is a masculine noun and the second choice ("compressed pike") is an adjective. Therefore, Article 31.2.2 (International Code of
Zoological Nomenclature, 1999) applies and the name is to be treated as a noun in apposition, retaining the original spelling.

**DIAGNOSIS:** The male’s “tergum X forming two very long spines recurved ventrad toward genitalia, sharp apically and with dorsal apophysis in middle of curve” refers to the lower part of tergum X; “large dorsal branch arising on inner base of that part, curved dorsad then caudad and ventrad, bulbous and rounded with its apex adorned with sharp bristles’ refers to the recurved process of the inferior appendage, “third part dorsal, straight, slender, but enlarged like hammerhead apically and covered with spines directed caudad” refers to the mesal basodorsal process of the inferior appendages. Although the presence and the structure of the upper part of tergum X are not indicated, I assume the upper part of tergum X is apparently absent like *T. africana*. This species differs from *T. africana* in the hammerhead mesal basodorsal process of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. africana*. A synapomorphy is indicated above.

**DISTRIBUTION:** Democratic Republic of the Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Microtriaena)* Species *Incertae sedis*

Four species *incertae sedis* share synapomorphy 14 with other species of subgenus *Microtriaena*, but no other synapomorphies are evident to suggest more refined relationships.

*Triaenodes (Microtriaena) florida* Ross, 1941

Fig. 3.71

*Triaenodes florida* Ross, 1941; p. 96-97, Pl. X, fig. 78.

**TYPE MATERIAL:** Paratype, male: NORTH AMERICA, Florida, Washington County, May 30, 1940, Coll. L. Berner (INHS, #24813).
**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, posterior margin of tergum IX broadly triangular, tergum IX with posteromesal margin rounded in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X narrow, bifurcate as V-shaped, apically bearing long hairs, lower part of tergum X membranous, broad, lateral margin with short process in lateral view; preanal appendages short, stout, setose; inferior appendages subrectangular in ventral view, distal part pointed, apicomesal lobe subtriangular in lateral view, its posterior margin covered with stout setae, mesobasodorsal process short, robust, setose; recurved process short, sclerotized; phallus sclerotized ventrally to apex, broadest at base and apex, with deep groove, apically membranous, parameres absent, phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7.0 mm; length of body, Male, 9.5 mm.

**MATERIAL EXAMINED:** Paratype, male. Also, I have examined the following material; 2 males: NORTH AMERICA, Florida, Alachua County, 194?, CAT. NO. S55, Gainesville, Coll. By T.S. D and By M. W. Nisenbero (?) (INHS, #45828).

**DIAGNOSIS:** This species has only (1) a short and broad lower part of tergum X and (2) the short process present at the lateral margin of the lower part of tergum X, while that of the other species is a pair of or single long and narrow spines.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Microtriaena* are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.
Triaenodes (Microtriaena) fortunio Schmid, 1994

Fig. 3.72

Triaenodes fortunio Schmid, 1994; p. 8, figs. 12-14 (male).

**TYPE MATERIAL:** Holotype, male: INDIA: Assam, United Jaintia and Khasi Hills, Mawlang, 12-IV-1960 (CNC).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, with scent-organs (flaps not discernible on dried specimen). Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, tergum IX with posteromesal margin broadly rounded in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long, slender, apically setose, lower part of tergum X sclerotized, pair of long, thin spines, slightly curved downwards over phallus; preanal appendage half as long as upper part of tergum X, setose; inferior appendage broad subrectangular in ventral view, distal part thumb-like, setose, apicomesal lobe thick, setose; recurved process short, curved caudad, apex bluntly rounded; phallus thick, elongate, ventrally sclerotized, apical one-third of phallus membranous, parameres absent, phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.0 mm.

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species somewhat resembles *T. kofi*, but is distinguishable from it by a pair of very slender lower part of tergum X and the strongly recurved and thick recurved process of the inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Microtriaena* are unknown.
**DISTRIBUTION:** India.

**BIOGEOGRAPHIC REGION:** Oriental region.

\[ \text{Triaenodes (Microtriaena) kofi} \] \text{Andersen and Holzenthal, 2002}

\[ Triaenodes kofi \] \text{Andersen and Holzenthal, 2002; p. 75, figs. 25-28 (male).}

**TYPE MATERIAL:** Holotype, male: GHANA; Western Region, Ankasa Game Production Reserve, 16. xi. 1995, at light, NUFU-project (UMSP)

**DESCRIPTION** \text{Andersen and Holzenthal (2002):}

“Male (n=6). Forewing length 5.4-5.8, 5.6 mm, hind wing length 3.9-4.3, 4.1 mm. Eye 0.31-0.34, 0.32 mm wide. Antenna at least 17.9 mm long, including 0.45-0.59, 0.54 mm long scape. Maxillary palp segment lengths (in mm): 0.37-0.50, 0.41; 0.50-0.56, 0.53; 0.47-0.56, 0.52; 0.31-0.37, 0.35; 0.55-0.58, 0.56. Colour in alcohol overall reddish-brown.”

**MALE GENITALIA** \text{Andersen and Holzenthal (2002):}

“Abdominal segment IX with anterior margin slightly concave and broadly rounded anterioventral corner; with tergum and pleural narrow; sternum subrectangular, strongly produced posteriorly; in ventral view with posterior margin nearly straight. Preanal appendage triangular apparently fused to upper part of tergum X. Upper part of tergum X long, tubular, slightly curved ventrad subapically, with club-shaped, setose apex. Lower part of tergum X long, narrow, spine, distal half curved ventrad; in dorsal view asymmetrical, with apex curved to the left. Inferior appendage with basal two thirds subrectangular, subapically sinuous with apex hooked dorsad; lateral subbasodorsal process short, digitate, setose; abbreviated basal plate weak, with short, slightly recurved process, with few setae apically. Phallus narrow, tubular, strongly curved, with small, rounded, symmetrical flanges subbasally, larger, membranous, slightly asymmetrical flanges dorsomedially and narrowly rounded apex.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None

**DIAGNOSIS:** This species somewhat resembles \text{T. fortunio,} but is distinguishable from it by the lower part of tergum X forming a long, narrow curved spine and the preanal appendage apparently fused to upper part of tergum X.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus \text{Microtriaena} are unknown.

**DISTRIBUTION:** Ghana.
**BIOGEOGRAPHIC REGION:** Afrotropical region.

_Triaenodes (Microtriaena) kwasi_ Andersen and Holzenthal, 2002

_Triaenodes kwasi_ Andersen and Holzenthal, 2002; p. 81, figs. 42-45 (male).

**TYPE MATERIAL:** Holotype, male: GHANA; Central Region, Kakum Forest Reserve, 8-15. xi. 1994. Malaise trap, NUFU-project (UMSP)

**DESCRIPTION** Andersen and Holzenthal (2002):
“Male (n=1). Forewing length 5.1 mm, hind wing length 4.0 mm. Eye 0.34 mm wide. Antenna broken, scape 0.37 mm. Maxillary palp segment lengths (in mm): 0.37, 0.54, 0.58, 0.40, 0.72. Colour in alcohol uniformly light yellowish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2002):
“Abdominal segment IX with anterior margin subtriangular, rounded; tergum narrow; pleural region triangular, semi-membranous, posterior margin setose; sternum triangular, produced posteriorly; in ventral view with rounded posterior corners. Preanal appendage long, narrow, setose. Upper part of tergum X reduced. Lower part of tergum X a strong spine, split at two third length, left spine broken [one single specimen known], right spine curved ventrad, sinuous, projecting caudad, subapically with shallow pits; in dorsal view apex curved slightly mesad. Inferior appendage subquadrangular, with posterodorsal corner produced, setose; apicominal lobe triangular, with rounded posterior margin, with strong, spine-like setae mesally; mesal basodorsal process enlarged, triangular in distal one half, with scalloped, weakly rounded posterior margin, setose; abbreviated basal plate weak, with short, recurved process projecting caudad, with bluntly rounded, setose apex. Phallus short, curved; with symmetrical, dorsal flanges; phallothremal sclerite present.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.1 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species shows similarities to _T. africana_ and _T. contartus_, but it differs from the shape of the lower part of tergum X which is the strong spine, split at two third length, while that of each of them a pair of spines.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus _Microtriaena_ are unknown.

**DISTRIBUTION:** Ghana.
BIOGEOGRAPHIC REGION: Afrotropical region.
CHAPTER IX

SUBGENUS TRIAENODES MCLACHLAN, 1865b

Type species: *Triaenodes bicolor* (Curtis, 1834)

There have been 92 species of this subgenus found in major biogeographic regions except the Neotropical region. The relationships of this subgenus and other subgenera are discussed in Chapter III (Fig. 2.1).

Males of this subgenus share two synapomorphies (Fig. 2.1) that (15) the phallus has distinctive lateral ridges for resting or guiding the recurved process of each inferior appendage (Fig. 4.24A) and (16) the recurved process on the basal plate of each inferior appendage is long and slender, extending well beyond the inferior appendages (Fig. 4.1A).

Subgenus *Triaenodes* adult males are distinguishable from other subgenera by the following characters: (1) the scent organs of male antennal scapes are present or absent; (2) the preanal appendages are long, slender, and setose; (3) the upper part of tergum X is a long and slender median lobe, sometimes apically bifid or trifid, or apparently reduced; (4) the median lobe of the upper part of tergum X has a pair of lateral processes at midlength or a pair of small basal papillae (probably vestiges of lateral processes of the upper part of tergum X) present at the base of upper part of tergum X; (5) the lower part of tergum X is a pair of sclerotized spines, a long single spine, a hood-like membranous plate, or apparently reduced; (6) the male inferior appendages have a pair of recurved processes on the well-developed basal plate of the inferior appendages and the recurved processes are usually symmetrical, very long, and slender. The
recurred processes of some species are bifurcated or have a small spur at midlength; (7) the lateral subbasodorsal process on each inferior appendage is lack; (8) the inferior appendages of some male species (mostly in the Nearctic region) each has a mesodorsal process; (9) the male phallus usually lack parameres, but some species have parameres or spines.

Three Lineages have been recognized in this subgenus (Fig. 2.7), but no synapomorphies are known by which their trichotomy may be resolved.

Lineage #1

_Triaenodes (Triaenodes) imakus_ Group

The _T. (Triaenodes) imakus_ Group includes ten species found in the Afrotropical and West Palearctic regions. Some synapomorphies are that (43) the upper part of tergum X is inconspicuous (Fig. 4.1B) and (52) the apex of the mesal basodorsal process of each inferior appendage is obliquely truncated (Fig. 4.2A).

_T. imakus_ and _T. kwaku_ are sister species in this Group. A synapomorphy is that (53) the apex of the mesal basodorsal process of each inferior appendage is forked (Figure 4.1A).

The phylogenetic relationships of the remaining eight species of the Group are unknown.

Some diagnostic characters include the following:

1. the lower part of tergum X is usually a pair of spines;
2. the male inferior appendages each has a well-developed recurved process;
3. the distal part of each inferior appendage is short or long, and pointed in lateral view;
4. the apicomesal lobe of each inferior appendage is present.

_Triaenodes (Triaenodes) imakus_ Gibbs, 1973
Fig. 4.1

*Triaenodes imakus* Gibbs, 1973; p. 400, figs. 113-115 (male).

**TYPE MATERIAL:** Holotype, male: GHANA: Eastern Region, Tafo, Sp-50 *Triaenodes* UV trap 24-VI-67, Gibbs (BMNH).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown; antennal basal part long with hairy scent-organ without flap; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX with posterior margin straight, broadly rounded anteroventral corner, sternum IX with posterior margin broadly rounded in dorsal view; upper part of tergum X reduced, lower part of tergum X divided distally into long, narrow, with narrowly triangular base; preanal appendage long, slender, setose; inferior appendage semi-oval shaped in ventral view, distal part narrow, pointed, curved posterodorsad in lateral view, lateral subbasodorsal lobe short, triangular, apically setose, apicomesal lobe narrowly triangular, covered with stout setae, mesal basodorsal process prominent, curved caudad, forked subapically; recurved processes long, ventrally bent extending anteriorly beyond phallus base; phallus ventrad, shallowly dorsally concave, with small dorsolateral expansions just before membranous apex, parameres absent, phallotremal sclerite U-shaped.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.5 mm.

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** There was no etymology provided with the original description and there are no clues in the description about the meaning of the species epithet. The epithet has no recognizable meaning in Greek or Latin. Therefore, Article 31.2.2 (International Code of Zoological Nomenclature, 1999) applies and the name is to be treated as a noun in apposition, retaining the original spelling.
**DIAGNOSIS:** This species is closely related to *T. kwaku* by having the forked mesal basodorsal process of the inferior appendage. However, it is easily distinguished by the strong and pointed distal part and the stout apicomesal lobe of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. kwaku*. A synapomorphy is indicated above.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) kwaku* Andersen and Holzenthal, 2002

*Triaenodes kwaku* Andersen and Holzenthal, 2002; p. 77, figs. 34-37 (male).

**TYPE MATERIAL:** Holotype, male: GHANA; Volta Region; Agumatsa Waterfalls, Wli, 6-15. iii. 1993, Malaise trap, NUFU-project (UMSP)

**DESCRIPTION** Holzenthal and Andersen (2002):
“Male (n=1-2). Forewing length 5.8-6.2 mm, hind wing length 4.4-5.0 mm. Eye 0.35-0.39 mm wide. Antenna at least 16.4 mm long, including 0.47-0.52 mm long scape; scape with well developed scent organ and brush of dark brown seta. Maxillary palp segment lengths (in mm): 0.45, 0.60, 0.63, 0.42, 0.77. Colour in alcohol overall reddish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2002):
“Abdominal segment IX with anterior margin slightly rounded; tergum narrow; pleural region rounded, setose, widest dorsally; sternum subrectangular, strongly produced posteriorly; in ventral view with rounded corners, shallowly excavated with nearly straight apical margin. Preanal appendage long, very narrow, setose. Upper part of tergum X short, bilobed. Lower part of tergum X narrow, slightly sinuous, with fine setae subapically; in dorsal view forked almost to base, the forks very narrow, weakly sinuous. Inferior appendage short, subrectangular; apicomesal lobe bilobed, with short, tooth-like lobe posterovertrally and triangular, rugose, strongly setose lobe posterodorsally; lateral basodorsal lobe [mesal basodorsal process] prominent, with broad base, forked medially, ventral projection irregular, broadly rounded, with long, apical setae, dorsal projection narrow, curved, with two strong apical setae; abbreviated basal plate projecting anteroventrad, with long, spine-like recurved process projecting caudad, forked medially, ventral projection lanceolate, dorsal projection long, narrow, curved, with few short setae subapically. Phallus slender, curved; with symmetrical, dorsolateral flanges; membranous apically; phalotremal sclerite u-shaped.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.
**DIAGNOSIS:** This species is closely related to *T. imakus* by having the forked mesal basodorsal process of the inferior appendage. However, it is easily distinguished by the medially forked recurved processes and the short and blunt distal part of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. imakua*. A synapomorphy is indicated above.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) longispina* Jacquemart, 1966a

Fig. 4.2

*Triaenodes longipina* Jacquemart, 1966a; p. 4, fig. 1 (male)

**TYPE MATERIAL:** Holotype, male; DEMOCRATIC REPUBLIC OF CONGO; Lubumbasi (=Elisabethville), XII-1960 (microscope preparation) (ISBN; I. G. 22735).

**DESCRIPTION** Jacquemart (1966, translated from French):

“The first antennal segment has the scale characteristic of the genus. MLE GENITALIA – Tergum XI producing two long sclerotized filaments, projecting caudad over all the genitalic armature then curving ventrad to reach the level of the ends of the gonopods from its end arises a long membranous pouch (inferior appendage). The phallus is evenly curved ventrad, it is sclerotized except dilated at its apex. The superior pieces (=preanal appendages) are very long and slender. Intermediate appendages have the same appearance as those of the preceding species [*Triaenodes hirsuta* sp. n.], but the lateral organ [mesal basodorsal process] is larger than that. It arises from a slender stalk and then gets very greatly widened toward the top, the upper edge is straight and covered with some hairs.

Each gonopod [inferior appendage] appears in profile rectangular in the basal two-thirds then abruptly constricted from there is a lobe that is curved slightly dorsad and rounded apically. The inner surface of each gonopod bears a nipple bristling with sharp spines.

This species is very close to the morphological structure of the former [*T. hirsuta*] and shows a certain resemblance with *T. uncata* Kimmins, but it is differentiated by the more irregular structure of the gonopod in those species.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm; hind wing: Male, 5 mm

**MATERIAL EXAMINED:** None.
**DIAGNOSIS:** Male of this species, *T. tanzanica* and *T. uncata* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which is basally slender and apically dilating. They need more evidences other than adult morphological characters.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) imakus* Group are unknown.

**DISTRIBUTION:** Democratic Republic of the Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) tanzanica* Olah, 1986

**TYPE MATERIAL:** Holotype, male: TANZANIA; USA River, Ix, 1956-II. 1966 leg. Szunyoghy; type repository = Hungarian Natural History Museum, Budapest.

**DESCRIPTION** Olah (1986):

“Male (in alcohol). General colour faded yellow. Antennae, palpi and legs paler. Each antennal segment annulated with a darker narrow ring. Stem of epicranial suture hardly visible on holotype. Spurs 1, 2, 2. Wing venation with *Triaenodes*-pattern, although apical half of stem of M present. Cu_{1b} represented by a cross-vein from behind anastomosis to Cu_{3}+A. Discoidal cell broad nearly as long as it footstalk. In hind wing, R_{4+5} and M_{1+2} not confluent even for a short distance just touching each other. Length and largest width of fore wings 7.3-1.8 (probably, 8.1) mm, those hind wings 6-1.7 (probably, 7.1) mm.”

**MALE GENITALIA** Olah (1986):

“Ninth segment almost triangular in lateral view. Its tergite on the dorsum reduced to a very thin hardly visible transverse band. Its sternite in ventral aspect forming a nearly tetragonal shape with two anterolateral and one anteromedian sinuate excision. Tenth segment [lower part of tergum X] comprising a pair of extremely long, slender spines, forming a complete arch in side view and running parallel beyond the inferior appendages. Their apices not crossing. The spines are fused basally. Their base covered by the also fused base of the two long upwards directed, slender superior appendages. No short processes visible on this basement (at least not on the caustic potash-treated pale holotype genitalia). Aedeagus [phallus] forming also a complete arch in lateral aspect and ornamented with a sclerotized, small, horizontally situated half ring [phallotremal sclerite], midway on arch. Dorsum with a median groove along
the whole length and with a middle circular part separating the sclerotized basal half from the apical membranous part. Inferior appendages stout, twice as long as wide in side view. Its upper margin excised subapically. Apical part curving downwards then sharply upwards. In ventral view the basic units of the inferior appendages taper gradually from the base to the apices which then curve inwards. The basic units are supplied with three branches. Inner margin [mesodorsal process] produced upwards, midway, to form a rounded, highly setose lobe. At the anterior end of the inferior appendages, from the dorsal angel, two strong flattened spines [recurved processes] arise and run along the aedeagus. The third branch [mesal basodorsal process] arises from the dorsal angel posterior to the joining of the flat spine. This is a slender branch broadening apically then tapering dorsoapically.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Male of this species, *T. longispina* and *T. uncata* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which is basally slender and apically dilating. Especially, this species is very close to *T. uncata*. The significant difference is that the lower part of tergum X is much longer without the apical crossing than that *T. uncata*. Also, Olah (1986) mentioned about the difference of the wing venation between two species.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) imakus* Group are unknown.

**DISTRIBUTION:** Tanzania.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triagenodes (Triaenodes) uncata* Kimmins, 1962b

Fig. 4.4

*Triagenodes uncata* Kimmins, 1962b; p. 107-109, figs. 68-69, 76-81 (male, female)

**TYPE MATERIAL:** Holotype, male: UGANDA; Mbanga Forest, Mpigi, P. S. Corbet, 1♂, 4♀ (BMNH).

**DESCRIPTION** Kimmins (1962b):
♂ HOLOTYPE (in alcohol). General colour pale tawny yellow. Antenna finely annulated with fuscous [grayish brown], basal segment without dorsal flap but with a small, median, longitudinal carina on apical half of dorsal surface, which curved over outwards. Fore wing with golden pubescence and traces of fuscous [grayish brown] pubescence (rather denuded). Apical half of stem of M present. Cu₁b represented by a weak cross-vein from anastomosis to Cu₂₊₆. In hind wing, R₄₊₅ and M₁₊₂ confluent for a short distance.

**MALE GENITALIA** Kimmins (1962b):
“Resembling *T. wambana* Mosely (1939:15), but differing in detail. Ninth segment with prominent, triangular side-pieces and below them there is a triangular excision of the lateral margin. Tenth segment [lower part of tergum X] comprising a pair of long, slender spines, strongly arched in side view, their apices crossing in the type. Above these spines (which fused basally) are two long, slender cerci and two short processes. Aedeagus [phallus] arched basally, with a median dorsal groove, apical part membranous. Clasper [inferior appendage] stout, about twice as long as wide in side view, its upper margin elevated about mid-way, then excised before the acute apex. Lower margin sinuous in side view, apex obliquely truncate. In ventral view, the clasper tapers gradually from base almost to apex and it then suddenly constricted to a finger, curving inwards from the outer angle. Inner margin of the clasper produced upwards in apical half to form a rounded setose angle. Inner margin of the clasper produced upwards in apical half to form a rounded setose lobe [mesodorsal process]. At the extreme base of the clasper there arises, from the dorsal margin, a strong, sickle-shaped spines [recurved processes], adjacent to the stem of the aedeagus. Just posterior to this spine arises the basal branch [mesal basodorsal process], slender basally, directed obliquely upward and caudad, dilating apically and setose. This branch is very thin and lightly sclerotized and in the course of mounting has twisted spirally and changed its direction.”

**FEMALE:** A description and illustrations were provided by Kimmins (1962b).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7.0 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Male of this species, *T. longispina* and *T. tanzanica* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which is basally slender and apically dilating. Especially, this species is very close to *T. tanzanica*. The significant differences are that the lower part of tergum X is much shorter than that *T. tanzanica* and the apex of the lower part of tergum X is apically crossing.
PHYLOGENY: The phylogenetic relationships of this species in the *T. (Triaenodes)* *imakus* Group are unknown.

DISTRIBUTION: Uganda.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodes) clara* Jacquemart, 1961a

Fig. 4.5

*Triaenodes clara* Jacquemart, 1961a; p. 227 (male)

TYPE MATERIAL: Holotype, male: DEMOCRATIC REPUBLIC OF CONGO, Lusinga (1.760m.), 1-8-XII-1947, Mis. G. F. de Witte., 1126a, (RMCA).

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish brown; antennal basal part long without hairy scent-organ; forewings and hind wings pale yellow, densely covered with yellow hairs.

MALE GENITALIA: Sternum IX with posterior margin sinuate in lateral view, probably, upper part of tergum X probably reduced (like the upper part of tergum X of most species of the Afrotropical region apparently reduced), lower part of tergum X with pair of long and pointed spines, curved downward; preanal appendages elongate, with subtriangular-shaped base, setose; inferior appendage complex, distal part pointed, covered with stout setae, mesal basodorsal process prominent, with slender base, apically enlarged and truncated, bearing several setae; apiomesal lobe long subtriangular-shaped, covered with many stout setae, lateral subbasodorsal process short, pointed; recurved processes long, slender, pointed, well beyond inferior appendage; phallus ventrally sclerotized, dorsally membranous, paramere absent, phallotremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, ca. 6.7 mm

DIAGNOSIS: There are some difficulties to interpreter the structure of male genitalia because of the microscope preparation mounted. Male of this species, *T. kwame* and *T. wambana* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which has a slender stem and apically truncated. Especially, this species is very close to *T. wambana*. It differs from other two species by having the long recurved process, the subtriangular apicominal lobe, the short distal part of inferior appendage.

PHYLOGENY: Although, the sister species of this species might be *T. wambana*, the phylogenetic relationships of this species in the *T. (Triaenodes) imakus* Group are unknown.

DISTRIBUTION: Democratic Republic of the Congo.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodes) kwame* Andersen and Holzenthal, 2002

*Triaenodes kwame* Andersen and Holzenthal, 2002; p. 77, 81 figs. 38-41 (male).

TYPE MATERIAL: Holotype, male: GHANA; Western Region; Ankasa Game Production Reserve, 8. xii. 1993, at light, NUFU-project (UMSP)

DESCRIPTION Andersen and Holzenthal (2002):
“Male (n=1). Forewing length 6.3 mm, hind wing length 4.9 mm. Eye 0.39 mm wide. Antenna at least 19.2 mm long, including 0.69 mm long scape; Maxillary palp segment lengths (in mm): 0.48, 0.55, 0.58, 0.40, 0.79. Colour in alcohol overall light yellowish-brown.”

MALE GENITALIA Andersen and Holzenthal (2002):
“Abdominal segment IX with slightly rounded anterior margin; tergum narrow; pleural region broadly rounded, posterior margin membranous, setose; sternum subrectangular, strongly produced posteriorly; in ventral view with broadly rounded posterior margin and protruding, rounded corners. Preanal appendage long, narrow, setose. Upper part of tergum X in form of paired, short, digitate lobes. Lower part of tergum X in form of a pair of strong spine curved ventrad,
apex finely setose. Inferior appendage with apicomosomal lobe bilobed, with irregularly rounded dorsal lobe, with short, spine-like setae mesally, and triangular, setose ventral lobe; basodorsal lobe short, setose; mesal basodorsal lobe slightly sinusoid, with short, irregular, setose lobes medially and shallowly bilobed, setose apex; abbreviated basal plate strong, projecting anteriad, with thin, recurved process extending caudad, with lanceolate, setose apex. Phallus long, slender, curved subapically, distal one quarter semi-membranous; with low, symmetrical flanges subbasally; with distinct u-shaped phallotremal sclerite.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Male of this species, *T. kwame* and *T. wambana* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which has a slender stem and apically truncated. It differs from other two species by having the lancolate apex of the recurved process and the bilobed apicomosomal lobe.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *imakus* Group are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) wambana* Mosely, 1939a

Fig. 4.6

*Triaenodes wambana* Mosely, 1939a; p. 15, figs. 39-43 (male).


**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.
**MALE GENITALIA:** Tergum IX with posterior margin nearly straight in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X reduced, lower part of tergum X pair of long, slender spines; preanal appendage long, slender, setose; inferior appendage caliper-shaped, broad at base in ventral view, distal part long, blunt, apicomesal lobe rounded, covered with stout setae, mesal basodorsal process prominent, with slender base, apically enlarged, truncated, bearing several setae, with short spur about midway; recurved process long, rather thick, apex rounded bearing several long setae; phallus stout, apically membranous, apex somewhat excised in lateral view, parameres absent, phalotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** Male of this species, *T. clara* and *T. kwame* can be separated from the other species of *T. (Triaenodes) imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which has a slender stem and apically truncated. It differs from other two species that the mesal basodorsal process of each inferior appendage has the short spur about midway and the recurved process is rather shorter than other two species.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *imakus* Group are unknown.

**DISTRIBUTION:** Uganda.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) darurica* Mosely, 1936

Fig. 4.7

*Triaenodes darurica* Mosely, 1936; p. 434, figs. 10-14 (male)

*Triaenodes bernardi* Vaillant, 1953; p. 153-155, figs. 22-39 (male, larvae)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown hairs; antennal basal part long and without scent-organs. Forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX in lateral view with posterior margin rounded; upper part of tergum X reduced, with pair of small dorsomesal papillae, lower part of tergum X pair of long, slender spines, with broad base; preanal appendage long, slender, setose; inferior appendage triangular in ventral view, distal part short, pointed, apicomesal lobe irregularly triangular, covered with stout setae, mesal basodorsal process slightly sinuous, narrow subapically with several long setae along posterior margin; recurved process long, stout; phallus slender, distal half membranous, parameres absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** Male of this species can be separated from the other species of *T.* (*Triaenodes*) *imakus* Group by the shape of the mesal basodorsal process of each inferior appendage which is slightly sinuous and narrow subapically with several long setae along posterior margin and the stout recurved process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T.* (*Triaenodes*) *imakus* Group are unknown.

**DISTRIBUTION:** Sudan.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) hirsuta* Jacquemart, 1966a
**Fig. 4.8**

*Triaenodes hirsuta* Jacquemart, 1966a; p. 3, fig. 2 (male)

**TYPE MATERIAL:** Holotype, male; DEMOCRATIC REPUBLIC OF CONGO; Lubumbasi (=Elisabethville), XII-1960 (microscope preparation) (ISBN; I. G. 22735).

**DESCRIPTION** Jacquemart (1966, translated from French):

“MALE GENITALIA – Superior [preanal] appendages are broad basally and evenly more slender, sparsely covered with relatively long hairs. The phallus is slender and bent ventrad, sclerotized, its apex beveled, releasing a long, erectile sac. Like many species of this genus, it has a pair of curved organs [recurved process] terminated in sharp points.

Close to the base of each organ arises a process [mesal basodorsal process] with long stalk and broadened spatula, the posterior edge of which is set with hairs.

Each gonopod [inferior appendage] has a simple basal piece, narrowed apically. The inner side has a piece composed of three irregularly formed elements and bristling with translucent spines.

This species has a long dorsal expansion arising from the base of each gonopod like *T. clara* Jacquemart, *T. darfurica* Mosely and *T. uncata* Kimmins; however, it completely differs from the morphology of the other parts, especially by the absence of the long dorsal recurved pieces [lower part of tergum X].”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.5 mm; hind wing: Male, 5.5 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species belong to *T. (Triaenodes) imakus* Group based on the combination of the inferior appendages, but it is distinguished from the absence of the upper part and lower part of tergum X.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) imakus* Group are unknown.

**DISTRIBUTION:** Democratic Republic of Congo.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

Lineage #2

*Triaenodes (Triaenodes) allax* Group
The *T. (Triaenodes) allax* Group includes seven species found in the Australasian region. A synapomorphy is that (54) the upper part of tergum X is apically trifid (Figs. 4.10B, 4.15B).

*T. allax* and *T. cymulosa* are sister species. A synapomorphy is that (55) the lower part of tergum X is a pair of short, rounded lobes (Figs. 4.9A, 4.10A).

The phylogenetic relationships of the remaining five species are unknown.

*Triaenodes (Triaenodes) allax* Neboiss and Wells, 1998

Fig. 4.9

*Triaenodes allax* Neboiss and Wells, 1998; p. 113, figs. 75 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, Tinaroo Dam, 2 km on Mt Edith Road, 23 Jun 1971, e. F. Riek, (ANIC, genitalia prep., PT-757).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX strongly produced anteroventrally, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X slender, long median lobe, apex trifid, apically setose, middle lobe longer than lateral lobes in lateral view, with pair of basal papillae, lower part of tergum X pair of sclerotized, short, rounded processes; preanal appendage slender, elongate, setose; inferior appendage broad in lateral view, apically truncate, covered with stout setae, lateral subbasodorsal process thumb-like, very short, mesal basodorsal process filamentous, posterovertradr, apically setose; recurved process basally fused with mesal basodorsal process, long, slender, tapering to apex; phallus elongate, slender throughout length, parameres absent, phalлотремal sclerite not evident

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.1 mm
**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species is closely related to *T. cymulosa* but it is distinguished from by (1) the truncated distal part of each inferior appendage in the lateral view and (2) the more strongly arched recurved process on the inferior appendage toward the phallobase.

**PHYLOGENY:** The sister species of this species is *T. allax*. A synapomorphy is indicated above.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes* (*Triaenodes*) _cymulosa_ Neboiss and Wells, 1998

Fig. 4.10

*Triaenodes cymulosa* Neboiss and Wells, 1998; p. 113, figs. 72-74 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: SE Queensland, Goomburra State Forest, 28°03’S, 152°07’E, 20 Jan 1986, G. Theischinger (NMV, T-16217).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, medially produced anteroventrally, tergum IX with posteromesal margin rounded in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long, slender median lobe, apex trifid, apically setose, middle lobe longer than lateral lobes in lateral view, with pair of short basal papillae, unequal, right side little longer than left side, lower part of tergum X pair of sclerotized, short, rounded processes; preanal appendage narrow, long, setose; inferior appendage long, narrow, triangular in ventral view, distal part long, dorsad, lateral subbasodorsal process short, mesal basodorsal process filamentous, posterovertral, apically setose, apicomesal lobe triangular in lateral view, covered with stout setae.; recurved processes
basally fused with mesal basodorsal process, long, stout, tapering to apex, strongly arched almost
reaching to distal part of each inferior appendages; phallus elongate, slightly wider distally than
proximally, ventrad, surface membranous, parameres absent, phalottremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.3-6.4 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for
holotype (NMV, T-16218, genitalia prep., PT-1747).

**DIAGNOSIS:** This species is mostly close to *T. allax*, but it differs from by the
combination of each inferior appendage having the long distal part, the triangular apicomesal
lobe, and the short lateral subbasodorsal process. Also, the recurved process is stouter and
strongly recurved toward the distal part of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. allax*. A synapomorphy is
indicated above.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) implexa* Neboiss and Wells, 1998

Fig. 4.11

*Triaenodes implexa* Neboiss and Wells, 1998; p. 110, figs. 62 (male).

**TYPE MATERIAL:** Holotype, male: SOUTH AUSTRALIA: Mitcham, Brownhill
Creek, 3 March 1976, A. Neboiss, (NMV, T-16413).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with
yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with
scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, tergum IX with
posteromesal margin indistinct in dorsal view, sternum IX with posterior margin gently sinuate in
lateral view; upper part of tergum X long, median lobe, apex trifid, apically setose, all three lobes equal in length, lower part of tergum X pair of slender, long spines; preanal appendage elongate, about length of upper part of tergum X, setose; inferior appendage long, narrow rectangular in ventral view, distal part short, blunt, slightly upturned in lateral view, lateral subbasodorsal process short, little bit thick, mesodorsal lobe filamentous, apically setose, apicomisal lobe broad subtriangular in lateral view, covered with stout setae; recurved processes basally fused with mesal basodorsal process, long, stout, tapering to apex, strongly arched reaching to apicomisal lobe; phallus narrow at base, ventrad, distally expanded, membranous in distal half (trough-like), parameres absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.4-7.6 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16414, genitalia prep., PT-773).

**DIAGNOSIS:** This species is very close to *T. perissotes* but is distinguished by the shape of the upper part of tergum X in which the middle lobe and lateral lobes of upper part of tergum X are almost equal in length.

**PHYLOGENY:** Although the sister species of this species might be *T. perissotes*, the phylogenetic relationships of this species in the *T. (Triaenodes) allax* Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) perissotes* Neboiss and Wells, 1998

Fig. 4.12

*Triaenodes perissotes* Neboiss and Wells, 1998; p. 110, figs. 63-65 (male).

**TYPE MATERIAL:** Holotype, male: SOUTH AUSTRALIA: Kangaroo Island, Rocky River at bridge, 20 Dec 1980, A. Wells, (NMV, T-16747).
DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin almost straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long, median lobe, apex trifid, apically setose, middle lobe about half length of lateral lobes, lower part of tergum X pair of slender, long spines; preanal appendage long, slender, about length of upper part of tergum X, setose; inferior appendage long, narrow, rectangular in ventral view, distal part short, blunt, slightly upturned in lateral view, lateral subbasodorsal process short, little bit thick, mesodorsal lobe filamentous, apically setose, apicomalous lobe broad subtriangular in lateral view, covered with stout setae; recurved processes basally fused with mesal basodorsal process, long, stout, tapering to apex, strongly arched reaching to apicomalous lobe; phallus narrow at base, ventrad, distally expanded, membranous in distal half (trough-like), parameres absent, phalotremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.5-7.5 mm

MATERIAL EXAMINED: Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16748, genitalia prep., PT-749).

DIAGNOSIS: This species is closely related to *T. implexa* but it differs from by the shape of the upper part of tergum X in which the middle lobe is shorter than the lateral lobes.

PHYLOGENY: Although the sister species of this species might be *T. implexa*, the phylogenetic relationships of this species in the the *T. (Triaenodes) allax* Group are unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes (Triaenodes) resima* Neboiss and Wells, 1998
Triaenodes resima Neboiss and Wells, 1998; p. 111, figs. 66-68 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Wingan River, 8 km S of Princes H-way, 37°37’S, 149°29’E, 30 Jan 1975, A. Neboiss, (NMV, T-16523).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin almost straight, tergum IX broadly rounded, with produced posteromesal margin in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long, medial lobe, apex trifid, apically setose, middle lobe about half length of lateral lobes, middle lobe acute, lateral lobes fine, lower part of tergum X pair of slender spines, asymmetrical, left side little bit longer than right side; preanal appendage long, slender, about length of upper part of tergum X, setose; inferior appendage long, narrow, triangular in ventral view, distal part long, posteriorly dorsad, lateral subbasodorsal process short, blunt, apically setose, apicomesal lobe subtriangular in lateral view, covered with stout setae, mesodorsal lobe filamentous, apically setose; recurved processes basally fused with mesal basodorsal process, swollen in median section, strongly curved ventrally, with small cluster of short setae apically; phallus narrow at base, ventrad, expanded in distal half, parameres absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.2-6.7 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16524, genitalia prep., PT-750).

**DIAGNOSIS:** This species somewhat resembles *T. implexa* and *T. perissotes* in the shape of upper part and lower part of tergum X and the combination of the inferior appendage,
but is distinguished by having the swollen section at the midway of the recurved process and the very long, strongly upturned distal part of inferior appendages.

**PHYLOGENY:** The phylogenetic relationships of this species in the T. (Triaenodes) *allax* Group are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Triaenodes) odysseus* Malicky, 2005

Fig. 4.14

*Triaenodes odysseus* Malicky, 2005; p. 38, pl. 6 (male)

**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA, Morbe, Mt. Kaindi 2350m, 3.10.1992, leg. V. O. Becker (USNM)

**DESCRIPTION** Malicky (2005, translated from German):

“Graybrownish, forwings mottled, length of forewing 9 mm.”

**MALE GENITALIA** (from the work of Malicky, 2005):

Abdominal segment IX anterior margin straight, sternum IX with posterior margin triangular in lateral view; upper part of tergum X long, median lobe, apex trifid, apically setose, middle lobe stout, bigger than lateral lobes in dorsal view, with pair of basal papillae midway, lower part of tergum X pair of slender, long spines; preanal appendage long, slender, setose; inferior appendage triangular in ventral view, distal part short, pointed, lateral subbasodorsal process digitate, apically setose, mesodorsal lobe filamentous, apicomesal lobe prominent, irregular shape, covered with setae; recurved processes basally fused with mesal basodorsal process, long, slender, tapering to apex, strongly recurved with acute angle in lateral view, reaching to apicomesal lobe; phallus deeply excised in lateral view, distally expanded, membranous in distal half, parameres absent, phalotremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.
LENGTH OF FOREWING: Male, 9 mm.

MATERIAL EXAMINED: None.

ETYMOLOGY: The species epithet is the Greek name of the hero of the *Odyssey*, a king of Ithaca, and one of the Greek leaders in the Trojan War. It is a masculine proper noun for which the gender need not agree with the genus name with which it is combined.

DIAGNOSIS: This species differs from the other species of this Group by the shape of the upper part of tergum X in which the middle lobe is short and two lateral lobes are relatively small and the prominently large apicomesal lobe on the inferior appendage.

PHYLOGENY: The phylogenetic relationships of this species in the the *T. (Triaenodes)* *allax* Group are unknown.

DISTRIBUTION: Papua New Guinea.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes (Triaenodes) telefominica* Kumanski, 1979

Fig. 4.15

*Triaenodes telefominicus* Kumanski, 1979; p. 217-218, figs. 61-65 (male)

TYPE MATERIAL: Holotype, male: PAPUA NEW GUINEA; Telefomin, West Sepic Province, 1600 m, 25. VIII. – 3. IX. 1975, 1♂ (at light) (National Natural History Museum, Sofia, Bulgaria).

DESCRIPTION Kumanski (1979):
“General colour smoky yellowish. Antennae pale, with fuscous [grayish brown] intersegmental annulations. Basal segment large, as long as the three following united, with its dorsomedial surface covered by a pencil of mixed black to whitish hairs. Palpi pubescent. Thorax pale, legs yellowish. Fore wing with long fuscous pubescence. This pubescence is especially long along the costal area and within the zone between SR and A₁ and the anastomosis. No thickened hairs (androconia). Hind wing less densely pubescent, with subcostal row of somewhat longer hairs and with very long hairs on hind margin. Venation without particularities.”

MALE GENITALIA Kumanski (1979):
“Ninth segment narrowed dorsally to a transverse band. Its distal margin bears an obtuse protuberance near the middle. The dorsal membrane between ninth and tenth segments forming a prolongate distal part, which terminates in two faint papillae [pair of small dorsomesal papillae]. Tenth segment divided into two parts: a slender and trilobed dorsal one [upper part of tergum X], having a slight pareaepical dilatation ventrally and a pair of slightly shorter lateral branches [preanal appendage], and a shorter ventral one [lower part of tergum X], terminating laterally in a sharp spine above the penis. Cerci [inferior appendage] in lateral aspect bilobed [?], the upper [lateral subbasodorsal process] being slender and with long hairs. The lower branch [main body of inferior appendage] a bit shorter, large and obtuse, with an inner row of short setae and a feeble dent at its apex. Other parts of the genitalia entirely asymmetric. From the right side of the penis there is a very long and strongly chitinized spine (paramere?) [recurved process]. It is sickle-shaped and bears one straight additional inner branch [mesal basodorsal process of inferior appendage which the figures do not show], arising from its middle. Viewed from the left side, there is a large appendage of the penis fused to its medial surface so that only the very distal pointed part of the left paramere (?) projects above the penial apex. The latter membranous, with one (or two) indistinct inner chitinous elements [phallostremal sclerite].

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 7.5 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: Males of this species differs from the other species of this Group without the apicomesal lobe of each inferior appendage.

PHYLOGENY: The phylogenetic relationships of this species in the the T. (Triaenodes) allax Group are unknown.

DISTRIBUTION: Papua New Guinea.

BIOGEOGRAPHIC REGION: Australasian region.

Lineage #3

Four sublineages have been recognized in Lineage #3 (Fig. 2.7), for which a synapomorphy is that (56) the mesal basodorsal process of each inferior appendage is secondarily absent (Fig. 4.20A). The phylogenetic relationships among these sublineages are unresolved. Five species incertae sedis have been recognized in this lineage, also, for which relationships with the four sublineages are not evident.
Sublineage #1

*T. (Triaenodes) mondoana* Group, *T. (Triaenodes) elegantula* Group, *T. (Triaenodes) excisa* Group, *T. (Triaenodes) cumberlandensis* Group, *T. (Triaenodes) injusta* Group and 20 species *incertae sedis* share a synapomorphy that (57) the apicomomal lobe of inferior aprependages is absent (Figs. 4.18A, 4.23A). The phylogenetic relationships among these groups are unresolved.

*Triaenodes (Triaenodes) mondoana* Group

The *T. (Triaenodes) mondoan* Group include five species found in the Oriental, Australasian, and Neotropical regions. A synapomorphy is that (64) the recurved processes of inferior appendages are asymmetrical, in which the left side process is always small (Fig. 4.16A).

*Triaenodes (Triaenodes) agrophe* Neboiss and Hur, sp. nov.

Fig. 4.16

**TYPE MATERIAL:** Holotype, male: INDONESIA; Sulawesi Tengah, Totop Camp., Batul River, 01º09’S, 122º31’E, alt. 120m SW of Luwuk, at light lowland rainforest. 20 Oct. 1989. J.P. Duffels (NMV, genitalia prep., PT-1887).

**DESCRIPTION:** ♂: n=2. Forewing length 7.1-7.5 mm, hind wing length 5.1-5.4 mm. Eye 0.44-0.5 mm long, 0.24 mm wide. Antennal scapes 0.9-1.0 mm long; antennae partly broken. Maxillary palp, holotype maxillary palp broken, 0.44, 0.62, 0.6, 0.26, 0.48. Body color yellowish brown; antennal scapes each with scent-organ; forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded medially, tergum IX with posteromesal margin indistinct, sternum IX with posterior margin broadly rounded in lateral view; upper part of tergum X long, strongly sclerotized, clavate, bearing three stout spines at apex, half twisted, sclerotized spot with three or four spines at the base, lower part of tergum X reduced; preanal appendage long, slender, about half length of upper part of tergum X, setose;
inferior appendage setose, in lateral view, narrow, skittle-shaped, in ventral view, narrow and elongate, apex rounded, covered with stout setae and long hairs; recurved processes strongly sclerotized, asymmetrical, right side more curved, longer than left side, tapering to apex and bent ventrally; phallus ventrally sclerotized, dorsally membranous, with broad flange, and apex membranous, gently curved, parameres absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- INDONESIA; Sulawesi Tenggara, Peg. Boroboro, 30 km, SW Kendari, 200 m, 26 Oct. 1989, MV-light, J.PHuisman, (NMV, genitalia prep., PT-2078).

**ETYMOLOGY:** From the Greek *agrophe* – rake referring to the shape of upper part of tergum X.

**DIAGNOSIS** Males of this species are most close to *T. tribulosa* Neboiss and Hur, sp. nov. It is distinguished from having the twisted upper part of tergum X which has three stout spines at the apex and the sclerotized spot including three or four spines at the base.

**PHYLOGENY:** Although the sister species of this species might be *T. tribulosa* Neboiss and Hur, sp. nov., the phylogenetic relationships of this species in the *T. (Triaenodes) mondoana* Group are unknown.

**DISTRIBUTION:** Indonesia.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) tribulosa* Neboiss and Hur, sp. nov.

**Figs. 4.17**

**TYPE MATERIAL:** Holotype, male: INDONESIA; Sulawesi Utara, Dumoga-Bone N.P. Project Wallace 1985. D. Dudgeon (NMV, genitalia prep., PT-1576)

**DESCRIPTION:** ♂: n=1. Forewing length ca. 8.0 mm, hind wing length ca. 6.0 mm. Eye ca. 0.47 mm long, ca. 0.26 mm wide. Antennal scapes ca.0.93 mm long; antennae half way
broken. Maxillary palp segment lengths (ca. in mm): 0.5, 0.51, 0.63, 0.43, 0.6. Body color yellowish brown; antennal scapes each with scent-organ; forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X reduced, lower part of tergum X long sclerotized spine, bifid; preanal appendage less than half length of lower part of tergum X, setose; inferior appendage narrow, long, skittle-shaped in ventral view, apex rounded; recurved processes strongly sclerotized, asymmetrical, right side more curved, longer than left side, tapering to apex and bent ventrally; two-thirds of anterior phallus ventrally sclerotized, dorsally membranous, with broad flange, and apex membranous, gently curved, parameres absent, parameres absent, phallotremal sclerite small.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** From the Latin *tribulus* – thorny referring to long spine process.

**DIAGNOSIS:** Males of this species are most close to *T. agrophe* Neboiss and Hur, sp. nov in this Group. It is distinguished by having the reduced upper part of tergum X and the bifid lower part of tergum X which is very slender and long in the dorsal view.

**PHYLOGENY:** Although the sister species of this species might be *T. agrophe* Neboiss and Hur, sp. nov., the phylogenetic relationships of this species in the *T. (Triaenodes) mondoana* Group are unknown.

**DISTRIBUTION:** Indonesia.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) mondoana* Kimmins 1962a

Fig. 4.18
Triaenodes mondoana Kimmins, 1962a; p. 173, figs. 63, 64 (male)

**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA: Mondo.5, 000 ft. I. 1934. L.E. Cheesman, B. M. 1934-321, (BMNH, (E) # 250907)

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with yellowish brown to brown; antennal basal part long without scent-organ; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin broadly rounded, pleural region membranous, tergum IX with posteromesal margin indistinct, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X narrow, long, apex slightly excised, setose, lower part of tergum X short hood-like plate; preanal appendage long, stout, setose; inferior appendage long, narrow, subrectangular, surface irregularly serrate in lateral view, distal part short, dorsad; recurved processes asymmetrical, right side much longer than left side, right side crossing over surface of phallus in dorsal view; phallus large, dorsal surface membranous, parameres absent, phallosomal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5.5 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species is somewhat related to *T. agrophe* Neboiss and Hur, sp. nov and *T. tribulosa* Neboiss and Hur, sp. nov by having the asymmetrical recurved process of the inferior appendage. However, the left side of the recurved process of this species is much slender, strongly recurved and the base is very stout in the lateral view.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) mondoana* Group are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.
**Triaenodes (Triaenodes) columbica** Ulmer, 1909

*Triaenodes columbica* Ulmer, 1909; p. 141-142, figs. 16-17 (male).

**TYPE MATERIAL:** Holotype, male: COLUMBIA; Columbien, Hac. Pehlke, E. Peglke leg., IV – VI 1908; type repository = Stettiner Museum, Germany

**DESCRIPTION** Ulmer (1909, translated from German):

“This species shows in the structure of the genitalia a particular similarity with the African *Triaenodes elegantula* Ulmer.

Entire body yellow, middle of abdomen whitish. Hairs of head, prontotum, and mesonotum, like first antenna segment bright yellow, antennae yellow, basal segments to middle each with annulation. Maxillary palps yellow with dark yellow hairs. Legs pale yellow, hind leg whitish. Forewing not sharply pointed, its membrane hyaline, with dense and uniformly yellow hairs; veins not as dark as membrane, fringe yellow; hind wing hyaline, with faint yellowish tone, iridescent, veins and fringe pale yellow. Venation normal; in forewing area between forks and beyond discoidal cell narrower than discoidal cell, somewhat not narrower than cubital area [Fork V]; in hind wing Fork II not stalked”

**MALE GENITALIA** Ulmer (1909, translated from German):

“Preanl appendage very short and slender, distally slightly tergite X shorter than in other species, not roof-shaped, but absolutely flat, not cleft apically; ventrally curved phallus, lies close against tergum X and projects very far beyond it [tergum X], it is narrower than it; the base of inferior appendage broad and the end very narrow; two slender sclerotized rods [recurved process] which are distinctively arising as inner upright surface branch from a dorsal projection [I assume this is the basal plate] of the inferior appendage, are shorter and less curved than in *T. elegantula*.

Footnote) in the type, the right sclerotized rods is bent higher than the left (fig. 17).”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** According to Holzenthal and Andersen (2004),

“As pointed out by Flint (1991), *T. columbica* Ulmer 1909, from Colombia, shows similarities to certain West African *Triaenodes* species. Since Ulmer (1909) described African species in the same article in which *T. columbica* was described (e.g., a species from Cameroon), it is almost certain that the type was mislabeled. Unfortunately, the abdomen of the type has been lost (Flint 1966).”

This species does not belong to the subgenus *Nototriaena* found only in the Neotropical region because of the similarities to the subgenus *Triaenodes*, even though the type country is
Columbia. I assume that “tergim X” refers to the lower part of tergum X; the presence and the structure of the upper part of tergum X are not indicated in Ulmer’s description or illustration.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) mondoana* Group are unknown.

**DISTRIBUTION:** Columbia.

**BIOGEOGRAPHIC REGION:** Neotropical region.

*Triaenodes (Triaenodes) narkissos* Malicky, 2005

*Triaenodes narkissos* Malicky, 2005: p. 34, pl. 1 (male).


**DESCRIPTION** Malicky (2005, translated from German):
“Yellow, outer edges of fore wings shaded darker (Plate 1). Fore wing 6 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Segment IX projecting ventrally, dorsally shorter. Segment X [lower part of tergum X] very short, in lateral view blunt with some small serrations on caudal edge, in dorsal view from a slender neck subtriangularly broadened and distally slightly serrate. Preanal appendages shorter than segment X, in dorsal view oval, in lateral view pointed oval. Main body of inferior appendage blunt and rounded; dorsal branch [recurved process] arising basally anterodorsally and bent then almost uniformly caudoventrad, very slender and long. In my voucher specimens [this slender and long condition] exists from time to time in this dorsal branch, either right or left [inferior appendage], and at times other is very short. I do not know similar species.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species epithet is the Greek spelling for a genus of the *Amaryllis* family Amaryllidaceae. Thus, the masculine gender is to be retained.
**DIAGNOSIS:** Based on Malicky’s simple description and crude illustration, this species might belong to the *T. (Triaenodes) mondoana* Group by the asymmetrical recurved processes of inferior appendages. However, it is unclear that the left recurved process is always small. It is distinguished from the other species of this Group by the irregularly serrated lower part of tergum X in the dorsal and lateral views.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) mondoana* Group are unknown.

**DISTRIBUTION:** Thailand

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) elegantula* Group

The *T. (Triaenodes) elegantula* Group include six species found in the Oriental and Afrotropical regions. A synapomorphy is that (65) each inferior appendage has a rounded posteroventral apex (Andersen and Holzenthal, 2002, p. 69, fig. 19).

*Triaenodes (Triaenodes) assimilis* (Banks, 1937)

*Allosetodes assimilis* Banks, 1937; p. 160, figs. 61-64 (male).

*Triaenodes assimilis* (Banks); Andersen and Holzenthal, 1999, p. 12, figs. 1, 5 (male).

**TYPE MATERIAL:** Lectotype, male: PHILIPPINES: Sibulan Riv. 31 VIII 7-8000 ft. 6 Sept, Mt. Apo, Mindanao Phil. Islds, C. S. Clagg; Galog Riv. 6000 ft. Sept. 26; Todaya plateau 5000 ft September 12; Mt. Mayo, Davao Mindanao, Phil. Islds., 4-5000 ft., Jan. 28, (MCZC, Type 22504).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown; antennal scapes long with scent-organs; forewings and hind wings pale yellow, densely covered with yellow hairs.
MALE GENITALIA (Andersen and Holzenthal, 19997, p. 12, figs. 5A-D): Abdominal segment IX anterior margin rounded, tergum IX subtriangular, produced posteriad in dorsal view, sternum IX with posterior margin sinuate square, posterolateral corners, shaowly emarginated medially; upper part of tergum X narrow median process, forked distally at midway, apically setose, lower part of tergum X triangular, membranous, distally pointed; preanal appendage triangular in dorsal view, setose, about three fifth as long as upper part of tergum X; inferior appendage elongate, broad, apex rounded, covered with stout setae, lateral subbasodorsal process digitate, short bearing sing long, strong apical setae, dorsal projection small with apical seta; recurved process very long, slender; phallus narrow, apicolaterally with fine striations and apical membranes, paramere absent, phallotremal sclerite very small.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 5.4 mm

MATERIAL EXAMINED: Lectotype

DIAGNOSIS: This species, *T. bulupendek* and *T. plutonis* can be separated from the other species in this Group by the bilobed upper part of tergum X and the triangular lower part of tergum X. However, this species differs from the shape of lower part of tergum X and the presence of lateral subbasodorsal process of each inferior appendage. Also, the recurved processes of inferior appendage are more slender and longer than that of above two species.

PHYLOGENY: The phylogenetic relationships of this species in the *T. (Triaenodes) elegantula* Group are unknown.

DISTRIBUTION: Philippines.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes (Triaenodes) bulupendek* Andersen and Holzenthal, 1999

*Triaenodes bulupendek* Andersen and Holzenthal, 1999; p. 13-15, figs. 3A-B, 6A-E (male)
**TYPE MATERIAL:** Holotype, male: MALAYSIA; Sabah; Kinabalu National Park, roadside, 06°00’S 116°32’E, 1500 m a.s.l., 12. v. 1987, at light, J. Huisman (RMNH).

**DESCRIPTION** Andersen and Holzenthal (1999): “Male (n=1). Forewing length 5.1 mm, hind wing length 4.2 mm. Eye 0.39 mm wide. Antennae broken, scape 0.39 mm long, with scent organ and brush of long seta. Maxillary palp segment lengths (in mm): 0.31, 0.37, 0.342, 0.27, 0.43. In the forewing discoidal cell 1.7 mm long, 0.29 mm wide apically, crossvein s 0.21 mm long, base of S3 0.12 mm long, ratio s/S3 1.75, folk I (S2) 0.72 mm long, stem of fork I (S1+S2) 0.69 mm long, fork II (S3) 1.73 mm long. In the hind wing fork I (S2) 0.67 mm long, stem of fork I (S1+S2) 1.54 mm long, fork II (S3) 1.40 mm long, stem of fork II (S3+S4) 0.33 mm long. Colour in alcohol overall reddish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (1999): “Abdominal segment IX with tergum and pleura narrow, lightly sclerotized; sternum basally semicircular, expanded anteriad, distally subtriangular, produced posteriad; in ventral view with basal on half wider than distal part, posterior margin concave with prominent, rounded posterolateral corners. Preanal appendage narrowly triangular, setose. Upper part of tergum X digitate, with few setae apically; in dorsal view with triangular basally, with short, triangular, lateral lobes subbasally; shallowly forked apically. Lower part of tergum X triangular, semimembranous; in dorsal view narrowly subrectangular, with sinuous lateral margins and shallowly concave apex. Inferior appendage subtriangular with bluntly rounded posteroverntal apex, setose; apicomesally with short, spinelike seta; basodorsally with small papillae, each bearing one setae; abbreviated plate projecting anteriad, with strong, curved pointed process [recurved process] projecting posterodorsad. Phallus curved, cylindrical, with pointed, membranous apex and weak, dorsolateral flanges, phallotremal sclerite small.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species, *T. assimilis* and *T. plutonis* can be separated from the other species in this group by the bilobed upper part of tergum X and the triangular lower part of tergum X. Also, this species is very close to *T. plutonis*, but it differs from the shape of lower part of tergum X and the shorter, less recurved process of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* elegantula Group are unknown.

**DISTRIBUTION:** Malaysia.

**BIOGEOGRAPHIC REGION:** Oriental region.
Triaenodes (Triaenodes) plutonis (Banks, 1931)

Allosetodes plutonis Banks, 1931; p 421, figs. 5, 7, 14 (male).

Triaenodes pultonis (Banks); Andersen and Holzenthal, 1999, p 10, figs. 4A-E (male)

**TYPE MATERIAL:** Holotype, male: MALAYSIA; B. N. Borneo, Mt. Kinabalu, Pakka, 10,000 ft., 25th Mar. 1929., H. M. Pendlebury coll., F.M.S. Museums, Type 16501.

**DESCRIPTION** Banks (1931):
“Black; antennae, palpi, and legs broken; fore-wings black, but with several large brown spots, two along the costa, reaching backward some distance, several in the apical parts of the apical cells, and one at the base of wing behind; these brown spots in the proper light show golden reflections; outer fringe largely brown, but with several black patches, one of them particularly prominent is at the extreme tip. Hind wings black, with long black fringe.”

**MALE GENITALIA** Andersen and Holzenthal (1999):
“Abdominal segment IX with tergum and pleura narrow, semimembranous; sternum wide, basally subrectangular, expanded anteriad, distally subtriangular, strongly produced posteriad; in ventral view with basal on half wider than distal part, with rounded, posterolateral corners and emarginated posterior margin. Preanal appendage narrowly triangular, setose, about half as long as upper part of tergum X. Upper part of tergum X with digitate, slightly curved, median process, apex irregularly rounded, setose; in dorsal view with triangular, finely setose base, narrow subbasally, widening in distal one half, forked in distal one fourth. Lower part of tergum X narrowly triangular with rounded, membranous apex; in dorsal view narrow, cleft in distal one fifth. Inferior appendage subtriangular with broadly rounded apex; apicomesally with strong, spinelike seta; with few strong seta along dorsal margin, two of which on short papilla; abbreviated vassal plate prominent, extending anteroventrad, with strong, recurved, pointed process projecting caudad. Phallus strongly curved, with subapical and apical membranes, apex with lateral flanges, phallostremal sclerite indistinct.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.3 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species, *T. assimilis* and *T. bulupendek* can be separated from the other species in this Group by the bilobed upper part of tergum X and the triangular lower part of tergum X. Also, this species is very close to *T. bulupendek*, but it differs from the shape of lower part of tergum X and the longer, more recurved process of each inferior appendage.
PHYLOGENY: The phylogenetic relationships of this species in the *T. (Triaenodes)* *elegantula* Group are unknown.

DISTRIBUTION: Malaysia.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes (Triaenodes) akua* Andersen and Holzenthal, 2002

*Triaenodes akua* Andersen and Holzenthal, 2002; p. 67 figs. 1, 8-11 (male).

TYPE MATERIAL: Holotype, male: GHANA; Eastern Region; Boti Waterfalls, 14.xi.1994, at light, NUFU-project (UMSP).

DESCRIPTION Andersen and Holzenthal (2002):

“Male (n=10). - Forewing length 6.7–7.4, 6.9 mm; hind wing length 5.0–6.0, 5.3 mm. Eye 0.37–0.42, 0.39 mm wide. Antenna at least 18.9 mm long, including 0.74–0.87, 0.79 mm long scape; scape with scent organ. Maxillary palp segment lengths (in mm): 0.53–0.60, 0.57; 0.56–0.63, 0.59; 0.55–0.60, 0.57; 0.34–0.40, 0.37; 0.74–0.82, 0.80. Colour in alcohol unicolourous reddish-brown.”

MALE GENITALIA Andersen and Holzenthal (2002):

“Abdominal segment IX with broadly rounded anterior margin; tergum narrow; pleural region broadly rounded, posterior margin membranous; sternum subtriangular, produced posteriad. Preanal appendage narrowly ovate, setose. Upper part of tergum X strongly sclerotized, broad spine, slightly curved ventrad; in dorsal view slightly sinuous, apex projecting to the right. Lower part of tergum X triangular, membranous, with short setae apically. Inferior appendage subrectangular, broadly rounded apically, setose; mesally with ridge with long setae, mid-dorsally with few setae on weak elevation; abbreviated basal plate small, projecting anterodorsad, with curved process extending caudad, weakly club-shaped suapically, apex with few setae. Phallus strong curved, with dorsal, asymmetrical flanges and trough-like, membranous apex.”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.9 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: This species and *T. troubati* can be separated from the other species in this Group in the combination; the spine-like upper part of tergum X, the general shape of the inferior appendage and the short recurved process, but it differs from having the narrowly ovate preanal appendage and the triangular, membranous lower part of tergum X.
**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *elegantula* Group are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Trienaenodes (Triaenodes) troubati* Gibon, 1982

*Trienaenodes troubati* Gibon, 1982; p 73-74, figs. 1, 7-8

**TYPE MATERIAL:** Holotype, male: IVORY COAST; Semien, Sassandra River (MNHN)

“Male (n=10). - Forewing length 6.5–7.2, 6.8 mm; hind wing length 5.1–5.7, 5.3 mm. Eye 0.34–0.39, 0.37 mm wide. Antenna at least 16.6 mm long, including 0.74-0.84, 0.80 mm long scape; scape with scent organ. Maxillary palp segment lengths (in mm): 0.55–0.61, 0.57; 0.55–0.61, 0.58; 0.50–0.56, 0.53; 0.34–0.42, 0.38; 0.64–0.77, 0.71. Colour in alcohol overall reddish-brown.”

“Abdominal segment IX with anterior margin rounded; tergum narrow; pleural region rounded, membranous; sternum subrectangular, strongly produced posteriorly, in ventral view with prominent, round corners, and slightly convex apical margin. Preanal appendage digitate, setose. Upper part of tergum X strong, narrow, spine-like, weakly curved ventrally; in dorsal view with tapering apex turned to the right. Lower part of tergum X apparently reduced. Inferior appendage slightly curved, with broadly rounded apex, setose; with two strong setae laterodorsally; abbreviated basal plate projecting anterodorsad, with strong curved process extending caudad, apex rounded with few setae. Phallus slightly curved, trough-like apically, with asymmetrical dorsolateral flange.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.8 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species and *T. akua* can be separated from the other species in this Group in the combination; the spine-like upper part of tergum X, the general shape of the inferior appendage and the short recurved process, but it differs from having the digitate preanal appendage and the reduced lower part of tergum X.
PHYLOGENY: The phylogenetic relationships of this species in the *T. (Triaenodes)* *elegantula* Group are unknown.

DISTRIBUTION: Ivory Coast.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodes) elegantula* Ulmer, 1908

*Triaenodes elegantula* Ulmer, 1908; p. 6-7, figs. 18-19 (male)

**TYPE MATERIAL:** Holotype, male: TANZANIA (Deutsch OST-Afrika); Usambaraa, Mombo (NHRS)

**DESCRIPTION** Andersen and Holzenthal (2002, p. 71-72, figs. 17-20):
“Male (n=1-2). - Forewing length 6.9–7.1 mm; hind wing length 5.0–5.4 mm. Eye 0.39–0.40 mm wide. Antenna at least 14.1 mm long, including 0.50-0.52 mm long scape; scape with scent organ. Maxillary palp segment lengths (in mm): 0.45, 0.47, 0.50, 0.34, 0.71. Colour in alcohol yellowish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2002, p. 71-72, figs. 17-20):
“Abdominal segment IX with anterior margin nearly straight, weakly rounded ventrally; tergum comparatively wide; pleural region with posterior margin straight; sternum subquadrangular, with rounded ventral margin; in ventral view with rounded corners, and weakly convex posterior margin. Preanal appendage short narrowly rectangular, setose. Upper part of tergum X lacking. Lower part of tergum X triangular with rounded apex, semimembranous; in dorsal view with V-shaped incision in apical one third. Inferior appendage narrow basally, wider apically with rounded posterior margin, curved posteroventrad; abbreviated basal plate projecting anterodorsad, with strongly curved spine extending caudad. Phallus cylindrical, curved; with weak dorsolateral flanges; with membranous swelling dorsomedially; phalottremal sclerite indistinct.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.9 – 7.1 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Males of this species shows the similarity to the other species of this Group the general shape of the inferior appendage, but it differs from having the reduced upper part of tergum X and the V-shaped incision in the dorsal view.
**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *elegantula* Group are unknown.

**DISTRIBUTION:** Tanzania.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) excisa* Group

The *T. (Triaenodes) excisa* Group includes five species found in the Australasian and Afrotropical regions. A synapomorphy is that (66) the lower part of tergum X is deeply excavated (Fig. 4.19B).

*Triaenodes (Triaenodes) excisa* Kimmins, 1957a

Fig. 4.19

*Triaenodes excisa* Kimmins, 1957a; p. 304, figs. 12B, 14 (male).

**TYPE MATERIAL:** Holotype, male: SOLOMON ISLAND; Guadalcanal, Tapenanje.


**DESCRIPTION** Kimmins (1957a):

“General colour dark ochraceous [pale yellow]. Antennae with long basal segment, its inner surface with a dense tuft of hairs, which become detached by clearing in caustic potash solution for preparation. Wing venation more typical of *Triaenodes* than in *T. picea*, Cu₂ terminating Cu₁b in fore wing. Apex of fore wing less broadly rounded.”

**MALE GENITALIA:** Abdominal segment IX with anterior margin nearly straight, tergum IX with posteromesal margin rounded, sternum IX with posterior margin broadly rounded in lateral view; upper part of tergum X pair of small, rounded lobes, each lobe bearing short digitate lobe at midway, lower part of tergum X hood-like, membranous, deeply excavated at midway, apex pointed in dorsal view; preanal appendage digitate, slightly longer than upper part of tergum X, setose; inferior appendage pyriform, narrowest at base, covered with stout setae, apex slightly excised in lateral view; recurved processes sclerotized, long, slender spine,
ventrally bent extending beyond inferior appendage; phallus long, slender, semi-membranous, parameres absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 4.5 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** This species is closely related to *T. picea* in the general shape of the tergum X and the inferior appendage. However, it is distinguished from the bilobed upper part of tergum X and the apically excised inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *excisa* Group are unknown.

**DISTRIBUTION:** Solomon Islands.

**BIOGEOGRAPHIC REGION:** Australasian region.

_Triaenodes (Triaenodes) picea_ Kimmins, 1957a

Fig. 4.20

_Triaenodes picea_ Kimmins, 1957a; p. 304, figs. 13A-C.

**TYPE MATERIAL:** Holotype, 3 males: SOLOMON ISLANDS (Guadalcanal); Tapenanje, 10-15 XII 1953, (BMNH)

**DESCRIPTION** Kimmins (1957a):
“General colour of the body and fore wings piceous, the anastomosis of the latter white. Antenna with two basal segments piceous, remainder pale fuscous, with darker annulations. The basal segment has on its inner surface a whitish false suture, somewhat simulating the scent-organ cap in certain species of _Triaenodes (Triaenodella)._ There are indications of a tuft of long hairs on the inner surface. Palpi and legs fuscous. Venation fairly typical of _Triaenodes_, in fore wing Cu₁ is a strong vein, running straight to the wing margin. The free, basal part of Cu₁ is very weak, resembling a cross-vein, apical part fused with the extended anal vein. Cu₂ is more or less obsolete towards its apex, in the type not reaching the wing margin.”

**MALE GENITALIA** Kimmins (1957a):
“Ninth segment with its upper part reduced, apical margin produced in a pair of short thin, obliquely truncate lobes [upper part of tergum X], separated by a U-
shaped excision. Tenth segment [lower part of tergum X] forming a thin hood, from above deeply and acutely excised, the sides of the excision with acute apices. Cercus [preanal appendage] digitate, about two-thirds as long as tenth segment. Aedeagus [phallus] long, slender, semi-membranous, stiffened by two sclerotized ribs. It apparently arises near the base of the claspers [inferior appendages] and thence runs basally before curving upward and tailward beneath the tenth segment. Running parallel with the aedeagus on each side is a long, slender spine. Clasper short, stout, somewhat rhomboidal from the side, truncate apically from beneath, with a serrate ridge on its inner surface.

The genitalia of this species are similar in pattern to those of a number of North American species of *Triaenodes*, though of course differing in detail. It is quite distinct from its nearest geographical neighbours, *T. volda* Mosely and *T. insulana* Ulmer."

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 5 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is closely related to *T. excisa* in the general shape of the tergum X and the inferior appendage. However, it is distinguished from the recurved process extending anterad well into the abdominal segment XIII and the rhomboidal inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* excisa Group are unknown.

**DISTRIBUTION:** Solomon Islands (Guadalcanal).

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) kwabena* Andersen and Holzenthal, 2002

*Triaenodes kwabena* Andersen and Holzenthal, 2002; p. 75, 77, figs. 3, 29-33 (male).

**TYPE MATERIAL:** Holotype, male: GHANA; Volta Region, Agumatsa Wanterfalls, Wli, 16.iii.1993, at light, NUFU-project (UMSP)

**DESCRIPTION** Andersen and Holzenthal (2002):

“Male (n=10). - Forewing length 6.8–7.7, 7.3 mm; hind wing length 5.2–6.0, 5.6 mm. Eye 0.43–0.48, 0.46 mm wide. Antenna at least 21.9 mm long, including 0.82-0.90, 0.87 mm long scape; scape with scent organ. Maxillary palp segment lengths (in mm): 0.52–0.60, 0.57; 0.63–0.71, 0.68; 0.58–0.71, 0.64; 0.37–0.43, 0.40; 0.74–0.84, 0.77. Colour in alcohol overall dark reddish-brown.”
MALE GENITALIA  Andersen and Holzenthal (2002):
“Abdominal segment IX with anterior margin weakly rounded; tergum narrow; pleural region rounded, membranous; sternum subrectangular, in ventral view with apical margin straight. Preanal appendage digitate, setose. Upper part of tergum X long, narrow, acute spine; medially strongly curved ventrad, with pair of short, rounded lobes [pair of small dorsomesal papillae] basolaterally. Lower part of tergum X broad, sinuous, basodorsally membranous, with weak setae; apically broadly rounded; in dorsal view with triangular corners at two thirds length and deeply split apex. Inferior appendage subrectangular, setose, projecting posteroventrad, posterodorsad, with spine-like recurved process extending caudad, setose medially, curved ventrally, subapically sinuous. Phallus tubular basally, slightly curved, broadly rounded distally, apex with paired lobes extending posteroventrad.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species is somewhat related to T. excise and T. picea in the general shape of the tergum X and the inferior appendage. However, it is distinguished from by the single, long upper part of tergum X, the overall shape of lower part of tergum X, and the subrectangular inferior appendages.

PHYLOGENY: The phylogenetic relationships of this species in the T. (Triaenodes) excisa Group are unknown.

DISTRIBUTION: Ghana.

BIOGEOGRAPHIC REGION: Afrotropical region.

*Triaenodes (Triaenodes) silvanus* Malicky, 2005

Fig. 4.21

*Triaenodes silvanus* Malicky, 2005; p. 39, pl. 2 (male).

TYPE MATERIAL: Holotype, male: PAPUA NEW GUINEA, Morbe Prov., Wau wau Ecological Institute, 1200m, 1-10.8.1983, leg. S and P Miller (USNM)

DESCRIPTION Malicky (2005, translated from German):
“Yellow, length of forewing 7 mm.”

MALE GENITALIA (from the work of Malicky, 2005):
Abdominal segment IX anterior margin straight; upper part of tergum X small, rounded lobe, with pair of basal papillae at base, lower part of tergum X hood-like, membranous, deeply excavated at midway, apex pointed in dorsal view; preanal appendage long, slender, setose; inferior appendage rectangular in ventral view, distal part blunt in ventral view, covered with setae; recurved processes sclerotized, long, slender spine, well recurved into abdominal segment IX, extending beyond inferior appendage; phallus long, slender, parameres absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the Latin god of woods and forests. Thus, the masculine gender does not need to agree with the gender of the genus.

**DIAGNOSIS:** This species differs from the other species of this Group by the single median lobe of the upper part of tergum X.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *excisa* Group are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes* (*Triaenodes*) *thespios* Malicky, 2005

*Triaenodes thespios* Malicky, 2005: p. 39, pl. 2 (male).

**TYPE MATERIAL:** Holotype, male and 1 female: PAPUA NEW GUINEA; Morobe Province, Wau Wau Ecological Institute, 1200 m, 1--10-viii-1983, col. S. and P. Miller, coll. (USNM).

**DESCRIPTION** Malicky (2005, translated from German):
“Dark yellow, forewing 7 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Segment IX about same length. Segment X [upper part of tergum X] with slender, nearly straight dorsal finger and with bifurcate plate [lower part of tergum X] beneath. Inferior appendages in lateral view in basal half broad, in distal half constricted suddenly in sharp, continuously bent finger, in ventral view these appendages long, blunt and nearly straight. Dorsal branch [recurved process] moderately strongly bent. Phallus moderately long and thick, with complicated sclerites, for which approximate form is understood from illustration.

The similarity of this species with *T. silvanus* n. sp. is only superficial and not very great.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the founder of the city of Thespiae in Boeotia. [Thespios and Megamede were the parents of fifty daughters, all of whom bore sons of Herakles (Latin Hercules).] Thus, the masculine gender does not need to agree with the gender of the genus.

**DIAGNOSIS:** Malicky mentioned that this male species is similar to *T. silvanus* Malicky, but differs from that the distal part of each inferior appendage is suddenly constricted at the half length and continuously bent dorsad and the recurved process is moderately bent caudoventrad.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) excisa* Group are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*T. (Triaenodes) injusta* Group and *T. (Triaenodes) cumberlandensis* Group

These two Groups share synapomorphies that (62) the mesodorsal process of each inferior appendage is present (Figs. 4.22A, 4.24A) and (63) the distal part of each inferior appendage is long (Figs. 4.22A, 4.24A).
Triaenodes (Triaenodes) injusta Group

The T. (Triaenodes) injusta Group includes two species found in the Nearctic region. A synapomorphy is that the upper part of tergum X is divided into two thick processes and their apex is truncated (Fig. 4.22B).

Triaenodes (Triaenodes) furcella Ross, 1959

Fig. 4.22

Triaenodes furcella Ross, 1959; p. 42-44, figs. 3A-B, 4A-B.

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA; Florida, Georgetown, April 1948 (INHS).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin straight, pleural region membranous, tergum IX with posteromesal margin indistinct, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X forked, apex truncate bearing several setae, lower part of tergum X membranous, apex ogival; preanal appendage long, slender, setose; inferior appendage triangular, distal part long, pointed, mesodorsal process clavate, covered with stout setae; recurved processes strongly sclerotized, tapering to apex, bearing few hairs; phallus large, apically membranous, slightly bilobed, with dorsal flange, parameres absent, phalotremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1959).

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 6 mm

**MATERIAL EXAMINED:** Holotype, male.
**DIAGNOSIS:** Males of this species is closely related to *T. injusta* by having the apically truncated and forked upper part of tergum X. However, it is easily distinguished by the longer distal part of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. injusta*. A synapomorphy is indicated above.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) injusta* (Hagen, 1861)

Fig. 4.23

*Setodes injusta* Hagen, 1861; p. 283.

*Triaenodes injusta* (Hagen); Banks, 1907, p. 45.

**TYPE MATERIAL:** Lectotype (designated by Ross 1938), male: CANADA; St. Lawrence River, 1859 (MCZC, Type 10996).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, without scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally; pleural region membranous, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X forked, apex truncate with pointed projection bearing several setae, with pair of small dorsomesal papillae, lower part of tergum X membranous, short; preanal appendage long, slender, setose; inferior appendage triangular, distal part short, pointed, mesodorsal process clavate, covered with stout setae; recurved processes strongly sclerotized, tapering to apex, bearing single setae; phallus large, apically membranous, bilobed, parameres absent, phalotremal sclerite evident.
**FEMALE:** A description and an illustration were provided by Ross (1944).

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 6 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** Males of this species is closely related to *T. furcella* by having the apically truncated and forked upper part of tergum X. However, it is easily distinguished by having the pointed projection on the apex of upper part of tergum X and the short distal part of the inferior appendage.

**PHYLOGENY:** The sister species of this species is *T. injusta*. A synapomorphy is indicated above.

**DISTRIBUTION:** Canada.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triadenodes (Triadenodes) cumberlandensis* Group

The *T. (Triadenodes) cumberlandensis* Group includes eight species found in the Nearctic region. A synapomorphy is that (68) the upper part of tergum X is centrally inflated (Fig. 4.24B). *Triadenodes cumberlandensis*, *T. marginata*, and *T. inflexa* share a synapomorphy in which (69) the distal part of each inferior appendage is extremely long (Fig. 4.24A). The phylogenetic relationships of the remaining five species in the Group are unknown.

*Triadenodes (Triadenodes) cumberlandensis* Etnier and Way, 1973

Fig. 4.24

*Triadenodes cumberlandensis* Etnier and Way, 1973; p. 427, figs. 4A-C (male).

**DESCRIPTION:** The head of holotype specimen was broken. Therefore, it is insufficient whether the male antennal scapes has the scent-organ or not (possibly, the scent organ present). The female specimen was used for the head. Head yellowish brown, vertex and palpi covered with yellowish hairs. Thorax of male brown and abdomen of male yellowish brown. Forewings and hind wings of male pale yellow with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X long, spindle-shaped (fusiform), apex acute, curved to right, covered with long setae on middle part, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages less than half length of upper part of tergum X, setose; inferior appendage narrow, subrectangular in ventral view, distal part very elongate, strongly dorsad in alteral view, curved medially in ventral view, mesodorsal process club-shape, covered with spine-like setae; recurved process long, slender, asymmetrically curved, bent to the right, bearing one subapical seta; basal half of phallus sclerotized, the sclerotized portion extending dorsally and ventrally almost to apices, phallic shield sclerotized, subrectangular in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, 9.5 mm

**MATERIAL EXIMINED:** Holotype. Also, I have also examined the following material: association based on 2 females reared from North America, Tennessee, Stewart Co., Panther Cr., 14 May 1991, coll. JBG, (CUAC).
**DIAGNOSIS:** Males of this species are closely related to *T. marginata* and *T. inflexa* by the distal part of each inferior appendage is extremely long and strongly inner curved in the ventral view. The significant difference is that the apex of upper part of tergum X is more acute, longer than that above two species and curved to right with the long setae on the middle part.

**PHYLOGENY:** *Triaenodes cumberlandensis*, *T. marginata*, and *T. inflexa* apparently consistute a monophyletic group, as indicated by a synapomorphy discussed above. The phylogenetic relationships among these three species remain unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) marginata* Sibley, 1926

Fig. 4.25

*Triaenodes marginata* Sibley, 1926; p. 80 (male and female)

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA; New York; Mud Pond, Mclean, Res., July 24, 1924, Cornell U. No. 2478. Lectotype placed in separate vial, labeled with above data (in alcohol) (CUIC)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings pale yellow, with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X spatulate or club-shaped in dorsal view, with upturned apex in lateral view, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages about two-thirds length of upper part of tergum X, setose; inferior appendages subtriangular in ventral view, distal part elongate, blunt to slightly inflated at apex, strongly curved medially in ventral view, mesodorsal process capitate in lateral view, covered
with spine-like setae; recurved process long, slender, long, slender, asymmetrically curved, bearing one subapical seta; ventral part of phallus sclerotized, apex divided into dorsal and ventral expandable membranous lobes, sclerotized dorsal keel of upper lobe irregularly folded, phallic shield sclerotized, triangular in lateral view paramere absent, phallothremal sclerite not evident.

**FEMALE:** A description and an illustration were provided by Ross (1944).

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, 9 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- NORTH AMERICA: Oklahoma: DB 93-154, Le Flore Co., Billy Cr., @ unnamed rd., ca. 1 mi. from Billy Cr. Recreation Area 18-VII-1993 DE Baumgardner: 1 male -- NORTH AMERICA: South Carolina: Barwell Co. Savannah R Plant Lower Three Runs Cr. @ SRP Rds 8 and 8-8, 29-May-1984, J.C. Morse (Light Trap G) (CUAC).

**DIAGNOSIS:** Males of this species are closely related to *T. cumberlandersis* and *T. inflexa* by the distal part of each inferior appendage is extremely long and strongly inner curved in ventral view. The significant differences are that the apex of upper part of tergum X is rounded and slightly upturned apex in the lateral view and the distal parts of inferior appendages are overlapped in the ventral view.

**PHYLOGENY:** *Triaenodes cumberlandensis*, *T. marginata*, and *T. inflexa* apparently consitutte a monophyletic group, as indicated by a synapomorphy discussed above. The phylogenetic relationships among these three species remain unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) inflexa* Morse
Fig. 4.26

_Triaenodes inflexa_ Morse, 1971, p. 82, figs. 7A-B, E.

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA; South Carolina; Pickens County, Carrick Creek, Table Rock State Park, May 21, 1969, J. Morse (University of Georgia)

**DESCRIPTION** Morse (1971):
"Length 11.5 mm. Sclerites of head, thorax, and appendages tan. Membranous areas and abdomen cream. Flagellum twice as long as the body and wings, the ends of each segment with a narrow, dark band. A tuft of long, plae hair lies on the dorsal surface of the enlarged scape. Fore wings yellow with light patches situated similar to _tarda_ (see Ross, 1944, fig. 863) and with two spots of dark hairs on the posterior margin. Hind wings clear with a dark sclerite in the third anal cell. Structure typical for genus."

**MALE GENITALIA** Morse (1971):
"Genitalia as in figure 7. Ninth Segment with sternite broad, tergite narrow. Clasper with long lateral lobe straight or only slightly curved, in lateral view, and inflected mesad apically, though not so much as in marginata (see Ross, 1944, fig. 850). Mesal lobe [mesodorsal process] rounded with short, thick spines on the dorsal and mesal surfaces. A pair of long sclerotized rods [recurved processes] extend dorsally from the mesal base of the claspers and curves posteriorly as in related species. Cerci [inferior appendage] on half as long as the tenth tergite, pointed apically, and with long scattered setae. Tenth tergite [upper part of tergum X] asymmetrically lanceolate, bent to the right at the base, and with short setae. Aedeagus [phallus] long, gradually broadened from the base in lateral view, and with its apex thrown into membranous folds."

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Males of this species are closely related to _T. marginata_ by the distal part of each inferior appendage is extremely long and strongly inner curved in ventral view, but the upper part of tergum X has a pointed apex and is slightly longer than that of _T. marginata_ in the latera view. Also, the distal parts of inferior appendages are not overlapped in the ventral view and the angle of inferior appendage is broader than that of _T. marginata_.

**PHYLOGENY:** _Triaenodes cumberlandensis_, _T. marginata_, and _T. inflexa_ apparently consistute a monophyletic group, as indicated by a synapomorphy discussed above. The phylogenetic relationships among these three species remain unknown.

**DISTRIBUTION:** North America.
**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes* (*Triaenodes*) *baris* Ross, 1938b

*Fig. 4.27*

*Triaenodes baris* Ross, 1938b; p. 88-89, pl. 1, figs. 3-3a (male)

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA: Illinois, Beach, June 10, 1993, Mohr and Townsend (INHS, #24811).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X spindle-shaped (fusiform), apex short, pointed, slightly curved to right, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages long, slender, setose; inferior appendages subtriangular in ventral view, distal part short, pointed, mesodorsal process oblong in lateral view, covered with spine-like setae; recurved process long, slender, asymmetrically curved, each with one subapical seta; phallus large, apex enlarged, slightly divided into dorsal and ventral membranous lobes, phallic shield sclerotized, small triangular in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** A description and illustrations of ventral view were provided by Ross (1944).

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 9.0 mm

**MATERIAL EXAMINED:** Holotype, male.
**DIAGNOSIS:** Males of this species are closely related to *T. smithi* by the shape of tergum X and the combination of each inferior appendage, but the apex of the upper part of tergum X is slightly curved to the right side and the mesodorsal process of each inferior appendage is more like oblong and the distal part of each inferior appendage is shorter than that of *T. smithi*.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) cumberlandensis* Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) flavescens* Banks, 1900

Fig. 4.28

*Triaenodes flavescens* Banks, 1900; p. 257-258.

**TYPE MATERIAL:** Holotype, male: NORTHE AMERICA: New York, New Brunswick (J. B. Smith); Florida (Mrs. Slosson) (MCZC, #11588).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X spindle-shaped (fusiform), apex long, pointed, strongly curved to left, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages long, slender, setose; inferior appendages subtriangular in ventral view, distal part long, pointed, mesodorsal process large, clavate in lateral view, covered with spine-like setae; recurved process long, slender, each with one subapical seta; phallus large, apex enlarged, slightly divided into dorsal and ventral
membranous lobes, phallic shield sclerotized, long, small triangular in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1944).

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, 10.00 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** Males of this species are closely related to *T. clumberlandersis* by the shape of upper part and lower part of tergum X, the combination of each inferior appendage, but the apex of the upper part of tergum X is much longer and the distal part of each inferior appendage is shorter than that of *T. clumberlandersis*.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* cumberlandensis Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

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*Triaenodes (Triaenodes) phalacris* Ross, 1938b

Fig. 4.29

*Triaenodes phalacris* Ross 1938b; p. 88, Pl. I, figs. 2-2A (male).

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA: Ohio, Athens, June 5 1931, W. C. Stehr, (pinned and genitalia prep.) (INHS, # 22475).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs (right antenna broken). Forewings and hind wings yellowish brown, with dense yellow hairs.
**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X long, spindle-shaped (fusiform), apex acute, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages about half length of upper part of tergum X, setose; inferior appendage narrow, rectangular in ventral view, distal part long, strongly dorsal in lateral view, strongly divergent in ventral view, mesobasodorsal process club-shaped, covered with spine-like setae; recurved processes long, slender, bent to the right, each with one subapical seta, right recurved process (holotype) broken; phallus membranous, bulbous (also like military beret), withdrawn through opening in phallic shield, phallic shield sclerotized, triangular in lateral view, with scoop-shaped arms forming large opening, paramere absent, phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 9.0 mm

**MATERIAL EXIMINED:** Holotype.

**DIAGNOSIS:** This species is known only from the holotype. It has the very distinctive phallus and the strongly divergent distal of inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* cumberlandensis Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) smithi* Ross, 1959

Fig. 4.30

*Triaenodes smithi* Ross, 1959; p. 40-42, figs. 1, 2A-B (male, female).

**TYPE MATERIAL:** Holotype, male: NORTHE AMERICA: Illinois, Wolf Lake, at McCann School Spring, June 6, 1951, at light, Ross and Richards (INHS, #24829).
**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X spindle-shaped (fusiform), apex short, pointed, slightly curved to left, with pair of small dorsomesal papillae, lower part of tergum X membranous, distal margin slightly concave in dorsal view; preanal appendages long, slender, setose; inferior appendages rectangular in ventral view, distal part digitate, blunt, mesodorsal process clavate, covered with spine-like setae; recurved process long, slender, each with one subapical seta; phallic shield sclerotized, subrectangular in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1959).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7.4 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- NORTHE AMERICA:

**DIAGNOSIS:** Males of this species are closely related to *T. baris* by the shape of tergum X, the combination of each inferior appendage, but the apex of the upper part of tergum X is slightly curved to the left side and the distal part of each inferior appendage is blunt and shorter than that of *T. baris*.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) cumberlandensis* Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.
Triaenodes (Triaenodes) tarda Milne, 1934

Fig. 4.31

Triaenodes marginata tarda Milne, 1934; p. 12, 19 (male; as subspecies of T. marginata)

Triaenodes vorhiesi Betten, 1934; p. 286-287, pl. 39, figs. 7-11 (male, female)

Triaenodes mephita Milne, 1936; p. 59 (male, female)

**TYPE MATERIAL:** Holotype, male: CANADA: Toronto, 24-VI-1926, L. J. Milne (The existence of the holotype of this species is in doubt).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with hairy scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX in lateral view with posterior margin sinuate; upper part of tergum X spindle-shaped (fusiform), apex pointed, with pair of small dorsomesal papillae, lower part of tergum X membranous, distal margin of concave in dorsal view; preanal appendages about half length of upper part of tergum X, setose; inferior appendages subtriangular-shaped in ventral view, distal part elongate, slightly bent toward dorsally in lateral view, slightly curved medially in ventral view, mesodorsal process capitate in lateral view, covered with spine-like setae; recurved process asymmetrically curved, each with one subapical seta; phallus enlarged to apex, apex deeply divided into dorsal and ventral membranous lobes, phallic shield sclerotized, triangular-shaped in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1944).

**IMMATURE STAGES:** The larvae and pupae are described by Vorhies (1909) as T. flavescens Descriptions and illustrations of larvae and pupae were provided by Ross (1944), Manuel and Braatz (1984), and Glover (1996).

**LENGTH OF FOREWING:** Male, 8.5-9.0 mm
MATERIAL EXAMINED: The holotype of this species was not examined. The following specimen was examined: 4 males – NORTH AMERICA: Illinois: Champaign Co. 2 mi. N. of Homer and 11/2 mi. W. of route 49 bridge on Salt Fork of Vermilion R., June 17-18 1972, J. D. Unzicker, blacklight, 9:15-7:00 AM (Period 3: 8: 56-9:16, Period #4) (INHS, # 43221 and #43222).

DIAGNOSIS: Males of this species are closely related to T. cumberlandersis, T. marginata and T. inflexa by the distal part of each inferior appendage is somewhat long and inner curved in ventral view, but the shape of the upper part of tergum X is different and the length of distal part of inferior appendage is shorter than that of above three species.

PHYLOGENY: The phylogenetic relationships of this species in the T. (Triaenodes) cumberlandensis Group are unknown.

DISTRIBUTION: Canada.

BIOGEOGRAPHIC REGION: Nearctic region.

Species incertae sedis near T. (Triaenodes) injusta Group

and T. (Triaenodes) cumberlandensis Group

Two species incertae sedis shares synapomorphies 62 and 63 with these Groups, but no other synapomorphies are evident to suggest more refined relationships.

Triaenodes (Triaenodes) ignita (Walker, 1852)

Fig. 4.32

Leptocerus ignita Walker, 1852; p. 72 (male)

Setodes ignita (Walker); Hagen, 1861, p. 281-282 (male)

Triaenodes ignita (Walker); Banks, 1900, p. 258 (male)

Triaenodes dentata (Walker); Bank, 1914, p. 261, fig. 45 (male)

Triaenodes connata (Walker); Ross, 1959, p. 44-45, figs.5, 8-9 (male, female)
**TYPE MATERIAL:** Lectotype (designated by Betten and Mosely 1940), male: NORTH AMERICA; Georgia, Coll. By John Abbot (pinned) (MCZC)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, tergum IX with posteromesal margin broadly rounded in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X pair of spines, asymmetrical, acute apex curved to the left, each spine with paired mediadorsal setae, with pair of small dorsomesal papillae at base, lower part of tergum X membranous, short; inferior appendage large, broad, inner margin smoothly rounded, distal part long, pointed, mesodorsal process irregular, fused with small dorsal process; stout basal one-third of recurved process gradually tapering to narrow distal two-thirds, apex acute bearing several subapical setae; sclerotized phallus strongly curved ventrally, with median flange, phallic shield sclerotized, rectangular in lateral view, paramere absent, phallotremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1944)

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 7 mm

**MATERIAL EXAMINED:** Lectotype. Also I have examined the following material. 3 males: NORTH AMERICA; South Carolina, Aiken Co., Site A, Savannah River Plant, Upper Three Runs Creek at SRP Rd. 8-1, 1 July 1984, J. C. Morse, (CUAC).

**DIAGNOSIS:** This species is distinguished from *T. oidipus* by the upper part of tergum X which is a pair of asymmetrical spines and its apices are curved to the left.
PHYLOGENY: The phylogenetic relationships of this species near *T. (Triaenodes) cumberlandensis* and *T. (Triaenodes) injusta* Groups are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

_Triaenodes (Triaenodes) oidipus_ Malicky, 2005

_Triaenodes oidipus_ Malicky, 2005: p. 38-39, pl. 3 (male).

**TYPE MATERIAL:** Holotype, male: INDONESIA; Irian Jaya, Wamena, 1600 m, 13-xi-1971, col. Diehl. (Malicky Collection).

**DESCRIPTION** Malicky (2005, translated from Gerrman):
“Dark yellow. forewing 10 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):
“Segment IX in dorsal half short, in ventral half elongate, projecting caudad. Segment X [upper part of tergum X] almost straight, slender, long middle finger and pair of somewhat longer, more slender, fish-bone projections [lower part of tergum X]. Preanal appendages slender, half as long as segment X projections [lower part of tergum X]. Inferior appendages long and slender, each with dorsal branch [reurved process] arising on base directed cephalad then bent caudad and extending nearly straight, shorter than main body of inferior appendage. Inferior appendages in ventral view with parallel out edges, distally bent slightly mesad to acute apices; mesal edges proceeding in S-shaped line to middle then mesad. From the inner edge of each appendage arises truncated, short finger [mesodorsal process] directed dorsad. Phallus long and slender, with pair of large, bent parameres.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the Greek mythological son (Greek Oidipos, Latin Oedipus) of Laios and Iokasta, king and queen of Thebes (who, raised by the king of Corinth, later returns to Thebes and unwittingly kills his father and marries his mother.) Thus, the masculine gender does not need to agree with the gender of the genus.
**DIAGNOSIS:** Based on Malicky’s simple description and crude illustration, I assume “a truncated, short finger” refers to the mesodorsal process of each inferior appendage. It is distinguished from *T. ignita* by having a pair of large bent parameres.

**PHYLOGENY:** The phylogenetic relationships of this species near near *T. (Triaenodes) cumberlandensis* and *T. (Triaenodes) injusta* Groups are unknown.

**DISTRIBUTION:** Indonesia.

**BIOGEOGRAPHIC REGION:** Oriental region.

Species *incertae sedis* near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1

Twenty species *incertae sedis* share synapomorphy 57 with the other Groups of this sublineage, but no other synapomorphies are evident to suggest more refined relationships.

*Fig. 4.33*

**Triaenodes (Triaenodes) adelophe** Neboiss and Hur, sp. nov.

**TYPE MATERIAL:** Holotype, male: PAPUPA NEW GUINEA; Panguna, Bougainville Island, C. Yule. April 1989, light trap (NMV, genitalia prep., PT-2091)

**DESCRIPTION:** ♂: n=1. Forewing length 4.5 mm, hind wing length ca. 3.65 mm. Eye ca. 0.38 mm long, ca. 0.18 mm wide. Antennal scapes ca.0.032 mm long; antennae broken. Maxillary palp segment lengths (ca. in mm): 0.3, 0.4, 0.42, 0.28, 0.44. Body color yellowish brown; each with scent-organs; forewings and hind wings yellowish brown, with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin straight, sternum IX with posterior margin rounded in lateral view; upper part of tergum X clavate, lower part of tergum X sclerotized, beak-shaped, little bit upturned in lateral view, dorsally membranous over sclerotized part in dorsal view, v-shaped excavated; preanal appendage long, slender, subequal to upper part of tergum X, setose; inferior appendage narrow, club-shaped, apex rounded in lateral view, apically setose, lateral subbasodorsal process digitate, short bearing single long hair, several short
hairs; recurved processes long, slender, strongly sclerotized, symmetrical, tapering to apex, posterodorsad; anterior half of phallus sclerotized, posterior half membranous, gently curved, parameres absent, phallothremal selerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** From the Greek *adelophe* – sister referring to the sister species of *T. rhopalota* n.sp.

**DIAGNOSIS:** Males of this species closely resemble *T. rhopalota* Neboiss and Hur, sp. nov. in the overall shape of inferior appendages with the digitate lateral subbasodorsal process, but differs in the beak-shaped of lower part of tergum X in the lateral view and the short lateral subbasodorsal process.

**PHYLOGENY:** Although this species might be the sister species *T. rhopalota* Neboiss and Hur, sp. nov., the phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) rhopalota* Neboiss and Hur, sp. nov.

Fig. 4.34

**TYPE MATERIAL:** Holotype, male: PAPUPA NEW GUINEA; Panguna, Bougainville Island, C. Yule. 7 Dec 1987, light trap (NMV, genitalia prep., PT-1824)

**DESCRIPTION:** ♂: n=1. Forewing length 5.0 mm, hind wing length 4.05 mm. Eye ca. 0.4 mm long, ca. 0.21 mm wide. Antennal scapes ca.0.43 mm long; right antenna broken. Maxillary palp segment lengths (ca. in mm): 0.29, 0.47, 0.51, 0.37, 0.6. Body color yellowish brown; antennal scapes with scent-organs; forewings and hind wings yellowish brown, with yellow hairs.
MALE GENITALIA: Abdominal segment IX anterior margin slightly rounded, sternum IX, with posterior margin rounded in lateral view; upper part of tergum X single median lobe, slightly clavate, lower part of tergum X cigar pipe-shaped in lateral view, sclerotized, dorsally membranous over sclerotized part in dorsal view, deeply excavated; preanal appendage long, slender, subequal to upper part of tergum X, setose; inferior appendage narrow, club-shaped, apex rounded, apically setose, lateral subbasodorsal process digitate bearing pair of long hairs; recurved processes strongly sclerotized, symmetrical, tapering to apex, ventrad; anterior half of phallus sclerotized, posterior half membranous, with broad flange at anterior phallus, gently curved, parameres absent, phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: Holotype, male.

ETYMOLOGY: From the Greek \textit{rhapolon} – club referring to the shape of inferior appendages

DIAGNOSIS: Male of this species closely resembles \textit{T. adelophe} Neboiss and Hur, sp. nov. in the overall shape of inferior appendages with the digitate lateral subbasodorsal process, but, it is distinguished by the shape of the lower part of tergum X which, in lateral view, is the cigar pipe-shaped and the lateral subbasodorsal process of the inferior appendages is longer.

PHYLOGENY: Although, this species might be the sister species \textit{T. adelophe} Neboiss and Hur, sp. nov., the phylogenetic relationships of this species with other species in and near \textit{Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57}, are unknown.

DISTRIBUTION: Papua New Guinea.

BIOGEOGRAPHIC REGION: Australasian region.

\textit{Triaenodes (Triaenodes) aurea} Kimmins, 1962a

Fig. 4.35

\textit{Triaenodes aurea} Kimmins, 1962a; p. 177, figs. 63, 66 (male).
TYPE MATERIAL: Holotype, male: PAPUA: Mt. Tafa. 8, 500 ft. iii. 1934. L.E. Cheesman, (BMNH, (E) # 251419 and #251420).

DESCRIPTION Kimmins (1962a):
“General appearance yellowish, with golden pubescence. Antennae luteous, with fuscous annulations, Basal segment long, densely clothes with long golden pubescence. Legs luteous. Fore wing with dense golden pubescence. Wings rather narrow, apices not falcate. Discoidal cell in fore wing elongate, about as long as its footstalk.”

MALE GENITALIA Kimmins (1962a):
“Ninth segment dorsally fused with tenth. Ninth sternite produced in a quadrate lobe with sinuous apical margin. Cerci [preanal appendage] long, digitate. Tenth segment [lower part of tergum X] forming a broad, plate-like hood, its lateral apical angles produced in long, downcurved spines, with a U-shaped excision between them. Median lobe of tenth segment [upper part of tergum X] also very long, exceeding the cerci, slender and digitate, with a short, transparent process on each side about midway. Aedeagus [phallus] long and arched downwards, membranous above. Claspers [inferior appendage] fused basally, each composed of a basal branch [recurved process] and with main part of the clasper divided into an outer [lateral subbasodorsal process] and an inner lobe [main body of inferior appendage]. The basal branch [recurved process] is slender, about as long as clasper and arched beneath the aedeagus. The outer lobe [lateral subbasodorsal process] is roughly triangular in side view, digitate in ventral view. The inner lobe, which is also the lower, is about twice as long as the outer. It is slightly forcipate, the inner margin with a serrate projection about midway, apex of clasper acute [distal part of inferior appendage].”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8.5 mm

MATERIAL EXAMINED: Holotype, male (mounted as microscope preparation).

DIAGNOSIS: There are some difficulties to interpreter the structure of male genitalia because of the microscope preparation mounted. This species somewhat resembles T. ustulata in the single, median lobe of upper part and U-shaped lower part of tergum X, but is distinguished by having a pair of lateral processes on the median lobe of upper part of tergum X and the lateral subbasodorsal process of each inferior appendages.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: Australia.
**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) bilobata* Yang and Morse, 2000

*Triaenodes bilobatus*, Yang and Morse, 2000; p. 99-100, figs. 63, 118A-D (male, female)

**TYPE MATERIAL:** Holotype, male: CHINA; Loc. 9 Fu-chou Shi (N.26.15, E.119.30), 15 may 1978, Coll. Zhao Xiu-fu (NAU)

**DESCRIPTION** Yang and Morse (2000):
“Head, thorax and legs testaceous, covered with same color setae; basal segments of antennae each about 1.5 times as long as head, with “scent-organs” on inner side; forewings hyaline, yellowish.”

**MALE GENITALIA** Yang and Morse (2000):
“Segment IX somewhat broader both dorsally and ventrally, posterior pleural margins each with deep oblique excision filled with membrane; from above apical margin strongly produced at center with paired conspicuous papillae just beneath it; venter of segment IX trapezoidal with lateral margins sinuate in ventral view. Preanal appendages triangular, very broad at base in lateral view (sometimes in dorsal view). Median process of upper part of tergum X absent [upper part of tergum X absent], its lateral processes represented by two ciliate [pair of small dorsomesal papillae], dorsal lobes placed laterally near apices of halves of lower part of tergum X; lower part of tergum X hood-like, deep at base, somewhat like species in *Adicella* but with apical excision shallow and with fused basal portion not membranous. Inferior appendages elongate, depressed, each with recurved basal plate process stout, curved 180º, slightly longer than main body of appendage; in ventral view main body of each appendage with broad, bulbous base gradually narrowing to blunt apex, mesal ridge and apex sparsely covered with short, spine-like setae. Phallus with only phallobase conspicuous, trough-like, slightly longer than inferior appendages, with weak longitudinal ridge on each side and with apicodorsal ends dentate; ejaculatory duct lying in middle of trough.”

**FEMALE:** A description and illustrations were provided by Yang and Morse (2000).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.1-7 mm

**MATERIAL EXAMINED:** None

**DIAGNOSIS:** This species resembles *T. ochreella ochreella*, *T. qingligensis* and *T. unanmis* in the general shape of each inferior appendage with relatively short recurved process
and the simple main body. It differs from above three species, in the absence of upper part of tergum X and the shape of lower part of tergum X which is apically excised.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: China.

BIOGEOGRAPHIC REGION: Oriental region.

_Triaenodes (Triaenodes) foliformis_ Yang and Morse, 2000

_Triaenodes foliformis_, Yang and Morse, 2000; p. 101, figs. 120A-D, 210A-C (male, female)

TYPE MATERIAL: Holotype, male: CHINA; Loc. 76d, Si-mian shan, Long-tan-hu, 900m elevation, 7 july 1990, Coll. John Morse (NAU)

DESCRIPTION Yang and Morse (2000): “Head and thorax yellowish brown, vertex and palpi yellowish brown to brown; scape of each male antennae stout, about twice as long as first flagellar segment, bearing large tuft of long fine hairs covered by long, thin plate; forewing ochraceus, densely covered with brown hairs.”

MALE GENITALIA Yang and Morse (2000): “Dorsum of segment IX forming triangular hood; pleural regions semisclerotized with deep excisions ventrally, segregating sternum into two parts, with posterior part projecting caudad, sub-quadrate in ventral view. Preanal appendages large, foliaceous, 3 times as long as wide. Upper part of tergum X with conspicuous median process straight, clavate, similar to that of _Tn. unanmis_; with pair of vestigial lateral processes basally; lower part of tergum X constricted sub-basally with large, rounded apex extending well beyond median process of upper part of tergum X, slightly exceeding inferior appendages. Inferior appendages foliaceous, in lateral view sub-oval with acute apex, about 1.4 times as long as width; recurved processes of basal plate about three times as long as appendages, with basal third directed forward then remainder arched backward; dorsolateral surface of each inferior appendage concave, this concavity defined by lateral ridge and dorsomesal ridge, bare except with two long setae arising from chalazae near base; in ventral view main body of appendage semicircular, with inner margins relatively straight bearing approximately three rows of short setae. Phallus slender, parallel-sided trough, six times as long as wide, 2.5 times as long as inferior appendages, with pair of lateral ridges near middle for engaging recurved processes of basal plate; ejaculatory duct arched dorsad sub-apically.”

FEMALE: A description and illustrations were provided by Yang and Morse (2000).

IMMATURE STAGES: Unknown.
LENGTH OF FOREWING: Male, 6.9 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: This species resembles T. qingligensis and T. unanmis in the overall shape of upper part of tergum X and the simple inferior appendages. It differs from above two species, in the tough-like lower part of tergum X in the dorsal view and the shape of each inferior appendage in ventral view.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: China.

BIOGEOGRAPHIC REGION: Oriental region.

Triaenodes (Triaenodes) menestheus Malicky, 2005

Triaenodes menestheus Malicky, 2005: p. 35, pl. 1 (male).


DESCRIPTION Malicky (2005, translated from Gerrman):
“Dark yellow, outer edge of fore wing with dark yellow marks, with most running together (Plate 1). Fore wing 7.5-8.5 mm.”

MALE GENITALIA Malicky (2005, translated from Gerrman):
“T. menestheus is very similar to T. pentheus, distinguished readily by form of inferior appendages, in which main body in lateral view rounded-triangular, with caudal edge more or less concave.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

ETYMOLOGY: The species name refers to Menestheus, who was the king of Athens at the time of the Trojan Wars. Thus, the masculine gender does not need to agree with the gender of the genus.
**DIAGNOSIS:** Malicky mentioned that this male species is similar to *T. pentheus*, but differs from by the rounded and triangular main body of each inferior appendage in the lateral view.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes* (*Triaenodes*) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Thailand

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) ochreella ochreella* McLachlan, 1877

Fig. 4.36

*Triaenodes ochreella* McLachlan, 1877; p. 322

*Triaenodes ochreella* McLachlan, 1884; p. 37, pl. IV.

**TYPE MATERIAL:** Holotype, male: FRANCE; type repository = the Selys Collection, (ISBN), but is badly damaged (borrow specimens from The Natural History Museum, London, or elsewhere).

**DESCRIPTION** McLachlan (1874-1884, from the First Additional supplement): “Add: Portugal (the Mondego at Cimbra, 2nd June, and at ponte de Morcellos, 12th June, Beira Baixa; near Villa real, 24th June, Traz-os-Montes; Eton, 6♂, 5♀). I subjoin a complete description from these examples: - Body yellowish; clothing yellow-ochreous [pale yellow]. Antennae pale yellowish, narrowly annulated with blackish at the sutures to beyond the middle, the apical portion almost whitish; basal joint much longer than the head, yellowish, clothed with ochreous hairs. Legs pale whitish yellow. Anterior-wings narrow, rather densely clothed with bright yellowish-ochreous pubescence; a black point on the inner margin rather before the middle, another (larger) just the arculus, a few specks (often wanting) on the apical portion of the disc, and the base of the apical fringe (these points all caused by black hairs in the otherwise pale pubescence); apical fringes long, brownish, becoming especially long and dark at the anal angle. Posterior-wings smoky-grey, with darker pubescence and fuscous iridescent fringes.”

**MALE GENITALIA** McLachlan (1874-1884, from the First Additional supplement): “In the ♂ the superior appendages [preanal appendages] are large and broad, not erected; laterally they are seen to be almost bilobate, the upper portion much longer than the lower, yellow (as are all the anal parts), clothed with very long
concolorous hairs. Between these appendages is a long, slender, straight, dorsal process [upper part of tergum X], slightly and gradually dilated to the apex. Below this [lower part of tergum X] is a straight, stout, semi-transparent process with rounded deflexed sides, and sharply truncate apex (upper penis cover?). Then follows the very long and thick penis (if it be such) [phallus], which is strongly curved down between the inferior appendages; on its upper edge are placed two parallel lanceolate blades (intermediate appendages?) [recurved processes], and one each side there is apparently a very slender sheath, slightly hairy at the tip. Inferior appendages placed on the very large, broad, sub-quadrate, 9th ventral segment: viewed laterally, they are curved upward, becoming slender at the tip, with two spines-bearing teeth on the upper edge, and the apex furnished with conspicuous dark spines; viewed from above, the apices are seen to be inturned, and provided with very numerous strong spines; ventrally they arise contiguously, are broad at the base, afterwards becoming more slender, the tips obtuse, the inner edges with strong spiniform teeth.

“Length of body, ♂, 5 mm., ♀, 6-7 mm. Expanse, ♂, 14½ -15 mm., ♀, 15½ - 18 mm..

As already noticed (p. 322), the type has lost its abdomen; but the Portuguese examples agree so precisely with it in size and colours that I do not hesitate to consider them specifically identical. It is possible that T. ochreella and unanimis are closely allied.

“N. B. – Rambur collected in Spain; but it is not probable that any confusion of localities occurred. Nevertheless, I have seen no further examples of T. ochreella from France.”

FEMALE: A description and an illustration were provided by McLachlan (1884).

IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: This species resembles T. qingligensis and T. unanmis in the single, long upper part of tergum X and the general shape of each inferior appendage with relatively short recurved process and the simple main body. It differs from above two species, in the bilobate preanal appendages and the form of the lower part of tergum X.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: France.

BIOGEOGRAPHIC REGION: West Palearctic region.
**Triaenodes (Triaenodes) ochreella lefkas Malicky, 1974**

Fig. 4.37

*Triaenodes ochreella lefkas* Malicky, 1974; p. 19-20, fig. 10 (male)

**TYPE MATERIAL:** Holotype, male: GREECE, Lefkas Island; Kaligoni, 14. 4. 1929, leg. BEIER, 4 Paratype as same data; type repository = Museum of Natural History Vienna.

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX posterior margin broadly rounded, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX in lateral view with posterior margin nearly stright; upper part of tergum X median process, slightly concave in apex, apically setose, lower part of tergum X broad membranous plate, rectangular, blunt in lateral view; preanal appendage broad, oval, tapering apex, covered with very long hairs; inferior appendage subtriangular in ventral view, inner margin bearing stout setae in ventral view, distal part blunt; recurved processes somewhat stout, directed anterodorsad, blunt apex bearing short hairs; phallus trough-like, parameres absent, phallothreema sclerite small.

**FEMALE AND IMMATURE STAGES:** A description and scanning electron microscope pictures were provided by Spinelli, Bicchierai and Moretti (1991).

**LENGTH OF FOREWING:** Male, 7.7-8.7 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 5 males -- SOUTH ITALY; Taranto, Puglie, Galeso River, 1969, coll. De Bartolomeo, det. Prof. Moretti.

**DIAGNOSIS:** This species is very close to *T. ochreella ochreella*. Since the existence of *T. ochreella ochreella* is indout, it is impossible to determine whether these two species within a single species or not. Based ont the original desription and figures of *T. ochreella ochreella*, it
differs from in the slightly concave apex in the lower part of tergum X and the shape of preanal appendages.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes* (*Triaenodes*) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Greece.

**BIOGEOGRAPHIC REGION:** West Palearctic region.

*Triaenodes* (*Triaenodes*) *pentheus* Malicky, 2005

*Triaenodes pentheus* Malicky, 2005: p. 34, pl. 1 (male).

**TYPE MATERIAL:** Holotype, male: THAILAND; Doi Angkang, 17.iii.1992, col. Malicky.


**DESCRIPTION** Malicky (2005, translated from German):

“Yellow. Fore wings with characteristic pattern according to Plate 1. Fore wing 8-9 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):

“Ventral half of segment IX quite long, dorsally shorter. Segment X [upper part of tergum X] with long, straight, distally slightly clavate rod and equally long flange [lower part of tergum X] lying beneath, tongue-shaped in dorsal view, appearing acute triangular in lateral view. Preanal appendages just as long as segment X appendages [actually shown half as long], slender [foliceous]. Inferior appendages consisting of main body appearing irregularly rectangular in lateral view and in form of plate bent dorsad; in ventral view appearing blunt and set with straight, stout bristles on mesal surfaces. Dorsal branch [recurved process] long and slender, elevated from base at first anterodorsad, then hooked in bend caudoventrad and somewhat longer than main body. Phallicus slender, moderately long. *Trianodes pentheus* is similar to *T. menestheus* n. sp. (see above).”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to Pentheus 1, the king of Thebes who denied the divinity of Dionysus 2 and was torn limb from limb by the Maenads. Thus, the masculine gender does not need to agree with the gender of the genus.
**DIAGNOSIS:** Based on Malicky’s simple description and crude illustration, this species resembles *T. qinglingensis* in the structures of the upper and lower parts of tergum X and the combination of inferior appendages. However, the overall shape of each inferior appendage in the lateral view is shorter and wider than that of *T. qinglingensis*.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Thailand

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) qinglingensis* Yang and Morse, 2000

*Triaenodes qinglingensis*, Yang and Morse, 2000; p. 102-103, figs. 122A-D, 211A-C (male, female)

**TYPE MATERIAL:** Holotype, male: CHINA; Loc. 71, Qing-ling (N34.20, E106.80), 9 July 1973, 1400m elevation, Coll. Zhou Yao and LU Zheng and Tian Zhu (NAU).

**DESCRIPTION** Yang and Morse (2000):
“Head and thorax reddish brown, legs testaceous, basal segment of male antennae very long, each with “scent-organ’ situated on inner side; forewing ochraceus, with brownish hairs.”

**MALE GENITALIA** Yang and Morse (2000):
“Segment IX dorsally forming triangular hood; pleural regions deeply excised, mostly dividing sternum from rest of segment; sternum large, sub-triangular in lateral view, about 1.5 times as long as tergum, sub-quadrate in ventral view. Preanal appendages large, foliaceous, 4 times as long as average width; median process of upper part of tergum X straight, clavate, bearing short setae, basal third narrowed, apex dilated and extending beyond lower part of tergum X. Lower part of tergum X entire, broad basally, strongly constricted at middle in dorsal view, with blunt apex, appearing very acute in lateral view. Inferior appendages oblong; recurved processes of basal plate each stout, projecting anterodorsad in basal third then arched backward with apex directed down beyond tip of main body of appendage; in ventral view, each main body slightly dilated basally, constricted near middle, with outer margins longer than inner margins, forming obliquely truncate apex bearing dense, spine-like setae, mesal region of appendages sparsely covered with short setae. Phallobase slender, trough-like, nearly twice as long as main body of inferior appendages, with its ventral surface deeply concave such that two lateral edges appearing as high ridges, ejaculatory duct elevated at apex.”
FEMALE: A description and illustrations were provided by Yang and Morse (2000).

IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.8-7.5 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: This species very resembles *T. unanmis* in the overall shape of upper part of tergum X and the simple inferior appendages. It differs from it that the base of each inferior appendage is less angled in the ventral view and the apex of each inferior appendage is broader and obliquely truncate.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near *Triaenodes* (*Triaenodes*) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: China.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes* (*Triaenodes*) *unanmis* McLachlan, 1877

Fig. 4.38

*Triaenodes unanmis* McLachlan, 1877; p. 324-325, figs. 1-4.

*Triaenodes unanmis forma rectus* Martynov, 1924; p. 129.

*Triaenodes yamamotoi* Tsuda, 1942; p. 296-297, figs. 46-47.

TYPE MATERIAL: Syntype (holotype not designated), male: FINLAND and OESEL ISLAND; type repository = Helsingfors Museum and BMNH

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX posterior margin broadly rounded, tergum IX with posteromesal margin straight in dorsal view, sternum IX in lateral view with posterior margin gently sinuate; upper part of tergum X median process slender in basal half, oval apically,
lower part of tergum X membranous plate, rounded, blunt in lateral view; preanal appendage oval, tapering apex, setose; inferior appendage subtriangular in ventral view, inner margin sinuous bearing stout setae in ventral view, distal part blunt; recurved processes directed anterodorsad, angled caudad, blunt apex bearing short hairs; phallus trough-like, with longitudinal, lateral flanges, parameres absent, phallothremal sclerite not evident.

**FEMALE:** A description and illustrations were provided by Yang and Morse (2000)

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 8-9 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 3 males -- SWEDEN; Valasjon lake (63°0'9"N, 17°30’30"E), 14 July 2003, Coll. Bo Gullefors.

**DIAGNOSIS:** This species very resembles *T. quinglingensis* in the overall shape of upper part of tergum X and the simple inferior appendages. It differs from it that the upper part of tergum X is relatively short and the apex of each inferior appendage is nearly acute.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Finland.

**BIOGEOGRAPHIC REGION:** East and West Palearctic and Oriental regions.

*Triaenodes (Triaenodes) eumeke* Neboiss and Hur, sp. nov.

Fig. 4.39

**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA; Binge River, Membok, 5 July 1981, K. Hortle (NMV, genitalia prep., PT-1130)

**DESCRIPTION:** ♂: n=1. Forewing length 7.2 mm, hind wing length 6.2 mm. Eye ca. 0.5 mm long, ca. 0.4 mm wide. Antennal scapes 1.4 mm long; left antaeae half way broken.
Maxillary palp segment lengths (ca. in mm): 0.65, 0.45, 0.75, 0.3, 0.65. Body color pale yellow in alcohol; antennal scapes each with scent-organ; forewings and hind wings very pale yellow.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X long, clavate, apically setose; lower part of tergum X membranous, lateral margins strongly sclerotized in dorsal view, apex truncate, both posterior angles protruded in lateral view, subtriangular; preanal appendage long, slender, setose; inferior appendage narrow, rectangular in ventral view, covered with many setae, apex truncate, cylindrical in lateral view; recurved processes long, slender, sclerotized, symmetrical, well beyond apex of inferior appendages, tapering to apex, ventrad; two-thirds of anterior phallus sclerotized, with broad flange at mesal portion, apex membranous, gently curved, parameres absent, phallothremal sclerite broad U-shaped.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** From the Greek *makros* – good length, tall referring to long scape of the male antenna.

**DIAGNOSIS:** The male of this species somewhat resembles that of *T. foliformis*, *T. qinglingensis* and *T. unanimis* in the general shape of each inferior appendage and the clavate upper part of tergum X. It differs from all these in the long recurved process well beyond the apex of inferior appendages, the reduced lower part of tergum X and the truncated apex of inferior appendages in ventral view.

**PHYLOGENY:** The relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

Triaenodes gazella (Hagen); Schmid, 1958, p. 137-138, pl. 25, figs. 11-12, pl. 26, fig. 1 (male).

**TYPE MATERIAL:** Syntype, male: SRI LANKA: Ceylon, Neitner (MCZC, Type 10983).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin slightly sinuate in lateral view; upper part of tergum X single, median lobe, less than preanal appendages, apically setose, lower part of tergum X pair of spines, asymmetrical, left side as long as two-thirds length of right side; preanal appendages as long as half length of left side of lower part of tergum X; recurved process long, slender (right side broken); inferior appendage broad, large, inner margin rounded, distal part medially curved in ventral view, covered with many setae; basal one-third of phallus sclerotized, sclerotization extending ventrally almost two-thirds of phallus, with membranous dorsal flange, apex membranous, paramere absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Syntype (mounted as microscope preparation and genitalia pre.).

**DIAGNOSIS:** This species is distinguished from the other species by the inferior appendage having the broad and large main body and the curved finger-like distal part.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.
DISTRIBUTION: Srilanka.

BIOGEOGRAPHIC REGION: Oriental region.

_Triaenodes (Triaenodes) helo_ Milne, 1934

Fig. 4.41


TYPE MATERIAL: Holotype, male: NORTH AMERICA; “N. C.” (No label), (MCZC, Type 10974).

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin rounded, slightly produced anteroventrally, tergum IX with posteromesal margin striaght in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long, slender, median lobe, apex clavate, setose, as long as twice length of preanal appendages, fused with pair of basal papillae at base, lower part of tergum X semimenbranous, elongate lobe, slightly sinuous, broad base, tapering to apex; inferior appendage triangular in ventral view, rectangular in lateral view, inner margin smoothly rounded, covered with stout setae, distal part blunt; recurved process strongly asymmetrical, apical half of left process widened, subapically oval, cup-shaped, tapered to apex, apex upturned, bearing three or four stout setae near apex, right process slender throughout, slightly thickened before apex, slightly twisted, bearing three or four stout setae at apical one-fifth point; phallus divided near base, dorsal lobe narrow, membranous, ventral lobe thick, tapering to apex, paramere absent, phallotremal sclerite evident.

FEMALE: Unknown.

LENGTH OF FOREWING: Male, 6.7-8.2 mm
IMMATURE STAGES: A description and illustrations were provided by Glover (1996).

MATERIAL EXAMINED: Holotype, male. Also, I have examined the following material. 5 males: NORTH AMERICA; Oklahoma, Comanche Co., Natural Resource Building, East Range, fort S.11, Black light, M. Garhart, 28May2003 (DRPC).

DIGNOSIS: This species is very close to *T. perna* among other species, but it distinguished from by (1) the left recurved processes of inferior appendages is subapically oval and cup-shaped and the apex is strongly upturned, (2) the shape of each inferior appendage in the lateral view is more like rectanglur and the distal part is truncated.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near *Triaenodes* (*Triaenodes*) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: North America.

BIOGEOGRAPHIC REGION: Nearctic region.

*Triaenodes* (*Triaenodes*) *perna* Ross, 1938a

Fig. 4.42

*Triaenodes perna* Ross, 1938a; p. 159-160, fig. 95 (male)

TYPE MATERIAL: Holotype, male: NORTH AMERICA; Illinois, Eichorn, June 13 1934, along Hick’s Branch, DeLong and Ross, (INHS; this holotype is actually not here).

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin rounded, tergum IX with posteromesal margin straight in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X long, slender lobe, apex clavate, setose, lower part of tergum X semimenbranous, elongate lobe, broad base, tapering to apex; inferior appendage triangular in
ventral view, inner margin smoothly rounded, covered with stout setae, distal part blunt; recurved process strongly asymmetrical, apical half of right process greatly widened, turned, tapered to apex, left process slender throughout, slightly thickened before apex; phallus divided near base, dorsal lobe narrow, membranous, ventral lobe thick, tapering to apex, paramere absent, phallotremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1938a)

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 7.1 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male -- NORTH AMERICA; Tennessee, Blount Co., BDH-2001-064, Great Smoky Mountains Nation Park, Abrams Creek, Abrams Creek campground 35.6103, 83.9327, 8July2001, ATBI Project U-v light 8:45-9:45 PM BDH,RED, SLJ (INHS, #5575)

**DIGNOSIS:** This species is very close to *T. helo* among other species, among other species, but it distinguished from by (1) the right recurved processes of inferior appendages is greatly widened, and tapered to the apex, (2) the shape of each inferior appendage in the lateral view is more rounded.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes* (*Triaenodes*) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes* (*Triaenodes*) *scottae* Gibon, 1982

*Triaenodes scottae* Gibon, 1982; p. 72, figs. 2, 5-6 (male).

**TYPE MATERIAL:** Holotype, male: IVORY COAST; Kouto, Bagoué River (MNHN)
DESCRIPTION Andersen and Holzenthal (2002, p. 81, 83):
“Adult (male: n=1,2). Forewing length 6.7-7.0 mm, hind wing length 4.8-5.0 mm. Eye 0.35-0.37 mm wide. Antennal broken, scape 0.63-0.66 mm long. Maxillary palp segment I-III lengths (in mm): 0.52, 0.49, 0.49, [segment IV and V missing]. Colour in alcohol yellowish-brown.”

MALE GENITALIA Andersen and Holzenthal (2002, p. 81, 83, figs. 46-49):
“Abdominal segment IX with anterior margin dorsally rounded, medially straight, ventrally broadly rounded; tergum narrow; pleural region with posterior margin rounded, semimembranous; sternum subrectangular, strongly produced posteriorly; in ventral view with rounded corners, weakly convex posterior margin. Preanal appendage narrowly subrectangular, setose. Upper part of tergum X apparently consisting of two pairs of very long, weak, filiform processes projecting caudad, with sparse short setae. Lower part of tergum X paired, strong, spine-like, projecting caudad, bifid at two thirds, dorsal branch short, tapering ventral branch longer, tapering apically, with sparse short setae. Inferior appendage narrow, curved posteroventrad, with short, spine-like setae apicesly; lateral baso-dorsal process small, with one setae; abbreviated basal plate projecting dorsad, with strongly curved spine-like recurved process extending caudad, apex tapering with few setae. Phallus cylindrical, curved with well-developed dorsolateal flanges; phallothremal sclerite large, distinct.”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.7-7.0 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: This species is somewhat close to T. tofana in the combination of inferior appendage. However, it is distinguished from by having the upper part of tergum X consisting of two pairs of very long processes and the lower part of tergum X consisting of a pair of spine-like projections. Also, the preanal appendages are longer than that of T. tofana.

PHYLOGENY: The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

DISTRIBUTION: Ivory Coast.

BIOGEOGRAPHIC REGION: Afrotropical region.

Triaenodes (Triaenodes) tafana Kimmins, 1962a

Fig. 4.43

Triaenodes tafana Kimmins, 1962a; p. 172, fig. 62 (male).
**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA; Mt. Tafa, 8,500ft., III 1934, L. E. Cheesman. B. M. 1934-321, (BMNH, (E) # 251409 and 251410)

**REDESCRIPTION** Kimmins (1962a):
“General colour dark fulvous. Head with golden hairs. Antennae fulvous, annulated basally with gold. Basal segment long, clothed with a mixture of golden and fuscous hairs. There is a large oval flap on the dorsal surface, covering a ligulate structure. Palpi fulvous, annulated with fuscous. Thorax fuscous above, with golden pubescence, yellowish on the sides and beneath. Legs clothed with yellowish and fuscous pubescence. Fore wing with fuscous and pale golden pubescence, the latter forming marginal spots in the apical cellules and less definite markings elsewhere. There is a dark fuscous tuft about midway along the anal margin and another just beyond the arculus. Hind wing hyaline, sparsely pubescent. Apices of both wings very slightly falcate.”

**MALE GENITALIA** Kimmins (1962a):
“Ninth segment narrowed dorsally to a transverse band. Ninth sternite moderately produced and rounded in ventral view. Cerci [preanal appendage] moderately long, flattened dorso-ventrally, tapering apically. Tenth segment [lower part of tergum X] forming a hood over the aedeagus [phallus], broad at its base in dorsal view, tapering to an excised apex. From its base on the upper surface arises a slender, digitate, median process [upper part of tergum X], as long as the hood. Aedeagus long, curved, its upper surface membranous and a single, spiniform paramere [ventral process] beneath. Clasper [inferior appendage] in side view somewhat swollen in basal half, apical half narrower and curved upwards. From the base of the clasper arises a strong, curved, blunt spine [recurved process], terminating in a single seta. From beneath, the clasper is less dilated in its basal half, and the upcurved apical part [distal part of inferior appendage] tapers to an out-turned apex.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.5 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is distinguished from the other species by the distinctive inferior appendages which are swollen in the basal half and strongly upcurved in the distal half and the phallus with a sclerotized, slender ventral process.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.
Triaenodes (Triaenodes) teresis Neboiss and Wells, 1998

Triaenodes teresis Neboiss and Wells, 1998; p. 115, figs. 83-85 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: North Queensland, Mt Bartle Frere, 0.5 km N of South Peak, 6-8 Nov 1981, 1500 m Earthwatch/ QM Expedition (QM).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight; sternum IX in lateral view with posterior margin sinuate; upper part of tergum X filamentous, apically setose, slightly longer than preanal appendage, lower part of tergum X pair of long spines, bent ventrally; preanal appendage slender, elongate, setose; inferior appendage narrow, rectangular in ventral view, distal part somewhat irregular, with dorsal setae papillose on subapical margin, lateral subbasodorsal process digitate bearing several apical setae, with dorsally rounded lobe between lateral subbasodorsal process and recurved process; recurved processes elongate, very slender; phallus elongate, slender, arching ventrally, with pair of dorsal flanges, parameres absent, phallothremal sclerite U-shaped and large.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.1-6.6 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-16208, genitalia prep., PT-1090).

**DIAGNOSIS:** This species is distinguished from the other species by having the dorsally rounded lobe between the lateral subbasodorsal process and the recurved process, and the dorsal setae papillose on the subapical margin of the inferior appendages.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near Triaenodes (Triaenodes) Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Australia.
**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) teuthras* Malicky, 2005

*Fig. 4.44*

*Triaenodes teuthras* Malicky, 2005; p. 36, pl. 4 (male)

**TYPE MATERIAL:** Holotype, male: INDIA; Orissa, Jeypore, October 1958, leg. P. Susai Nathan (USNM)

**DESCRIPTION** Malicky (2005, translated from German):

“Light yellow, length of forewing 7 mm.”

**MALE GENITALIA** (from the work of Malicky, 2005):

Abdominal segment IX anterior margin rounded; upper part of tergum X small, rounded lobe, with pair of basal papillae at base, lower part of tergum X hood-like, membranous plate, triangular, tapering to apex in lateral view; preanal appendage two-thirds of length of upper part of tergum X, setose; inferior appendage triangular in ventral view, distal part blunt in ventral view, covered with setae; recurved processes asymmetrical, very long, slender spines, well recurved into abdominal segment IX, left process extending apex of inferior appendage; phallus long, slender, parameres absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is somewhat similar to *T. perna* of the Neartic region in the overall shape of inferior appendage. However, it is distinguished from by the upper and lower part of tergum X and the preanal appendage are much short and the recurved processes are slender.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** India.
**BIOGEOGRAPHIC REGION:** Oriental region.

*Triasenodes (Triasenodes) tofana* Gibbs, 1973

Fig. 4.45


**TYPE MATERIAL:** Holotype, male: GHANA: Eastern Region, Tafo, Sp-11 *Triasenodes* UV trap 17-X-65, Gibbs (BMNH).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown; antennal scapes long, each with scent-organ without dorsal flap; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX posterior margin broadly rounded, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX in lateral view with posterior margin gently sinuate; upper part of tergum X sclerotized, long spine-like process, gently curved ventrad, lower part of tergum X reduced; preanal appendage setose, about as long as wide, constricted basally, apex subacute; inferior appendage narrow, curved posteroventrad, horizontally flattened, dorsal projection small bearing several stout hairs; recurved processes arising from small basal plate of inferior appendage, which is tilted outwards, long, ventrally bent; phallus ventrally curved, concave dorsally with broad lateral flanges, dorsal surface with longitudinal groove, paramere absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.7-7.0 mm

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** The species epithet is a latinized anagram for the type locality and, therefore, in compliance with Article 31.2 (International Code of Zoological Nomenclature, 1999), must agree in gender with the generic name with which it is combined.
**DIAGNOSIS:** This species is somewhat close to *T. scottae* in the combination of inferior appendage. However, it is distinguished from by having the single spine-like upper part of tergum X, the reduced lower part of tergum X and the shape of each inferior appendage in ventral view. Also, the phallus has broad lateral flanges.

**PHYLOGENY:** The phylogenetic relationships of this species with other species in and near *Triaenodes (Triaenodes)* Lineage #3, Sublineage #1, with synapomorphy 57, are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

Sublineage #2

*Triaenodes (Triaenodes) dipsia* Group

The *T. (Triaenodes) dipsia* Group includes three species found in the Nearctic region. A synapomorphy is that (58) the recurved process of each inferior appendage extends anterad well into the phallicrypt (Fig. 4.47A).

*Triaenodes (Triaenodes) dipsia* Ross, 1938b

Fig. 4.46

*Triaenodes dipsia* Ross, 1938b; p. 89, figs. 4-4A (male)

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA; Ohio, Athens, May 28, 1932, W. C. Stehr (pinned) (INHS, #22474)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, produced anteroventrally; tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posteromesal margin slightly sinuate in lateral view; upper part of tergum X long, slender lobe,
Distinctly sinuous, tapering to apex, setose, lower part of tergum X membranous, distal margin concave in dorsal view; preanal appendages long, slender, setose; inferior appendages subtriangular in ventral view, distal part pointed, apicomesal lobe broadly capitate, covering with spine-like setae, apex of apicomesal lobe elongate in lateral view; recurved process asymmetrical, right process bifurcate; phallus heavily sclerotized, conspicuously notched ventrally, sclerotized ventral lobe membranous dorsally, dorsal lobe apically membranous, phallic shield triangular in lateral view, paramere absent, phallothremal sclerite evident.

**Female:** Unknown.

**Immature Stages:** Unknown.

**Length of Forewing:** Male, ca. 8.5 mm

**Material Examined:** Holotype, male. I have also examined the following material. 1 male: North America: ELA, Kenora, Ontario Stream A, Stn. 14, 6/7/68, Det. D.G.C. (CUAC).  

**Diagnosis:** Males of this species are very close to *T. melaca* and *T. ochracea* by the recurved process of each inferior appendage is strongly recurved and extends anterad well into phallogrypt and the phallic shield is distinctively large. The significant differences are that the distal part of each inferior appendage is longer than that of two above species and the right-side recurved process of each inferior appendage is bifurcate.

**Phylogeny:** The phylogenetic relationships of this species in the *T. (Triaenodes)* dipsia Group are unknown.

**Distribution:** North America.

**Biogeographic Region:** Nearctic region.

*Triaenodes (Triaenodes) melaca* Ross, 1947

Fig. 4.47

*Triaenodes melaca* Ross, 1947; p.155, figs. 35A, 37 (male).
TYPE MATERIAL: Holotype, male: USA: Blackman’s Creek, Rudement, Illinois; May 14, 1964 (Mohr and Burks) (INHS, #24823).

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin slightly rounded; tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posteromesal margin nearly straight in lateral view; upper part of tergum X long, slender lobe, distinctly sinuous, tapering to apex, setose, with pair of small dorsomesal papillae, lower part of tergum X hood-like, broad base, narrow apical portion, less than one-half length of preanal appendages; preanal appendages slender, long, more than one-half length of upper part of tergum X, setose; inferior appendages rectangular, apicomosomal lobe enlarge, triangular in ventral view, covered with stout seta, distal part very short; recurved processes asymmetrical, extending anteriorly beyond phallus base, reaching anterior margin of segment IX, right process proximally enlarged, distally bifurcate, branches subequal in length, left process slender, only slightly enlarged proximally, not branches distally; basal three-quarters of phallus sclerotized, dorsal lobe slender, not as long as ventral lobe, apex of ventral phallic lobe membranous dorsally, phallic shield very large, rectangular in lateral view, paramere absent, phallothremal sclerite not evident.

FEMALE: A description and illustrations were provided by Ross (1947).

IMMATURE STAGES: A description and illustrations were provided by Ross (1944) and Glover (1996).

LENGTH OF FOREWING: Male, ca.8.9 mm

MATERIAL EXAMINED: Holotype, male. I have also examined the following material. 2 males: North America: IN: Kosciusko Co., Winona Lake, June 23, 1947, In foliage along Cherry Cr. E. L. Mockford (INHS, #44794).
**DIAGNOSIS:** Males of this species are very close to *T. dipsia* and *T. ochracea* by the recurved process of each inferior appendage is strongly recurved and extends anterad well into phallicrypt and the phallic shield is distinctively large. This species differs from above two species by having the ogival lower part of tergum X and the very large, rectangular phallic shield.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* *dipsia* Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) ochracea* Betten and Mosely, 1940

Fig. 4.48

*Triaenodes ochracea* Betten and Mosely, 1940; p. 77, fig. 37 (male).

**TYPE MATERIAL:** Holotype, male: Georgia, (BMNH, (E) #250354).

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with yellowish brown to brown; antennal scapes long with scent-organs; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight: tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posteromesal margin almost straight in lateral view; upper part of tergum X long, spindle-shaped (fusiform), inflated about midway, apex acute, setose, lower part of tergum X membranous, distal margin concave in dorsal view; preanal appendages half as long as upper part of tergum X, setose; inferior appendage subquadrangular, lateral margin rounded in ventral view, distal part short, apicomosomal lobe long, triangular in lateral view, inner surface covered with spine-like setae; recurved processes long, slender, almost same length as phallus; phallus sclerotized, bifurcate from about midway, ventrally bent, dorsal part thick, membranous, shorter than ventral part, ventral part
sclerotized to apex, ventrally extending to apicomesal lobe, phallic shield large, subtriangular in lateral view, paramere absent, phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca.8.7 mm

**MATERIAL EXAMINED:** Holotype, male. I have also examined the following material. 3 males: North America: Alabama: Baldwin Co., Pine Log Cr., 2mi. SE Tensaw on AL hwy 59, T2N, R3E, Sec7, SE1/4 – UV light, 19 May, 1983, - Hamilton, Herris, Holzenthal, Schuster and Schuster (CUAC).

**DIAGNOSIS:** Males of this species are very close to *T. dipsia* and *T. melaca* by the recurved process of each inferior appendage is strongly recurved and extends anterad well into phallogcrypt and the phallic shield is distinctively large, but the upper part of tergum is inflated about midway, and any recurved processes do not bifurcate.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) dipsia* Group are unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

Sublineage #3

*Triadenodes* (*Triaenodes*) aba Group

The *T. (Triaenodes) aba* Group includes three species found in the Nearctic region. Some synapomorphies are that (59) the recurved process of each inferior appendage has a hook at an anterior angle and (60) a small spine patch on that hook, and (61) there is a pair of recurved processes guides laterally on the lower part of tergum X (Fig. 4.50A).
Triaenodes (Triaenodes) aba Milne, 1935

Fig. 4.49

Triaenodes aba Milne, 1935; p. 20 (male)

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA: Fall R., Mass., 13-VII-1934, N. S. Easton (pinned, abdomen and genitalia missing) (The existence of the holotype of this species is in doubt).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally, pleural region membranous, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X reduced, with pair of small dorsomesal papillae, lower part of tergum X truncate, lateral sclerotized margins of lower part of tergum X flattened, posterolateral angles of lower part of tergum X pointed; preanal appendage slender, long, half length of phallus, setose; inferior appendages triangular in ventral view, covered with stout setae, distal part short, pointed, apicomesal lobe broadly rounded in lateral and ventral view, mesal face slightly concave; recurved process project posteriorally beyond apicomesal lobe of inferior appendage, small blunt hook at point of posterior inflection preceded by a cluster of small spines, apex clavate; phallus basal two-thirds of phallus sclerotized, membranous distally, phallic shield small, subtriangular in lateral view, paramere absent, phalotremal sclerite evident.

**FEMALE:** A description and illustrations were provided by Ross (1944).

**IMMATURE STAGES:** A description and illustrations were provided by Ross (1944) and Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 5.6 mm (forewing broken); body length: Male, 10 mm

DIAGNOSIS: Males of this species is close to T. nox and T. new species A but the distal part of each inferior appendage is shorter than above two species and the phallus is not excised apically.

PHYLOGENY: The phylogenetic relationships of this species in the T. (Triaenodes) aba Group are unknown.

DISTRIBUTION: North America.

BIOGEOGRAPHIC REGION: Nearctic region.

_Triaenodes (Triaenodes) nox_ Ross, 1941

Fig. 4.50

_Triaenodes nox_ Ross, 1941; p. 96, pl. 10, figs. 77-77A (male).

TYPE MATERIAL: Holotype, male: CANADA: Swansea, Ontario, 12 August 1937, H.S. Parish, (The existence of the holotype of this species is in doubt).

DESCRIPTION: Head and thorax brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally, pleural region membranous, tergum IX with posteromesal margin indistinct, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X reduced, with pair of small dorsomesal papillae, lower part of tergum X broadly flattened, posterolateral angles pointed; preanal appendage slender, long, subequal to length of phallus, setose; inferior appendages quadrate in ventral view, covered with stout setae, distal part long,
pointed, apicomesal lobe broadly rounded in ventral view; basal one-quarter of recurved process stout, large blunt hook at point of posterior inflection preceded by a cluster of small spines, distal three-quarters slender, apex slightly inflated, tapering to a fine point; basal three-quarters of phallus sclerotized, apex divided into dorsal and ventral lobes of equal length, dorsal lobe membranous, ventral lobes largely sclerotized and spatulate in cross section, phallic shield small, subtriangular in lateral view, paramere absent, phallotremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, 8 mm

**MATERIAL EXAMINED:** The holotype of this species was not examined. The following specimen was examined: 1 male — NORTH AMERICA: Maine, Salisbury Cove, July 28, 1956 (INHS, #45881), 1 male: NORTH AMERICA: South Carolina, Aiken Co., Savannah R. Plant, Upper Three Runs Cr. @ SRP Rd. 8-1, 28 May 1984, coll. J. Morse, (CUAC).

**DIAGNOSIS:** Males of this species is very close to *T.* new species A but the lower part of tergum X is shorter than that of *T.* new species A and the distal part of lower part tegum X is very slightly concave in dorsal view. Also, the distal part of each inferior appendage is longer than that of *T.* aba and the phallus is excised apically.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T.* (*Trienodes*) aba Group are unknown.

**DISTRIBUTION:** Canada.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Trienodes (Trienodes)* new species A

Fig. 4.51
“This species will be described and named by Mr. Ken L. Manuel based on adult males and females (pers. comm.).” (Glover, 1996)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs; forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, tergum IX with posteromesal margin indistinct, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X reduced, with pair of small dorsomesal papillae, sclerotized basolateral margins of lower part of tergum X expanded laterad, posterior end of lower part of tergum X semimembranous, slightly notched medially; preanal appendage long, slender, setose; inferior appendages broad quadrate in ventral view, distal part long, projecting posterodorsad, slightly sinuous, apex pointed, apicomeral lobe narrow, rectangular in ventral view, covered with stout setae; recurved process long, pointed, almost symmetrical, hook at anterior angle with small spine latch below it, distal two-thirds slender; basal two-thirds of phallus sclerotized, apex semimembranous and membranous, divided into short dorsal lobe and long down-turned ventral lobe, ventral lobe sclerotized ventrally almost to apex, phallic shield subtriangular in lateral view, paramere absent, phallotremal sclerite located in basal membranous folds of ventral lobe.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996) as *Triaenodes* new sp. A.

**LENGTH OF FOREWING:** Male, ca.7.2 mm

**MATERIAL EXAMINED:** The following specimen was examined: 1 male – NORTH AMERICA: Maine: Washington Co., Tomah Stream @ floodplain, N45o28.279', W067o35.579', 11/12-VIII-97, A.D. Huryn, (CUAC).
**DIAGNOSIS:** Males of this species is very close to *T. nox* but the lower part of tergum X is longer and more strongly concave than that of *T. nox* in the dorsal view. Also the distal part of each inferior appendage is longer than that of *T. aba* and the phallus is excised apically.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes) aba* Group are unknown.

**DISTRIBUTION:** At least Maine.

**BIOGEOGRAPHIC REGION:** Nearctic region.

Species *incertae sedis* within *Triaenodes (Triaenodes)* Lineage #3

Five species *incertae sedis* share synapomorphy 56 with the other sublineages of this lineage, but no other synapomorphies are evident to suggest more refined relationships.

*Triaenodes (Triaenodes) lankarama* Schmid, 1958

*Triaenodes lankarama* Schmid, 1958; p. 136-137, pl. 25, figs. 7-10 (male, female)

**TYPE MATERIAL:** Holotype, male: SRI LANKA; Horton Plains 7-8-III, 2♂; Ambawela 4-5-III, 2♂; Nuwara Eliya 26-II, 1♀ (this single female was not enough born to identify as the allotype), in Schmid Collection

**DESCRIPTION** Schmid (1958, translated from Franch):
“General coloration reddish-brown. Antennae dark gray in basal half, with anterior half of each segment white; in apical half, segments entirely white. Head and thorax red; male with longitudinal band of dense and thick, bristling black hairs on pronotum and mesonotum. Forewings reddish brown, each with series of black marks: one in middle of cubital cell, one at arculus, one row along anastomosis, another row arranged in middle of apical cells, and third series at apices of apical cells. Male with black hairs at bases of anterior wings and covering costal half of hind wings; these hairs much shorter and finer than those in more apical position. Venation not modified, as that of *T. gazella*, although wings bearing same hair covering. In fore wings, false discoidal cell of large size, about six times longer than broad; f1 slightly shorter than its petiole and f2 broad basally.”

**MALE GENITALIA** Schmid (1958, translated from Franch):
“Segment IX very short dorsally, but greatly elongated ventrally. Preanal appendages long and slender rods covered with long hairs. Segment X provided
with two branches: dorsal branch single, slender, relatively short, weakly sclerotized, enlarged apically and bearing two equal and very slender lateral projections; ventral branch paired, symmetrical, in very sclerotized, strong, simple spines regularly curved ventrad. Phallus slender, cylindrical and uniformly sclerotized on basal half; on apical half sclerotized only on ventral surface, from mid length dorsally with eversible membranous region. Inferior appendages small; in lateral view appearing triangular, with its dorsal apex extended and with digitate appendage arising from middle of lower apical edge; in dorsal view, these two branches appearing separated by circular indentation. From bases of each inferior appendage arises very long and slender spine, forming vast circling arch; right spine recurved in semicircle and weakly sclerotized apically, left spine twice as long, effecting three quarters of a circle and with few apical hairs.

This species is close to the following species and is distinguished by its unmodified venation and the nearly symmetrical male genitalia.”

**FEMALE:** A description and illustrations were provided by Schmid (1958).

**IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species can be separated from the other species by the asymmetrical recurved processes which the left side is twice as long as the right side. Also, it is somewhat close to *T. gazella* of the Oriental region, but it differs from by having the apicomeral lobe and the asymmetrical recurved processes of inferior appendages.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* Lineage #3, with synapomorphy #57, are unknown.

**DISTRIBUTION:** Sri Lanka.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) tridonta* Ross, 1938a

Fig. 4.52

*Triaenodes tridonta* Ross, 1938a; p. 158-159, fig. 94 (male)

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA, OKLAHOMA; Pushmataha Co., May 28, 1934, C. A. Soeler (INHS, #22474)
DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts part, each with scent-organ. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally; tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posteromesal margin slightly sinuate in lateral view; upper part of tergum X stout, single lobe, apex tridentate, setose, lower part of tergum X membranous, distal margin concave in dorsal view; preanal appendages long, slender, setose; inferior appendages rectangular in ventral view, distal part very short, apicomesal lobe wider, short, covered with stout seta; recurved process asymmetrically curved, each process with one subapical seta; phallus tubular, apically semimembranous, phallic shield subtriangular in lateral view, paramere absent, phallothremal sclerite evident.

FEMALE: Unknown.

IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, ca.9.0 mm (apically damaged)

MATERIAL EXAMINED: Holotype, male.

DIAGNOSIS: This species is known only from the holotype. It is easily distinguished by the trident upper part of tergum X.

PHYLOGENY: The phylogenetic relationships of this species in T. (Triaenodes.) Lineage #3 are unknown.

DISTRIBUTION: North America.

BIOGEOGRAPHIC REGION: Nearctic region.

_Triaenodes (Triaenodes) socolopia_ Neboiss and Hur, sp. nov.

Fig. 4.53
**TYPE MATERIAL:** Holotype, male: INDONESIA; Irian Jaya, Cyclop Mts. Sentani, 12 Oct. 1993. at light, de Vos et al. (NMV, genitalia prep., PT-2067)

**DESCRIPTION:** ♂: n=1. Forewing length 6.0 mm, hind wing length 4.6 mm. Eye 0.4 mm long, 0.2 mm wide. Antennal scapes 0.6 mm long; right antenna broken. Maxillary palp, 0.44, 0.48, 0.44, 0.28, 0.5. Body color yellowish brown; antennal scapes each with scent-organ; forewings, hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin slightly rounded, sternum IX, with posterior margin nearly straight in lateral view; upper part of tergum X long, sclerotized, clavate, bearing stout spines at apex, lower part of tergum X sclerotized, subtriangular, apex need-like in lateral view, deeply excavaated medially in dorsal view, preanal appendage elongate, about three-fourths length of upper part of tergum X, setose; inferior appendage board rectangular in ventral view, distal part thick, short, apicomesal lobe somewhat fan-shaped, covered with setae; recurved processes strongly sclerotized, symmetrical, tapering to apex, ventrad; phallus tubular, ventrally sclerotized, apex membranous, gently curved, parameres absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** Holotype, male.

**ETYMOLOGY:** From the Greek skolos – thorn referring to the thin thorn-like spine at the distal end of upper part of tergum X.

**DIAGNOSIS:** In general the form of male upper part of tergum X and inferior appendages, this species is somewhat similar to *T. smithi* in the Nearctic region. However, *T. socolopia* has the stout spines at the apex of upper part of tergum X, the lower part of tergum X taper to apex need-like and deeply excavaated medially and the lateral process of inferior appendages are much short.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Trieanodes)* Lineage #3, with synapomorphy #57, are unknown.
DISTRIBUTION: Indonesia.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes* (*Triaenodes*) *ustulata* Kimmins, 1962a

Fig. 4.54

*Triaenodes ustulata* Kimmins, 1962a; p. 177, figs. 63, 67 (male, female).

**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA: Kokoda. 1,200 ft., viii.1933. L.E. Cheesman. B. M. 1933-427, (BMNH, (E) # 251421 and 251422)

**DESCRIPTION:** Head and thorax brown, vertex and palpi covered with yellowish brown to brown; antennal scapes long with scent-organs; forewings, hind wings pale yellow, densely covered with yellow hairs, margin of forewing with blackish hairs

**MALE GENITALIA:** Abdominal segment IX anterior margin broadly rounded, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin generously sinuate lateral view; upper part of tergum X long, tapering, sclerotized lobe, apex bifid, lower part of tergum X pair of long, slightly sinuous spines, apex slightly dorsally bent in lateral view; preanal appendage half as long as upper part of tergum X, dilated about midway in lateral view, setose; inferior appendage triangular in ventral view, distal part short, pointed, apicominal lobe clavate, setose in lateral view; recurved processes long, slender, with short, ventral spur at midway; phallus short, ventrad, dilated at midway, tapering to apex, dorsal surface membranous, parameres absent, phallothremal sclerite not evident.

**FEMALE:** A description and illustrations were provided by Kimmins (1962a).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6 mm

**MATERIAL EXAMINED:** Holotype, male.
**DIAGNOSIS:** The species can be separated from the other species by the apically bifid upper part of tergum X and the recurved processes of the inferior appendage bearing a short, ventral spur at the midway.

**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* Lineage #3, with synapomorphy #57, are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes (Triaenodes) grifo* Malicky, 2005

*Triaenodes grifo* Malicky, 2005: p. 34-35, pl. 2 (male).


**DESCRIPTION** Malicky (2005, translated from Gerrman):
“Dark yellow, forewing conspicuously bluntly rounded. Fore wing 4 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):
“Segment IX wide and round, only dorsally very short. Segment X [upper part of tergum X] consisting of short median, rounded rod, half as long as preanal appendages, and pair of underlying very long sword-shaped, downward-curved rods [lower part of tergum X]. Preanal appendages long and slender. Inferior appendages quite short, with blunt main body, its caudal edge with stout, straight bristles, short lateral finger [lateral subbasodorsal process], and bending high [above these] dorsal branch [recurved process] strongly curved and acute. Phallus long and slender. I do not know any very similar species.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** Based on Malicky’s crude illustration, it suggests that each inferior appendage has the very short distal part, the digitate lateral subbasodorsal process and the subtriangular apicomesal lobe. This species can be separated from the other species by having the digitate lateral subbasodorsal process.
**PHYLOGENY:** The phylogenetic relationships of this species in the *T. (Triaenodes)* Lineage #3, with synapomorphy #57, are unknown.

**DISTRIBUTION:** Thailand

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) Species Incertae sedis*

Sixteen species *incertae sedis* share synapomorphies 15 and 16 with the other lineages of this subgenus, but no other synapomorphies are evident to suggest more refined relationships.

*Triaenodes (Triaenodes) bicolor* Curtis, 1834

Fig. 4.55

*Triadenodes bicolor* Curtis, 1834; p. 214.

**TYPE MATERIAL:** Holotype, male: BRITAIN; type repository = unknown.

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and without scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin nearly straight, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin almost straight in lateral view; upper part of tergum X reduced, lower part of tergum X membranous, hood-like plate, triangular in lateral view; preanal appendage as long as twice length of lower part of tergum X, slender, setose; inferior appendage subrectangular in ventral view, inner margin rounded in ventral view, distal part long, stout, innerly bent in ventral view, mesal basodorsal process elongate, thick, apex blunt, covered with stout setae; recurved process stout, posterventrad; phallus ventrally sclerotized, basal half of phallus membranous, phallic shield subtriangular in lateral view, paramere absent, phallothremal sclerite evident.
FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.1 mm

MATERIAL EXIMINED: The holotype of this species was not examined. The following specimen was examined: 1 male -- NORWAY: Outer West-Agder, Mandal Nomevann (UTM: 32VMK157464), 19 VII 1988. Kjell Arne Johnson (TAPC); 2 males -- NORWAY: Vestfold, Tjøme, Mølledammen, 25 VII 2003 (TAPC).

DIAGNOSIS: This species is distinguished from the other species by (1) the membranous plate of lower part of tergum X, (2) the distal part of inferior appendages is mesally bent, and (3) the recurved processes are rather stout and short.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus Triaenodes are unknown.

DISTRIBUTION: Britain.

BIOGEOGRAPHIC REGION: West Palearctic region.

Triaenodes (Triaenodes) new species C

Fig. 4.56

“The adults of this species are being described and named by Mr. Ken L. Manuel (pers. comm.).”

(Glover, 1996)

DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, each with scent-organs under flap; forewings and hind wings pale yellow, densely covered with yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin slightly rounded, produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X pair of spatulate lobes, slightly asymmetrical, each lobe with one subapical setae, sclerotized lateral margin of lower part
of tergum X short, broad in dorsal view, with long horn-like projection on each margin; inferior appendage triangular in ventral view, distal part thumb-like, slightly curved dorsad, lateral subbasodorsal process and mesal basodorsal process short, apicomesal lobe triangular in lateral view, covered with stout setae; recurved process gradually tapering distally, acute apex almost reaching tip of inferior appendage; sclerotized phallus strongly curved ventrally, with median and distal flanges, paramere absent, phallostremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996) as *Triaenodes* new sp. C.

**LENGTH OF FOREWING:** Male, ca. 7.1 mm

**MATERIAL EXAMINED:** The following specimen was examined: 1 male -- NORTH AMERICA: South Carolina; Aiken Co., Savannah River Plant, upper Three Runs Creek at T@SRP Rd. 28 May 1984, J. C. Morse, (CUAC).

**DIAGNOSIS:** This species is distinguished from the other species by (1) the upper part of tergum X is a pair of spatulate lobes, (2) the lower part of tergum X has the lateral projections and (3) the inferior appendages has the mesal basodorsal process, the lateral subbasodorsal process and the apicomesal lobe.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** At least South Carolina.

**BIOGEOGRAPHIC REGION:** Nearctic region.

*Triaenodes (Triaenodes) taenia* Ross, 1938a

Fig. 4.57

*Triaenodes taenia* Ross, 1938a; p. 157-158, fig. 93 (male)
**TYPE MATERIAL:** Holotype, male: NORTH AMERICA, Gatlinburg, Tennessee, June 12, 1935, along Little Pigeon River, H. H. Ross (in alcohol) (INHS, #24828)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin almost straight, slightly produced anteroventrally, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin gently concave in lateral view; upper part of tergum X pair of slender spines, asymmetrical, less than twice as long as preanal appendage, curved ventrally almost reaching apices of inferior appendages, tapering to apex, each spine with paired mediodorsal setae, lower part of tergum X membranous, short, posterior margin almost round; preanal appendage elongate, setose; inferior appendage subrectangular in ventral view, distal part very long, pointed, strongly curved medially, mesal basodorsal process thumb-like, covered with several setae, very small dorsal process behind mesal basodorsal process, apicomesal lobe capitate, covered with stout setae; recurved process abruptly narrow distally, apex blunt bearing several setae; phallus ventrally sclerotized, strongly ventrad, apically membranous, with dorsal flange near middle, paramere absent, phallothremal sclerite evident.

**FEMALE:** Unknown.

**IMMATURE STAGES:** A description and illustrations were provided by Glover (1996).

**LENGTH OF FOREWING:** Male, ca. 8.0 mm

**MATERIAL EXAMINED:** Holotype, male.

**DIAGNOSIS:** This species is distinguished from the other species by having the upper part of tergum X which is a pair of asymmetrical spines and its apices are slightly crossover, and the very long and slender distal part of each inferior appendage.
PHYLOGENY: The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

DISTRIBUTION: North America.

BIOGEOGRAPHIC REGION: Nearctic region.

*Triaenodes (Triaenodes) fantasio* Schmid, 1994

Fig. 4.58

*Triaenodes fantasio* Schmid, 1994; p. 8-9, figs. 15-17 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, with scent-organs. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin almost straight, tergum IX with posteromesal margin straight in dorsal view, sternum IX with posterior margin broadly rounded in lateral view; upper part of tergum X long, median lobe, apically setose, lower part of tergum X hood-like, broad at base, tapering to narrow, membranous, triangular in lateral view; preanal appendage dilated about midway, narrow to apex, about two-thirds length of upper part of tergum X, setose; inferior appendage narrow rectangular in ventral view, distal part short, dorsad, mesal basodorsal process thick, rounded, oval shaped in lateral view, covered with stout setae, with concave between mesal basodorsal process and each inferior appendage in lateral view; recurved processes slender, tapering to apex; phallus elongate, slender throughout length, apically with two notches in lateral view, parameres absent, phallothremal sclerite not evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8-9 mm

MATERIAL EXAMINED: Holotype, male (mounted as microscope preparation).
DIAGNOSIS: The species is very close to *T. trivulcio*, but, in dorsal view, the upper part of tergum X is slenderer, and in lateral view, the shape of the mesal basodorsal process is more rounded and the distal part of inferior appendage is shorter than that of *T. trivulcio*.

PHYLOGENY: Although some characters of the males of this species suggest that it might be the sister species *T. trivulcio*, the phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

DISTRIBUTION: India.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes (Triaenodes) trivulcio* Schmid, 1994

Fig. 4.59

*Triaenodes trivulcio* Schmid, 1994; p. 9, figs. 18-20 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts. Forewings and hind wings yellowish brown, with dense yellow hairs. (This specimen, now the pin collection, does not show the scent organ and the wing venation.)

MALE GENITALIA: Abdominal segment IX anterior margin almost straight, tergum IX with posteromesal margin straight in dorsal view, sternum IX with posterior margin straight in lateral view; upper part of tergum X long, median lobe, apically setose, lower part of tergum X hood-like, broad at base, tapering to narrow, membranous, triangular in lateral view; preanal appendage dilated about midway, narrow to apex, about two-thirds length of upper part of tergum X, setose; inferior appendage narrow rectangular in ventral view, distal part short, dorsad, mesal basodorsal process reversed trapezoid in lateral view, covered with stout setae, with large concave between mesal basodorsal process and each inferior appendage in lateral view; recurved
processes slender, tapering to apex; phallus elongate, slender throughout length, apically with two notches in lateral view, parameres absent, phallothremal sclerite not evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 8-9 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** The species is very close to *T. fantasio*, but the shape of the mesal basodorsal process is more angled and the distal part of inferior appendage is longer and more strongly dorsad than that of *T. fantasio*.

**PHYLOGENY:** Although some characters of the males of this species suggest that it might be the sister species *T. fantasia*, the phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** India.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) fuscinula* Neboiss and Wells, 1998

*Triaenodes fuscinula* Neboiss and Wells, 1998; p. 113, figs. 76-78 (male).

**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Victoria, Lake Mountainm 4600 ft, 17 Jan 1965, A. Neboiss, (NMV, T-16572).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin almost straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with deep oblique groove in lateral view; upper part of tergum X slender, long median lobe, apex trifid, apically setose, middle lobe stout, bigger than lateral lobes in dorsal view, lower part of tergum X pair of long, slender spines, asymmetrical, left side about half length of right; preanal appendage narrow,
elongate, setose, shorter than upper part of tergum X; inferior appendage subrectangular in ventral view, tapered to distal part, distal part long, dorsad in lateral view, mesal basodorsal process somewhat fan-shaped in lateral view, covered with stout setae, lateral subbasodorsal process digitate, short; recurved process somewhat short, tapering to apex, bearing digitate spur, apically setose, with small protuberance at base; phallus elongate, narrow at base, swollen in distal half, apex membranous, with well developed dorsolateal flanges in lateral view, these asymmetrical, parameres absent, phalotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.9 - 7.9 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- AUSTRALIA: Delegate River, Gunmark track, 12 km SW of Bendock, 15 Dec. 1976, A. Neboiss, (NMV, T-16582, genitalia prep., PT-797).

**DIAGNOSIS:** This species is distinguished from the other species by (1) the short recurved process bearing a digitate spur, (2) the fan-shaped mesal basodorsal process and (3) the long distal part of each inferior appendage.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.

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*Triaenodes (Triaenodes) hastata* Ulmer, 1908

*Triaenodes hastata* Ulmer 1908; p. 7-8, pl. 1, figs. 20-21 (male).

*Triaenodella hastata* (Ulmer); Mosely, 1939a, p. 16.

**TYPE MATERIAL:** Holotype, male: TANZANIA, Kilimanjaro, Kibonoto, Kulturzone, March (RMNH)

**DESCRIPTION:** Ulmer (1908, translated from German):
“Genitalia of the male (fig. 20, 21) strongly projecting; superior appendages [preanal appendages] very slender, nearly twice as long as inferior appendages (fig. 21); between and below the superior appendages [preanal appendages] projects an even longer light yellow sclerotized rod [upper part of tergum X], which on the end is egg-shaped, long and widened (in dorsal view it lies somewhat crooked (fig. 20); beneath this is found the only membranous expanded rearscale of segment X; it falls away along the sides roof-like (fig. 21) and its upper lateral edges are sclerotized; theses carinae are positioned out over the distal end of the rearscale of segment X as two dark brown stout spines [lower part of tergum X], whose ends ventrolaterally are bent and always set with a seta; the inferior appendages are short and very broad, the two segments angular, outside somewhat striated, setose; their inner branch [mesal basodorsal process] is positioned diagonally dorsad, somewhat longer than the stem, much more slender, at the end again somewhat widened and there surrounded with little hairs (fig. 21); in dorsal view this branch appears laterally bent; mesad of the inferior appendages, on the sides of segment X are found in addition two bent hook-shaped appendages [reurved process], of which the blunt end is blackened (fig. 21). Length of forewing: 6 mm."

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None

**DIAGNOSIS:** The species is somewhat close to *T. yaw* by having the rounded apex of mesal basodorsal process of each inferior appendage but, it differs from that that size is much smaller than that of *T. yaw* and the upper part of tergum X is a single medial lobe; that of *T. yaw* is apparently reduced.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** Tanzania.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) intricata* Neboiss, 1977

Fig. 4.60

*Triaenodes intricata* Neboiss, 1977; p. 142, figs. 759-763 (male, female).
**TYPE MATERIAL:** Holotype, male: AUSTRALIA: Tasmania, South Esk River, Evandale, 1 March 1967, A. Neboiss, (NMV, T-5469).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin rounded, slightly produced anteroventrally, sternum IX with posterior margin almost straight in lateral view; upper part of tergum X long, slender median lobe, apically setae, lower part of tergum X pair of slender spines, asymmetrical, right side strongly upturned in lateral view; preanal appendage short, triangular in lateral view, covered with distinctively long hairs; inferior appendage long, narrow rectangular in ventral view, distal part short, apically slightly upturned in lateral view, apicomesal lobe subtriangular in lateral view, covered with stout setae, lateral subbasodorsal process digitate, short, apically bearing setae, mesal basodorsal process filamentous, posterovertrad, apically setose; recurved process basally fused with mesal basodorsal process, long, slender, tapering to apex, strongly curved ventrally almost reaching the apex of inferior appendage; phallus short, narrow at base, greatly expanded, down-turned in distal two-thirds, parameres absent, phallotremal sclerite not evident.

**FEMALE:** A description and illustrations were provided by Neboiss (1977).

**IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 7-8 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype (NMV, T-5471, genitalia prep., PT-199).

**DIAGNOSIS:** This species somewhat resembles *T. implexa, T. perissotes* and *T. resima* of *T. (Triavenodes) allax* Group in the general form of the tergum X and the combination of inferior appendages, but the upper part of tergum X is a simple median lobe and the preanal appendage is relatively shorter than that of above species.
PHYLOGENY: The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes* (*Triaenodes*) *mouldsi* Neboiss and Wells, 1998

*Triaenodes mouldsi* Neboiss and Wells, 1998; p. 115, figs. 79-82 (male).


DESCRIPTION: Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts, each with scent-organs under flap. Forewings and hind wings yellowish brown, with dense yellow hairs.

MALE GENITALIA: Abdominal segment IX anterior margin almost straight, tergum IX with posteromesal margin indistinct in dorsal view, sternum IX with posterior margin nearly straight in lateral view; upper part of tergum X long median lobe, clavate, apically setose, lower part of tergum X pair of slender spines, asymmetrical, left side shorter than preanal appendage, right side well beyond upper part of tergum X; preanal appendage slender, about half length of upper part of tergum X, setose; inferior appendage subtriangular in ventral view, apicomesal lobe apically expanded, irregular shape in lateral view, covered with stout setae, lateral subbasodorsal process thumb-like, apically setose, mesal basodorsal process slender, shorter than recurved process; recurved processes asymmetrical, left process longer than right process, curving anteriorly, strongly arching posteriorly; phallus slender at base, greatly swollen, deeply divided in distal two-thirds, distal part of phallus membranous, with well developed dorsolateal flange in right side, asymmetrical, parameres absent, phallothremal sclerite not evident;

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 6.6 - 7.2 mm

DIAGNOSIS: This species is distinguished from the other species by having the phallus which is greatly swollen and deeply divided in distal two-thirds and the irregular apicomesal lobe of the inferior appendage.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus Triaenodes are unknown.

DISTRIBUTION: Australia.

BIOGEOGRAPHIC REGION: Australasian region.

Trienaenodes (Triaenodes) pelias Malicky, 2005

Trienaenodes pelias Malicky, 2005: p. 35, pl. 3 (male).


DESCRIPTION Malicky (2005, translated from German):
“Completely yellow, fore wing 7-8 mm.”

MALE GENITALIA Malicky (2005, translated from German):
“Segment IX in ventral half longer and projecting, otherwise moderately uniformly short. Segment X [upper part of tergum X] consisting of moderately long dorsal finger and long ventral flange [lower part of tergum X] just as long, in lateral view triangular or appearing broadly rounded. Preanal appendages oval, somewhat shorter than segment X appendages. Inferior appendages with distinctive form: main body stout and approximately rounded-quadrate. Very large spoon-shaped process [mesal basodorsal process] arising from its dorsal edge, straight from its base then bent 90° caudal. Dorsal branch [recurved process] arising from anterior edge of main body, usually curved caudal and acute. Only one dorsal branch developed, actually left branch, lying nearly in middle between inferior appendages; not discerned on right. Phallus slender, broader apically. I do not know even one approximately similar species.”

FEMALE AND IMMATURE STAGES: Unknown.
MATERIAL EXAMINED: None.

DIAGNOSIS: Based on Malicky’s simple description and crude illustration, it is distinguished from the other species of this Group that each inferior appendage has the stout and rounded-quadrate main body and the very large spoon-shaped mesal basodorsal process.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus Triaenodes are unknown.

DISTRIBUTION: Indonesia.

BIOGEOGRAPHIC REGION: Oriental region.

_Triaenodes_ (Triaenodes) _penelope_ Malicky, 2005

_Triaenodes penelope_ Malicky, 2005: p. 38, pl. 6 (male).


DESCRIPTION Malicky (2005, translated from Gerrman): “Bright yellow. Forewings each with one dark spot, 8 mm.”

MALE GENITALIA Malicky (2005, translated from Gerrman): “Segment IX in ventral half slightly bulbous, shorter dorsally, ventrally with long projection [?]. Segment X [upper part of tergum X] with long, slender dorsal finger and beneath it somewhat thicker and longer sharp appendage [lower part of tergum X]. Preanal appendages short, oval. Inferior appendages with main body short and slender, with basodorsal finger [lateral subbasodorsal process?] and subapicodorsal point [apicomantal lobe?]. Each inferior appendage with two dorsal branches. One branch [recurved process] set dorsobasally and directed dorsad, then bent immediately posterad and thickened into club. Second branch [mesal basodorsal process] asymmetrical: left one set dorsobasally, initially directed deeply cephalad and then sharply bent caudad, sharp apically; right one short and clubbed and directed dorsad. Phallus large, moderately thick, acute apically.”

FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: Based on Malicky’s simple description and crude illustration, this species resembles _T. intricata_ in the structures of the upper part of tergum X and the combination of
inferior appendages. However, the lower part of tergum X is a simple median lobe and the mesal basodorsal processes on inferior appendages are asymmetrical.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** Indonesia.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Tri* *aenodes (Tri* *aenodes) yaw* Andersen and Holzenthal, 2002

*Triaenodes yaw* Andersen and Holzenthal, 2002; p. 86, figs. 59-62 (male).

**TYPE MATERIAL:** Holotype, male: GHANA; Volta Region; Agumatsa Waterfalls, Wli, 5-14.iii.1993, Malaise trap, NUFU-project (UMSP)

**DESCRIPTION** Andersen and Holzenthal (2002):

“Male (n=7). Forewing length 5.2-5.5, 5.3 mm, hind wing length 4.2-4.5, 4.4 mm. Eye 0.31-0.35, 0.33 mm wide. Antenna at least 16.0 mm long, including 0.50-0.58, 0.54 mm long scape. Maxillary palp segment lengths (in mm): 0.35-0.39, 0.37; 0.56-0.63, 0.60; 0.55-0.64, 0.61; 0.42-0.52, 0.46; 0.76-0.87, 0.83. Colour in alcohol overall reddish-brown.”

**MALE GENITALIA** Andersen and Holzenthal (2002):

“Abdominal segment IX with anterior margin straight; tergum narrow; pleural region dorsally membranous, ventrally weakly rounded, setose; sternum triangular, produced posteriorly; in ventral view posterior margin with square corners, membranous mesally. Preanal appendage long, narrow, setose. Upper part of tergum X short, rounded, shallowly bilobed. Lower part of tergum X long, very narrow, curved ventrad, distal one third semi-membranous; in dorsal view split to base, both forks apically curved to the left. Inferior appendage subrectangular with small, laterodorsal ridge in distal three fourths, with thick setae mesally; mesal basodorsal lobe large, projecting posterodorsad, with enlarged, broadly rounded apical one third, setose; abbreviated basal plate asymmetrical, right side with shorter spine than left; right plate projecting anterodorsad, with thicker, strongly recurved process projecting caudad; left plate projecting anteroventrad, with slimmer, longer, strongly recurved process, both processes broadened and slightly sinuous subapically. Phallus curved, with dorsolateral flange in basal one half, with distal one half broadly triangular, membranous.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None
**DIAGNOSIS:** The species can be separated from the other species by the asymmetrical recurved processes of the inferior appendages and the mesal basodorsal process which is apically enlarged and rounded in the lateral view.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes (Triaenodes) dusra* Schmid, 1965

*Triaenodes dusra* Schmid, 1965; p 147, figs. 7-8

**TYPE MATERIAL:** Holotype, male; CHINA: Li-kiang (now Li-jing, Yun-nan Province), (ZFMK)

**DESCRIPTION** Yang and Morse (2000, p. 100, fig. 119):
“Body light reddish yellow and covered with light yellow pilosity. Reaming pilosity of anterior wings gold. Venation: in anterior wings, fork I as long as its stalk; false discoidal cell very large. Level with origin of that cell and in middle of its width, sub-radial cell in both anterior wings showing short segment of longitudinal vein not attached to any other vein.

**MALE GENITALIA** Yang and Morse (2000, p. 100, fig. 119):
“Segment IX well developed ventrally, showing longitudinal median carina. Preanal appendages relatively small, oval-triangular. Dorsal lobe of segment X twice as long as preanal appendages, clearly visible in profile and distinctly situated above lower part of segment X. Lower part of segment X of similar form to that of *Triaenodes hoenei*, appearing very obliquely truncate basally in lateral view. Inferior appendages small, of complex form and terminated in three lobes; one external, relatively obtuse, hairy on its lateral surface; one internal, separated from the external lobe by wide rounded space and bearing row of spines on its median edge; and one middle lobe [probably, mesal basodorsal process], smaller than the other two, more slender and originating anteriorly in the space separating the other two. Dorsal branched of inferior appendages and phallus similar to those of *Triaenodes hoenei*.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, ca. 8 mm

**MATERIAL EXAMINED:** None.
**DIAGNOSIS:** I assume the “Dorsal lobe of segment X” refers to the upper part of tergum X; “one external, relatively obtuse, hairy on its lateral surface” refers to the lateral subbasodorsal process, “one internal, separated from the external lobe by wide rounded space and bearing row of spines on its median edge” refers to the apicomesal lobe, “one middle lobe, smaller than the other two, more slender and originating anteriorly in the space separating the other two” refers to the mesal basodorsal process, and “dorsal branched of inferior appendages” refers to the recurved processes of the inferior appendages. Schmid commented on the similarity to *T. hoenei*, but a single process of the upper part of tergum X is much longer than that of *T. hoenei*. It differs from by the overall shape of inferior appendage.

**REMARK:** Based on Schmid’s (1965) description and illustration, it is difficult to define the structure of inferior appendages. This species does not include the phylogenetic analysis.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** China.

**BIOGEOGRAPHIC REGION:** East Palearctic region.

*Triaenodes (Triaenodes) hoenei* Schmid, 1959

*Triaenodes hoenei* Schmid, 1959; p 328-329, figs. 10-12.

**TYPE MATERIAL:** Holotype, male; CHINA: Li-kiang (now Li-jing, Yun-nan Province), (ZFUB)

**DESCRIPTION** Yang and Morse (2000, p. 101, fig. 121):
“Dorsum of body reddish, with dense beige pilosity, also covering palps. Face and sides reddish yellow. Tarsi covered with yellowish silver scaley hairs. Abdomen brown, relatively dark. Anterior wings with dense pilosity uniformly light reddish brown. False discoidal cell remarkably large, fork I shorter than its stalk.

**MALE GENITALIA** Yang and Morse (2000, p. 100, fig. 119):
Segment IX relatively long ventrally dorsally high, short, but not oblique; recessed angle separating these two parts very acute, prolonged for toward the base and including basolateral parts of segment X. Preanal appendages relatively
large; broad basally, abruptly narrowed in middle and bearing remarkably long hairs. Median process of segment X simple and as long as preanal appendages; in dorsal view appearing slender in basal half and circularly rounded apically. Segment X rather obtusely oval and slightly longer than preanal appendages. Inferior appendages small and of complex form; in lateral view, lower branch showing upper basal prominence and terminating in two poorly developed lobes; in ventral view, appearing obtuse with apex excised; resulting apicomesal lobe bearing short thick hairs; apicolateral lobe more slender and armed with two or three short spines; partly hidden triangular lobe found in apical excision. Upper branch of inferior appendage not very large, parallel with phallus, slightly shorter than phallus, apex rounded with few small hairs, phallus of medium size, nearly horizontal, slightly arched basally, not very sclerotized, but with ejaculatory duct clearly visible.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, ca. 14 mm

**MATERIAL EXAMINED:** None

**DIAGNOSIS:** I assume “median process of segment X simple and as long as preanal appendages” refers to the upper part of tergum X, “lower branch showing upper basal prominence and terminating in two poorly developed lobes” refers to the main body of the inferior appendages, and “upper branch of inferior appendage” refers to the recurved process of the inferior appendages. This species differs from *T. indica* which Yang and Morse (2000) mentioned nearly like to resemble, by the shorter and more-clavate median process of the upper part of tergum X, the vestigial mesal basodorsal process of each inferior appendage (much longer and slender in *T. indica*) and the lateral process of each inferior appendage as long as the apicomesal lobe (much longer in *T. indica*).

**REMARK:** Based on Schmid (1959) description and illustration, it is difficult to define the structure of inferior appendages. This species does not include the phylogenic analysis.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** China.

**BIOGEOGRAPHIC REGION:** East Palearctic region.
**Triaenodes (Triaenodes) indica** Martynov, 1936

*Triaenodes indica* Martynov, 1936; p. 278, 302, figs. 46a-c.

**TYPE MATERIAL:** Holotype, male; INDIA: Kodaikanal, 6,900ft., Palni Hills, viii. 22, at light; S. W. Kemp (in spirit); type repository = Indian Museum.

**DESCRIPTION** Martynov (1936):
“Head brownish-yellow, paler at sides near eyes; antennae yellow, with brown annulations. Thorax brownish yellowish above, pleural regions and coxae brownish; legs yellow, femora somewhat darker. Anterior wings pale, yellowish, with usual venation. Abdomen pale yellow; 9th segment and pedes genitales darker, brownish yellowish.

**MALE GENITALIA** Martynov (1936):
“Preanal appendages not very long, more than twice shorter than the median appendage of 10th tergite. 9th segment broad in its ventral portion, very narrow in its dorsal portion; side pieces broadly excised above the base of the pedes genitales. 10th segment covering only the basal half of the penis, moderately broad at base, then narrow, acute at end; median basal process of 10th tergite long, slender, arcuate from side, somewhat thickened in its end portion. Pedes genitiaux elongated and broad from side, with upper and lower edges subparallel; their hind upper portions each prolonged into a process, which at its end is curved downwards. Seen from beneath the inferior appendages are cone-shaped, truncated at their ends, but at their outer upper angles each extended into a narrow process, which has been described above in the side view; near the base of the upper edge of each appendage is a small and very slender process visible from the side. Penis very long, curved downwards, accompanied at sides with two slender sickle-shaped appendages, representing, probably, its titillators.

Remarks - This is a distinct species apparently allied to *Tr. hastata* Ulm.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, unknown; length of body: Male, 3.6 mm

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** I assume “10th segment covering only the basal half of the penis” refers to the lower part of tergum X, “median basal process of 10th tergite” refers to the upper part of tergum X, “their hind upper portions each prolonged into a process” refers to the distal part of inferior appendages, “near the base of the upper edge of each appendage is a small and very slender process” refers to the mesal basodorsal process, “two slender sickle-shaped appendages” refers to the recurved process of the inferior appendage. The overall shape of inferior appendages is somewhat similar to *T. bicolor* of the West Palearctic region; *T. baris* and *T. furcella* of the...
Nearctic region, but it differs from all of these by, in the ventral view, the elongated and rectangular inferior appendages and the short and slender mesal basodorsal process (much thicker in those species).

**REMARK:** Based on Martynov’s description and illustrations, it is difficult to define the structure of the inferior appendages. This species is not included in the phylogenetic analysis.

**PHYLOGENY:** The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

**DISTRIBUTION:** India.

**BIOGEOGRAPHIC REGION:** Oriental region.

*Triaenodes (Triaenodes) sinica* Ulmer, 1932

*Triaenodes sinica* Ulmer, 1923; p. 61, figs. 32-33.

**TYPE MATERIAL:** Holotype, male; CHINA: Soochow (now Su-zhou, Jiang-su Province); type repository = Yen-ching University (now Beijing University);

**DESCRIPTION** Yang and Morse (2000, p. 103, fig. 123):
“Colors faded [in alcohol], hair abraded. Head dirty olive-brown, in life probably clear green; base of antenna (these broken), palps and legs colored similar to head; only somewhat more clear; first antennal segment near base on posterior surface with hair pencil, about half as long as segment, itself as long as head. Wings entirely colorless, transparent, without discernible hair, veins obvious, appearing olive-brown over white background, in transmitted light most veins, especially in hindwing, virtually clear or whitish. In forewing veins of anastomosis forming straight line, discoidal cell large, about three times as long as its stalk, somewhat narrower than following cell; fork I stalked, about as long as its stalk, following four apical cells sessile and all of similar length, third cell acute (simulating fork 2), remaing cells closed by straight base; apical cell 4 narrower than apical cell 2 and 5, the rest very similar width. In hindwing, somewhat broader than forewing, fork I with long stalk, longer than in forewing; apical cells 2 and 4 broad, ending diagonally and extending basally parallel; apical cell 3 (simulating fork 2) acute and shorter than neighboring cell.

**MALE GENITALIA** Yang and Morse (2000, p. 103, fig. 123):
Tergite IX strongly produced, extended in triangle to process, best seen in dorsal view; preanal appendages narrowly oval, their outer edge excised before apex, so that apex appearing somewhat constricted; tergite X cleft in two thick, straight, parallel rods, apically rounded in dorsal view and somewhat narrowed in lateral view; pair of slender, sclerotized, apically setose rods further ventrad, closely
over thick phallus; inferior appendages large, in dorsal view visible beneath preanal appendages as foliaceous plates, gradually tapered apically to blunt point, inner edge convex, outer edge sinuous before concave apex; in later view inferior appendages situated on prominent last sternite, excised between inferior appendages on hind edge (ventral view); in lateral view inferior appendages more or less parallelsided, bent upward, cut out from outer surface with longitudinal carina, on bent inner edge.

“Material: 2 males, C 37, Soo-Chow, C.F. Wu collector, one in Yen-ching University Museum; on in my collection.”

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8 mm

MATERIAL EXAMINED: None.

DIAGNOSIS: I assume “tergite X cleft in two thick, straight, parallel rods” refers to the lower part of tergum X, “pair of slender, sclerotized, apically setose rods” refers to the recurved process of the inferior appendage. Based on the overall shape of inferior appendages, this species might belong to *T. ochreella ochreella*, *T. unanimis* and their relatives.

REMARK: Ulmer’s (1932) description and illustrations do not mention about the presence and the structure of upper part of tergum X. This species does not include the phylogenetic analysis.

PHYLOGENY: The phylogenetic relationships of this species in the subgenus *Triaenodes* are unknown.

DISTRIBUTION: China.

BIOGEOGRAPHIC REGION: East Palearctic region.
Thirteen species *incerte sedis* of the genus *Triaenodes* have not been placed in any of the foregoing subgenera, mostly because of lack of opportunity to study specimens of them.

*Triaenodes costalis* Group

The *T. costalis* Group includes three species in the Australasian region. This Group is characterized by the very long and incurved lateral subbasodorsal process of each inferior appendage and by a pair of parameres of phallus (Neboiss and Wells, 1998, p. 126, figs. 122; Fig. 4.62A; Malicky, 2005, p. 5, pl. 5). These species also exhibit characteristics of the genus *Triaenodes*, including the typical wing venation and antenna scapes with scent organs. However, by the lack of a recurved process and the mesal basodorsal process of inferior appendages, it is difficult to decide the subgenus of the Group.

*Triaenodes costalis* Kimmins, 1962a

Fig. 4.61

*Triaenodes costalis* Kimmins, 1962a; p. 169, figs. 58, 60 (male).

**TYPE MATERIAL:** Holotype, male: PAPUA: Kokoda.1,200 ft. viii. 1933. L.E. Cheesman. B. M. 1933-427, (BMNH, (E) # 251415 and # 251418).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings pale yellow, densely covered with yellow hairs.
MALE GENITALIA: Abdominal segment IX anterior margin almost straight, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X median lobe, apex truncated, very slightly concave in dorsal view, with pair of spines, tapering to apex, longer than median lobe, lower part of tergum X long, large, hood-like, broad at base, apex bifid, apically truncate in lateral view, with short, blunt process at midway; preanal appendage long, slender, about half as long as spine of upper part of tergum X, setose; inferior appendage stout, broad rectangular in ventral view, distal part short, apicomesal lobe short, covered with stout setae, lateral subbasodorsal process elongate, tapering to apex, posterodorsad in lateral view; recurved process absent; phallus stout at base trough-like, apex excised in ventral view, two parameres present, phallothremal sclerite evident.

FEMALE AND IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8 mm

MATERIAL EXAMINED: Holotype, male (mounted as microscope preparation). I have examined the following material. 4 male: NEW GUINEA: Hollandia, 15 III 1945. Light. Nr. JaFiwi H. Hoogstraal L (INHS).

DIAGNOSIS: This species closely resembles T. melanopoeza but, the apical shape of median lobe of upper part of tergum X is slightly different.

PHYLOGENY: The phylogenetic relationships of this species in the Triaenodes costalis Group and of the Group in the genus Triaenodes are unknown.

DISTRIBUTION: Papua New Guinea.

BIOGEOGRAPHIC REGION: Australasian region.

_Triaenodes melanopeza_ Neboiss and Wells, 1998

_Triaenodes melanopeza_ Neboiss and Wells, 1998; p. 125, figs. 121-123 (male).

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin broadly rounded, sternum IX with posterior margin sinuate in lateral view; upper part of tergum X median lobe, apex clavate, apically setose, with pair of spines, tapering to apex, longer than median lobe, lower part of tergum X long, large hood-like, broad at base, tapering to narrow, apex bifid, apically rounded in lateral view, with short, blunt process at midway; preanal appendage long, slender, about two-thirds length of spine of upper part of tergum X, setose; inferior appendage stout, broad rectangular in ventral view, distal part short, apicomesal lobe short, covered with stout setae, lateral subbasodorsal process elongate, tapering to apex, small triangular-shape lobe about midway; recurved process absent; phallus stout at base trough-like, apex excised in ventral view, two parameres present, phallothremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6.5 - 7.3 mm

**MATERIAL EXAMINED:** Holotype, male. Paratype, 1 male -- same data as for holotype, (NMV, T-16466, genitalia prep., PT-767)

**DIAGNOSIS:** This species closely resembles *T. costalis*, but it differs from by having the small triangular lobe about the midway of lateral subbasodorsal process of inferior appendage in ventral view.

**PHYLOGENY:** The phylogenetic relationships of this species in the *Triaenodes costalis* Group and of the Group in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Australia.

**BIOGEOGRAPHIC REGION:** Australasian region.
**Trienodes sinis** Malicky, 2005

*Trienodes sinis* Malicky, 2005: p. 37, pl. 5 (male).

**TYPE MATERIAL:** Holotype, male: PAPUA NEW GUINEA; Bismark Archipelago, Mussau Island, Talumalaus, 9-ii-1962; all Noona Dan Expedition, collection of Zoological Museum Copenhagen.

**DESCRIPTION** Malicky (2005, translated from German):
“Head and its appendages yellow, with dark brown hair especially thick in costal field of the forewing and on posterior edge of hind wing. Forewing 6 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Genitalia (plate 5): Segment IX ventrally longer, but not conspicuously so. Segment X [upper part of tergum X] present as short, erect finger; pair of slender sharp thorns [upper part of tergum X] bent slightly downward, twice as long as tergum X, massive ventral part, appearing as blunt triangle in lateral view, but notched plate [lower part of tergum X] in dorsal view, shaped as in illustration. Superior appendages [preanal appendages] slender, about as long as dorsal finger of segment X. Inferior appendages each with rounded basal edge and very long, straight (in lateral view), sharp process [lateral subbasodorsal process], bent in semicircle in ventral view; in ventral half of base with small flange and teeth. Phallus moderately large and with lateral pair of large, basally thick, sharply pointed parameres. The unusual form of the inferior appendages and existence of parameres raises doubt if it is really a *Trienodes*, but the venation characteristics point to that conclusion. Furthermore, all of these characters are not at all very different from those of *T. costalis* Kimmins, 1962, from New Guinea, except the proportions are distinctly different.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species closely resembles *T. costalis*, but it differs from that a pair of parameres of phallus are relatively short.

**PHYLOGENY:** The phylogenetic relationships of this species in the *Trienodes costalis* Group and of the Group in the genus *Trienodes* are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Trienodes eximia* Schmid, 1994
**Triaenodes eximius** Schmid, 1994; p. 4, 6-7, figs. 9-11 (male).

**TYPE MATERIAL:** Holotype, male: INDIA: Mysore, Nagodi, 28-I-1959, F Schmid (CNC)

**DESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish brown to brown hairs; antennal scapes long with blackish annulations in their basal parts and each with scent-organs under flap. Forewings and hind wings pale yellow, densely covered with yellow hairs.

**MALE GENITALIA:** Abdominal segment IX anterior margin straight, tergum IX with posteromesal margin straight in dorsal view, sternum IX with posterior margin broadly sinuate, laterally filled with membranous in lateral view; upper part tergum X reduced, with pair of small dorsomesal papillae, lower part of tergum X pair of sclerotized, very long, slender spine in lateral view, reaching apex of phallus; preanal appendage very slender, less than half length of lower part of tergum X, setose; inferior appendage long rectangular, base diverged in ventral view; recurved process absent; phallus as long as inferior appendage, two-thirds sclerotized, apex membranous, ventrad, distinctly asymmetrical in dorsal view, paramere absent, phallotremal sclerite evident.

**FEMALE AND IMMATURE STAGES:** Unknown.

**LENGTH OF FOREWING:** Male, 6 mm

**MATERIAL EXAMINED:** Holotype, male (mounted as microscope preparation).

**DIAGNOSIS:** This species is easily distinguished from by the distinctively developed abdominal segment IX, the extremely long lower part of tergum X and the simple inferior appendage. However, by the lack of a recurved process and the lack of a mesal basodorsal process of each inferior appendage, it is difficult to decide the subgenus of this species.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** India.
**BIOGEOGRAPHIC REGION:** Oriental region.

*Triadenodes insulana* Ulmer, 1951

*Triadenodes insulana* Ulmer, 1951; p 447-448, pl. 22, figs. 691-695 (male)

**TYPE MATERIAL:** Holotype, male: type repository = Museum Buitenzorg, also Type in Ulmer Collection, type locality = INDONESIA; Kei Island, Gunung Daab, Nr. 148, 1992, H. C. SIEBERS leg.

**DESCRIPTION** Ulmer (1951, translated from German):
“Head and thorax dark yellow, with similar hair; abdomen basally transparent, clear, dark brown apically; antennae yellowish white, [segments] in basal third [each] with moderately distinct, fine dark rings disappearing toward end of antennae; basal segment dark brown, robust, much longer than head; palps dark yellow, slightly more clear than head and thorax, with light yellow hairs. Legs yellowish white, spurs not darker, coxae darker yellow. Fore wings long and narrow, with light grey nearly colorless membrane, strongly iridescent, with moderately thick, clear dark yellow (nearly gold or yolk-yellow) hair, apparently without dark spots, only spur of brownish hair pencil perhaps on hind edge, somewhat in middle and on base of Fork 1; marginal fringe of same color as wing hairs, long from apex to arculus; veins very clear, in transmitted light not always recognizable. Hind wing narrower than forewing, colorless, transparent, very strongly iridescent, set with fine, diffuse, yellowish hairs, with clear yellow hair fringe apically and on hind margin, and clear yellow, very distinct veins. In the fore wing (fig. 691) discoidal cell about 1.5 times as long as its stalk, about as wide as the following space; fork 1 two-thirds as long as its stalk, other apical cells sessil; crossveins of anastomosis aligned; third apical vein running to apex. In hind wing (Fig. 692) fork 1 with very long stalk, apical cell III not reaching the succeeding crossvein and therefore with short stalk.”

**MALE GENITALIA** Ulmer (1951, translated from German):
(fig. 693-695) yellow rust red. Tergite IX in middle of hind margin projecting in long rod-like process, in dorsal view (fig. 693) straight, sword-shaped, in lateral view (Fig. 694) swung S-shaped. Preanal appendages slender, long, hairy rods bent somewhat mesad and ventrad. Tergite X open below, above apex somewhat cleft hollow body with 2 (or 4?) long sclerotized rods; in dorsal view (fig. 693) tergite X basally very broad and considerably narrowed apically, with lateral margins strongly S-shaped, hind edge very straight (not considering longitudinal cleft), posterior angles bluntly pointed; in lateral view (fig. 694) tergite X tube-like, apically truncate, such that upper rounded angle projecting not as far as lower point. On either side of sword-shaped process of tergite IX very dark sclerotized rods from tergite X with sharp apices bent laterad, in lateral view (fig. 694) swung S-shaped and projecting caudad over tergite X and somewhat dorsad; also in dorsal and ventral views (figs. 693, 695) these rods longer than tergite X, indistinct pair of similarly S-shaped rods appearing distinctly under pointed end of tergite X only in lateral view (fig. 694). Phallus thick, tube-like, bent somewhat
downward, about as long as tergite X (fig. 694), in ventral view (fig. 695) tergite X extending slightly beyond phallus, its apex excised. Inferior appendages large and slender and bearing inner flange below middle; this flange (fig. 694, lateral) strongly bristled, while slender S-shaped branch with shorter hairs and with its ending with sharply bent point (Fig. 693-695).

Body length: 4.5 mm; fore wing: 6 mm; wingspan: about 13 mm.

Distribution: Kei Island, Gunung Daab.”

**MATERIAL EXAMINED:** None.

**REMARK:** This species shows the genus *Triaenodes* character by the wing venation (Ulmer, 1951, fig. 692) and antenna scapes with scent organs. However, based on the Ulmer’s description and illustrations, it is difficult to understand the structures of inferior appendages. The subgenus level is completely unresolved.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Indonesia.

**BIOGEOGRAPHIC REGION:** Oriental region.

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*Triaenodes iphis* Malicky, 2005

*Triaenodes iphis* Malicky, 2005: p. 35, pl. 6 (male).

**TYPE MATERIAL:** Holotype, male: THAILAND; Tung Salaeng Luang National Park, 30-iii-1998, col. ? (Malicky Collection).

**DESCRIPTION** Malicky (2005, translated from German):

“Uniformly dark yellow, forewing 7 mm.”

**MALE GENITALIA** Malicky (2005, translated from Gerrman):

“Segment IX short, somewhat longer dorsally and ventrally. Segment X [upper part of tergum X] consisting of long, slender rod, about as long as preanal appendages, and very large, membranous, rounded sac [lower part of tergum X] beneath, in dorsal view apparently two-pointed. Preanal appendages long and slender. Inferior appendages short, with blunt main body, small short lateral finger [lateral subbasodorsal process] on it, and longer slender dorsal finger [reurved process or mesal basodorsal process?], arising from base. For many *Triaenodes* species, typical bent dorsal branch short, shorter than blunt main body. In ventral view, main body apparently triangular. Phallus large and thick. I do not know very similar species.”
FEMALE AND IMMATURE STAGES: Unknown.

MATERIAL EXAMINED: None.

DIAGNOSIS: Based on Malicky’s description and illustration, this species resembles *T. proteus* Malicky in the structures of the upper and lower parts of tergum X. However, it differs from that species in the short and rounded lower part of tergum X; that of *T. proteus* is the long and triangular in the lateral view. Also, each inferior appendage has two dorsal branches [recurved process and/or mesal basodorsal process?] and the lateral subbasodorsal process.

REMARK: I have not seen the holotype specimens of this species. By the insufficient description about the inferior appendages and the crude drawings, the subgenus level is completely unsolved and it needs more study.

PHYLOGENY: The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

DISTRIBUTION: Thailand.

BIOGEOGRAPHIC REGION: Oriental region.

*Triaenodes kwadwo* Andersen and Holzenthal, 2001

*Triaenodes kwadwo* Andersen and Holzenthal, 2001; p. 243- 245 figs. 3-5, 51-55 (male).

TYPE MATERIAL: Holotype, male: GHANA: Volta Region: Agusmatsa Waterfalls, Wli, 4-13. iii. 1993, Malasie trap, NUFU-project (UMSP)

DESCRIPTION Andersen and Holzenthal (2001):
“Male (n=8-9). - Forewing length 5.4-6.1, 5.7 mm; hind wing length 4.2-4.5, 4.3 mm. Eye 0.34-0.39, 0.36 mm wide. Antenna at least 17. 5 mm long, including 0.68-0.77, 0.71 mm long scape; scape with well developed scent organ and brush of yellowish seta. Maxillary palp segment lengths (in mm): 0.43-0.45, 0.45; 0.48-0.56, 0.52; 0.47-0.56, 0.50; 0.29-0.34, 0.32; 0.53-0.60, 0.57. Colour in alcohol overall yellowish-brown.

MALE GENITALIA Andersen and Holzenthal (2001):
Abdominal segment IX with anterior margin straight; tergum narrow; pleural region rounded, setose; sternum broadly triangular, in ventral view posterior margin with rounded corners, shallowly v-shaped excavation mesally. Preanal appendage short, rounded, setose. Upper part of tergum X short, broad, setose,
with small, rounded lobes basolaterally. Lower part of tergum X triangular in lateral view, with ventral margin concave; in dorsal view split to base, projections curved laterad apically. Inferior appendage long, narrow, tapering, apex pointed, weakly curved mesad; with low dorsomedian crest; with broad, triangular basal projection, bearing strong, spine-like setae. Phallus broad in basal two thirds; with sclerotized phallothremal sclerite dorsally; with two pairs of tapering spines medially, dorsiamenteal pair curved, with apex pointing ventromesad; dorsiamenteal pair straight, pointing caudad; distal part weakly curved, trough-shaped, with broadly rounded apex."

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is distinguished from the other species by the simple shape of inferior appendages and the phallus with two pairs of strong spines.

**REMARK:** According to Andersen and Holzenthal (2001), the wing venation and the antenna scapes with scent organs are characteristic of the genus *Triaenodes*. However, because of the lack of recurved processes and mesal basodorsal processes of the inferior appendages, it is difficult to decide the subgenus of this species.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Ghana.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

*Triaenodes longispina* Kimmins, 1962a

*Fig. 4.62*

*Triaenodes ongispina* Kimmins, 1962a; p. 169, figs. 58-59 (male, female).


**REDESCRIPTION:** Head and thorax yellowish brown, vertex and palpi covered with yellowish hairs; antennal scapes long with blackish annulations in their basal parts and with scent-organs. Forewings and hind wings pale yellow, with dense yellow hairs.
MALE GENITALIA Kimminis (1962a):
“Ninth segment narrowed dorsally, the apical margin produced in a transverse plate. Ventral margin much more produced and quadrate in ventral view. Tenth segment trilobed, the median lobe [upper part of tergum X] short, digitate, bearing two rows of short setae. Lateral lobes [lower part of tergum X] very long and spiniform, curving downwards. Cerci [preanal appendages] a little longer than median lobe of tenth segment, digitate. Aedagus [phallus] also very long, spiniform and curved, paralleling the spines of the tenth segment. Claspers [inferior appendage] are fused basally, about twice as long as the ninth segment. Basally they are stout, tapering somewhat towards the apices. From the side, the apex is dilated and set with numerous setae. Arising form elevated bases. The outer apical angle forms strong, incurved hook and there is also a small finger-like projection above the vase of the hook.”

To this I added the following based on the specimens mounted as microscope preparation:

Recurved processes of inferior appendage absent; inferior appendage with main body narrow, long with elevated base, lateral process short, slightly dorsally bent, apex of apicomesal lobe dilated with numerous setae, dorsal projection on inferior appendage small finger-like in later view.

FEMALE: A description and illustrations were provided by Kimmins (1962a).

IMMATURE STAGES: Unknown.

LENGTH OF FOREWING: Male, 8 mm

MATERIAL EXAMINED: Holotype, male (mounted as microscope preparation).

DIAGNOSIS: This holotype was mounted as microscope preparations. Therefore, there are some difficulties to understand the genitalia structures. I assume “the median lobe” refers to the upper part of tergum X, “lateral lobes and the spines of the tenth segment” refers to the lower part of tergum X, “the outer apical angle forms strong, incurred hook” refers to the lateral process of each inferior appendage. The phallus is very long, spiniform and curved, paralleling the spines of the lower part of tergum X. It appears to be unique in this species and it is difficult to decide the subgenus of this species.

REMARK: This species also shows Triaenodes characters in its wing venation (Kimmins, 1962, fig. 58A) and antenna scapes with scent organs. However, by the lack of
recurved processes and mesal basodorsal processes of inferior appendages, it is difficult to decide the subgenus of this species.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes minos* Malicky, 2005

*Malicky, 2005, p. 38, pl. 4 (male).

**TYPE MATERIAL:** Holotype, male and female: PAPUA NEW GUINEA; East Highland Province, Northwest Goroka, Mt. Gahavisuka, near Lipizuga Cr., ca 2200 m, 12-17-viii-1983, coll. S. and P. Miller, coll. (USNM)

**DESCRIPTION** Malicky (2005, translated from German):
“Dark yellow, forewing 8.5 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Genitalia (Plate 4): Segment IX appearing in lateral view uniformly long, but ventral part projecting slightly and on dorsal part projecting lateral flanges about same length. Segment X [upper part of tergum X] with very straight, slender middle finger, with large, complicated plate [lower part of tergum X] extending beneath, appearing mushroom-shaped in dorsal view. Superior appendages [preanal appendages] long and slender, somewhat shorter than dorsal finger. Inferior appendages very long and sharp, slender in lateral view and gradually tapering to point and bent slightly S-shaped, in ventral view bent together in a tulip shape. Near base on inner edge with two irregular protuberances, distally with some slender, parallel-lying long spines. Phallus long and slender. I do not know similar species.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the Greek mythological son of Zeus and Europa, a legendary king of Crete. Thus, the masculine gender does not need to agree with the gender of the genus.
DIAGNOSIS: This species is easily distinguished from by the mushroom-shaped lower part of tergum X and the long and sharp main body of inferior appendages. However, by the lack of a recurved process and the mesal basodorsal process of inferior appendages, it is difficult to decide the subgenus of this species.

PHYLOGENY: The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

DISTRIBUTION: Papua New Guinea.

BIOGEOGRAPHIC REGION: Australasian region.

*Triaenodes niwai* Iwata, 1927

*Triaenodes niwai* Iwata, 1927; p 212, figs. 118-122

**TYPE MATERIAL:** Holotype, larvae; JAPAN: Shimono, Fukuoka-mura, Gifu-ken; type repository = Zoological Institute, Kyoto Imperial University.

**DESCRIPTION** Iwata (1927):
“Larva; length 6mm, width 1 mm. Head yellow, with many black spots (fig. 118), clypeus with 4 pairs of black spots in from and 3 unpaired spots behind, but no other clypeus-figure, pleura with many spots, both lateral borders of prothorax have a black line. Case a very slender and straight cone, vegetable substance arranges spirally.”

**MALE AND FEMALE:** Unknown.

**LENGTH OF FOREWING:** Male, unknown.

**MATERIAL EXAMINED:** None.

**REMARKS:** This species is only known by the larvae. The description and illustration are insufficient to identify the species with confidence.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Japan.

**BIOGEOGRAPHIC REGION:** East Palearctic region.
**Triaenodes polystachya** (Marlier, 1957)

*Triaenodella polystachya* Marlier, 1957; p 283, 287-288, fig.4 (male)

**TYPE MATERIAL:** Holotype, male: DEMOCRATIC REPUBLIC OF CONGO; Kasompi, drainage basin of Kasompi W., at light trap (N. LELEUP); type repository = probably in either Royal Belgian Institute of Natural Science or The Royal Museum for Central Africa.

**DESCRIPTION** Marlier (1957, translated from French):

“The sole male captured by the present mission presents few differences from the (unique) type of *T. clavata*. It differs however very distinctly by its genitalia. Wings not very hairy, with hairs learned, forewing membrane yellowish, hind wing membrane iridescent. Sclerites yellowish, brownish, eyes black. Antennal segments yellow, each with narrow apical ring.

**GENITALIA:** Of the form of *T. clavata*. Median appendage arising from posterior edge of tergite IX enlarged and clubbed and hairy apically and bearing at its basal third two short asymmetrical projections. Two superior appendages long, slender, and hairy. Tergite X represented by 2 long sclerotized processes asymmetrically twisted on themselves and recurved ventrad. In type specimen, right process longer and more curved than left process. Phallus large, curved ventrad, with irregular sclerotized covering at posterior end. Gonopods short, quadrangular basally, bristling with numerous set and short spines on internal surface; terminal process simple, setiferous, curved dorsad, and bearing on its dorsal end a projection (neither enlarged nor irregular as in *T. clavata*).

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**DIAGNOSIS:** This species is distinguished from the other species by the asymmetrical lower part of tergum X.

**REMARK:** By the lack of the recurved processes and the mesal basodorsal process of inferior appendages, it is difficult to decide the subgenus of this species.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Democratic Republic of the Congo.
**BIOGEOGRAPHIC REGION:** Afrotropical region.

_Triaenodes proteus_ Malicky, 2005

_Triaenodes proteus_ Malicky, 2005: p. 37, pl. 5 (male).


**DESCRIPTION** Malicky (2005, translated from German):
“Dark brown, forewing 8 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Segment IX ventrally only slightly longer, from which dorsally gradually shorter. Segment X process [upper part of tergum X] straight in dorsal view and broader in lateral view and equally long bifid ventral part [lower part of tergum X] appearing acute in lateral view. Preanal appendages long-oval, somewhat shorter than segment X [upper part of tergum X] processes. Inferior appendages short, rounded, in lateral view blunt triangular, in ventral view rectangular with concave mesal edge bearing some straight, stout bristles. Dorsal branch [recurved process or mesal basodorsal process?] small, uniformly slender, normally bent and ending [behind] apex of main body. Phallus slender and short. Characters varying insignificantly, whereby it is not obvious whether they give clear differences between animals from Manus and New Britain. See Petersen (1966) concerning the island situation.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the Greek mythological minor sea god and servant of Poseidon: he can change his form or appearance at will. Thus, the masculine gender does not need to agree with the gender of the genus.

**DIAGNOSIS:** Based on Malicky’s description and illustration, this species resembles _T_ (Triadenodes). _bilobata_ Yang and Morse in the overall shapes of the lower part of tergum X and the inferior appendages, but it differs from by having the upper part of tergum.
**REMARK:** I have not seen the holotype specimens of this species. By the insufficient description about the inferior appendages and the crude drawings, the subgenus level is completely unsolved and it needs more study.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes xanthos* Malicky, 2005

*Triaenodes xanthos* Malicky, 2005: p. 36, pl. 5 (male).


**DESCRIPTION** Malicky (2005, translated from German):
“Yellow. Fore wing 6 mm.”

**MALE GENITALIA** Malicky (2005, translated from German):
“Segment IX in ventral half projecting. Segment X [upper part of tergum X] consisting of very long, slender, nearly straight middle finger and pair of longer and thinner rods [lower part of tergum X] lying beneath. Preanal appendages long and slender, somewhat longer than half length of finger. Inferior appendages oval, each with slender, moderately long straight finger on dorsal edge, directed dorsocaudad. Dorsal branch arising on base, short and straight. In ventral view, inferior appendages appearing long with slightly projecting end on mesal edge. Phallus moderately long and thick. *Triaenodes telefominica* Kumanski 1979 from New Guinea is similar to this, but parts of segment X and the phallus are very different in details.”

**FEMALE AND IMMATURE STAGES:** Unknown.

**MATERIAL EXAMINED:** None.

**ETYMOLOGY:** The species name refers to the name given to the river God, (known as Scamander or Skamandros to mortals) who attempts to drown Achilles in book XXI of the Iliad. Thus, the masculine gender does not need to agree with the gender of the genus.
**DIAGNOSIS:** Malicky mentioned that this male species is similar to *T. telefominica* Kumanski, but differs from that the upper part of tergum X is the single median lobe and the lower part of tergum X is a pair of long and thin rods.

**REMARK:** Based on Malicky’s description and illustration, it is difficult to decide the presence of the mesal basodorsal process and the recurved process of the inferior appendages. The subgenus level is completely unsolved and its destination needs further investigation.

**PHYLOGENY:** The phylogenetic relationships of this species in the genus *Triaenodes* are unknown.

**DISTRIBUTION:** Papua New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.
CHAPTER XI

NOMINA DUBIA

_Triaenodes apicata_ Navás, 1933

_Triaenodes apicata_ Navás, 1933; p. 74-75, fig. 16.

**TYPE MATERIAL:** Holotype, male; MADAGASCAR, Ankarana (MNHN)

**DESCRIPTION** Navás (1933, translated from Latin):
“Similar to _T. hastate_ Ulmer.
Body yellowish brown, hairs yellowish brown.
Head with reddish brown eyes; palps yellowish brown with pale hairs; antennae yellowish brown, first segment cylindrical, longer than head, second segment short, following segments long, apex grayish brown.
Mesonotum longitudinal lines reddish brown, barely conspicuous.
Legs yellowish brown, spurs long, obscure.
Forewing narrow, apex sub-acute; with yellowish brown venation, dense pubescence mostly yellowish brown, broad transverse bands before the apex nearly grayish brown, veins in the same places grayish brown; discoidal cell long; area beyond that not broad; posterior branch of Fork I curved, subequal to the stem, Fork II long; anastomosis with the proximal part of the veins white, arranged straight line.
Anterior margin of hind wing broad in the middle, apex acute; membrane strongly iridescent; venation, hairs, fringes yellowish brown, axillary fringe long, Fork I small, shorter, and narrower than in forewing, posterior branch slightly curved and anterior branch shorter, straight.
Length of forewing 8.0 mm
Length of hindwing 6.3 mm

**FEMALE AND IMMATURE STAGES:** Unknown.

**REMARK:** Navás’ description and illustration for this species are not adequate for identification.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** Madagascar.

**BIOGEOGRAPHIC REGION:** Afrotropical region.
**Trienodes bifasciata** Navás, 1933

*Trienodes bifasciata* Navás, 1933; p. 75-76, fig. 17.

**TYPE MATERIAL:** Holotype, male; MADAGASCAR, Amparandrandava (MNHN).

**DESCRIPTION** Navás (1933, translated from Latin):

“Similar to *T. apicata* Navás.

Body yellowish brown, hairs yellowish brown.

Head with grayish brown eyes; antennae pale yellowish brown, first segment longer than head, others slender, grayish brown annulated.

Thorax without spots.

Legs white yellowish brown, with same color spur hairs.

Wing venations with yellowish brown, with grayish brown pubescence; partly grayish brown, fringe mostly grayish brown.

Forewing apex smoothly parabolic, sub-acute; pubescence in middle apex partly grayish brown in two small distinct transversal bands, apical fork I slightly shorter than its stem, posterior branch curved; discoidal cell long.

Hind wing costal margin smoothly concave, apex sub-acute; hairs of fringe beyond middle of wing darker than the rest.

Length of forewing 6.6 mm

Length of hindwing 5.1 mm


**FEMALE AND IMMATURE STAGES:** Unknown.

**REMARK:** Navás’ description and illustration for this species are not adequate for identification.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** Madagascar.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

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**Trienodes borealis** Banks, 1900

*Trienodes borealis* Banks, 1900; p. 257.

**TYPE MATERIAL:** Holotype, male: NORTH AMERICA; Minnesota, St. Anthony’s Park (UMSP)

**DESCRIPTION** Banks (1900):

“Dirty yellowish, verging on brown: head clothed with white hair; palpi with many black hairs; antennae pale, narrowly annulate with brown; wings with many yellowish hairs, but with plenty of black, giving the wing a gray appearance, much darker than *T. flavescens*; sometimes two black dots on hind
margin, fringe at apex mostly yellowish, but at posterior angle fuscous; hind wings pale gray, with gray fringe; venation as in T. ignita.
Length 12 mm”

**MALE AND IMMATURE STAGES:** Unknown.

**REMARK:** Banks’ description of the female without illustration cannot be used to distinguish this species.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** North America.

**BIOGEOGRAPHIC REGION:** Nearctic region.

_Triaenodes cloe_ (Hagen, 1859)


_Triaenodes cloe_ (Hagen); Hagen, 1864: p. 882

**TYPE MATERIAL:** SYNTYPE, female; SRI LANKA, Rambodde; collector = Nietner (MCZC, Type 10987)

**DESCRIPTION** Hagen (1859):
“Body color yellow, antennae white as snow, annulations dark or black; palps with black hairs; head, thorax yellow; legs pale; wings anteriorly yellow, apical margin of wing with dark hairs, several spots in posterior margin of wing rather obscure, hind wings hyaline gray. 
Length of body 10 mm, length of expanded wings 19 mm.
Habitat Rambodde, collector Nietner.”

**MALE AND IMMATURE STAGES:** Unknown.

**REMARK:** Hagen’s description of the female without illustration cannot be used to distinguish this species.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** Sri Lanka.

**BIOGEOGRAPHIC REGION:** Oriental region.

_Triaenodes esakii_ Tsuda, 1941
**Triaenodes esakii** Tsuda, 1941; p. 121-122, figs. 1-2

**REMARK:** Tsuda’s description and illustration for this species are not adequate for identification. The holotype has been destroyed. The male, female, and larva are unknown in the Japanese fauna.

**Triaenodes fulva** Navás, 1931

**Triaenodes fulva** Navás, 1931; p. 9-10, fig. 17

**TYPE MATERIAL:** Holotype, female; CHINA, Zô-Sè [possibly Zheng-ze Xian, 100 km S.E. of Shanghai at Loc. 54, “Zo-Sè” probably Zheng-ze Xian, 100 km S.E. of Shanghai (N30.92, E120.49) 14 June 1930, Coll. O. Piel] (Institute of Zoology, Academia Sinica)

**DESCRIPTION** Yang and Morse (2000, p. 106, fig. 213; translated from Latin):

“Body completely fulvous [yellowish brown], with white fulvous [yellowish brown] hairs. Head with fuscous [grayish brown] eyes; palps white fulvous [yellowish brown]; antennae both with scape fulvous [yellowish brown], shorter than head, remainder white fulvous [yellowish brown], apex with narrow fuscous [grayish brown] annulations. Abdomen ventrally pale. Legs white fulvous [yellowish brown]. Wings iridescent, membrane colored light fulvous [yellowish brown], reticulation fulvous, pubescence fine, in forewing near veins partly fuscous [grayish brown]. Forewing apical fork 1 long, anterior branch as long its stalk, posterior branch longer; discoidal cell twice as long as its stalk;; anatomosis crossveins forming straight line, posterior discoidal cell white. Hind wing paler, pubescence completely pale; apical fork 1 posterior branch twice as long as anterior branch, half as long as its stalk. Length of body of female 7.1 mm, length of forewing 9.7 mm length of hindwing 7.5 mm.


**MALE AND IMMATURE STAGES:** Unknown.

**REMARK:** Navás’ description and illustration for this species are not adequate for identification.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** Sri Lanka.

**BIOGEOGRAPHIC REGION:** Oriental region.
**Triaenodes insularis** Navás, 1935a; p. 109-110.

**TYPE MATERIAL:** Holotype, male; MADAGASCAR, Périnet (MNHN).

**DESCRIPTION** Navás’ (1935a, translated from Latin):
“Similar to *T. africana* Ulmer.
Yellowish brown hairs, mostly yellowish brown.
Head with black eyes; palps long, yellowish brown; antennae with scape longer than head, yellowish brown, following segments pale, distal part lost.
Thorax yellowish brown, anteriorly reddish and yellowish brown, hairs yellowish brown, with two undivided grayish brown [groups of hairs] in posterior mesonotum.
Abdomen light reddish brown, covered with hairs; appendages yellowish brown, superior appendages [preanal appendages] arched.
Legs yellowish brown, with same color spurs.
Wings with thin reticulations, yellowish brown, anatomsis whitish, pubescence yellowish brown.
Apex of forewing elliptical, setation in distal third mixed reddish brown; fork I longer than its stalk, yellowish brown.
Length of body of male 5.3 mm
Length of forewing 8.2 mm
Length of hind wing 4.9 mm

**FEMALE AND IMMATURE STAGES:** Unknown.

**REMAKR:** Navás’ description for this species is not adequate for identification.

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** Madagascar.

**BIOGEOGRAPHIC REGION:** Afrotropical region.

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**Triaenodes jacquemarti** Hur and Morse, 2006

**Triaenodes aurea** Jacquemart and Statzner, 1981; p. 18, Pl. XII, figs. 5-7 (male, larvae).

**TYPE MATERIAL:** Holotype, 1 mature male; DEMOCRATIC REPUBLIC OF CONGO, Western of Tshinganda (2.450 m alt.) 15-VI-1972; type repository = probably, National Center for Scientific Research at Central Africa (Tervuren).

**DESCRIPTION** Jacquemart and Statzner (1981, translated from French):
“This species description is based on the male genitalia of a mature pupa.
Description - male genitalia: Tergite X with very long median process without hairs, acute apically; cerci cylindrical, slender and shorter than median process, covered with hairs.
Phallus is partly membranous, bent asymmetrically and, dorsally, on right side, with long bristle. Inferior appendage formed of 4 parts:
1) basal part large, then, reduced apically, bearing second part; 2) dorsal process folded back anterad and armed with numerous, strong spines; 3) semi-circular process from dorsal surface of basal piece directed dorsad then caudad and ventrad, asymmetrical (left process 1.5 times right process); 4) cylindrical, straight stick, directed dorsad and caudad, always on dorsal surface of basal piece, but slightly further back of #3.”

FEMALE: Unknown.

IMMATURE STAGES: A description and illustrations were provided by Jacquemart and Statzner (1981)

LENGTH OF FOREWING: Male, unknown.

DIAGNOSIS: I assume the “tergite X with very long median process without hairs, acute apically” refers to the lower part of tergum X; “dorsal process folded back anterad and armed with numerous, strong spines” refers to the apicomesal lobe, “semi-circular process from dorsal surface of basal piece directed dorsad then caudad and ventrad, asymmetrical (left process 1.5 times right process)” refers to the recurved process of each inferior appendage and “cylindrical, straight stick, directed dorsad and caudad, always on dorsal surface of basal piece, but slightly further back of #3” refers to the mesal basodorsal process of each inferior appendage; the presence and the structure of the upper part of tergum X are not indicated in Jacquemart and Statzner’s description or illustration.

PHYLOGENY: The phylogenetic relationships of this species remain unsolved because the male information is insufficient.

DISTRIBUTION: Democratic Republic of the Congo.

BIOGEOGRAPHIC REGION: Afrotropical region.

_Triaenodes loriai_ Navás, 1932

_Triaenodes loriai_ Navás, 1932; p. 154-155, fig. 87.
**TYPE MATERIAL:** Holotype, male; NEW GUINEA; type repository = Genoa Museum, Italy.

**DESCRIPTION** Navás’ (1932, translated from Latin):
“Similar to *T. conspersa* Curtis.
Head light reddish brown, with yellowish hairs; eyes black; first antennae segment cylindrical, twice longer than head, light reddish-yellowish brown, with yellowish brown hairs, remaining segment yellowish brown, apex with grayish brown annulations.
Thorax light reddish brown, with white hairs.
Abdomen ventrally yellow-yellowish brown, dorsally yellowish brown yellow, posterior margin of segments yellow; male dorsal process laterally projecting and bacilliform process, arched downward, long, phallus long, arched downward, gradually narrowed, apex acute, base reddish-brown, middle of apex dark rust-colored, cerci little short, cylindrical, directed dorsad, pale hairs, inferior appendages long and broad.
Legs pale with pale hairs
Wings with yellowish brown venation, membrane iridescent.
Forewing narrow, apex elliptically rounded, subopaque, dense pubescence yellowish brown, nearly obscuring venation; fringes dense, same color; sprinkled with grayish brown spots, three behind radius, two behind radial sector, three nearer middle of the wing in the axillary area, one at the arculus or beyond.
Hind wing without spot, broad in the middle, apex sub-acute.
Length of body of male 5.5 mm
Length of forewing 8.4 mm
Length of hindwing 6.6 mm

**FEMALE AND IMMATURE STAGES:** Unknown.

**REMARK:** The existence of the holotype of this species is in doubt. Also, Navás’ description and illustration for this species are not adequate for identification

**PHYLOGENY:** The phylogenetic relationships of this species remain unknown.

**DISTRIBUTION:** New Guinea.

**BIOGEOGRAPHIC REGION:** Australasian region.

*Triaenodes sericea* (Navás, 1935b)

*Triaenodes sericea* Navás, 1935b; p. 100-101, fig. 64.
MATERIAL: Holotype, female; CHINA, Zô-Sè [possibly Zheng-ze Xian, 100 km S.E. of Shanghai at Loc. 54, “Zô-Sè” probably Zheng-ze Xian, 100 km S.E. of Shanghai (N30.92, E120.49) 14 June 1930, Coll. O. Piel] (Institute of Zoology, Academia Sinica)


MALE AND IMMATURE STAGES: Unknown.

REMARK: Navás’ description and illustration for this species are not adequate for identification.

PHYLOGENY: The phylogenetic relationships of this species remain unsolved because the male information is unknown.

DISTRIBUTION: China.

BIOGEOGRAPHIC REGION: East Palearctic region.
CHAPTER XII

CONCLUSIONS

Diversity

As presented in this dissertation, the genus *Triaenodes* includes 245 described species worldwide; this study describes or redescribes 230 species (93%), including 9 new species. Most immature stages and females of the species reviewed in this dissertation are yet unknown.

Yang and Morse (1993) outlined the phylogeny of the Triaenodini and divided the genus *Triaenodes* into three subgenera *Triaenodes sensu stricto*, *Triaenodella*, and *Austrotriaena*, by presenting diagnostic characters and evidence for the monophyly of each subgenus (their characters 18-26). However, they did not include the Neotropical fauna and some West African species, because the species from those faunas were mostly undescribed then. Through my study, I also validate those subgenera as monophyletic groups (my characters 12-13 and 15-16) after having reviewed the complete world fauna phylogenetically.

Neboiss and Wells (1997) questioned the position of the Australian fauna in those three *Triaenodes* subgenera, because the recognition of homologies was problematical among the diversity of male genitalia structures of the Australian fauna. By examining the problem from a global perspective, I was able to infer a new monophyletic group among the Australian species and recognize it as a new subgenus *Neotriaena*, clarifying the confusion that Neboiss and Wells faced.
Holzenthal and Andersen (2004) reviewed Glover’s (1996) assessment of *Ylodes* larval morphology and habitat and Schmid’s (1998) hesitation about returning *Ylodes* to subgeneric status in *Triaenodes*, concluding that *Ylodes* is no more than a subgenus of *Triaenodes*. Based on my phylogeny of world species, I agree with Holzenthal and Andersen that the recognition of a genus *Ylodes* is unjustified phylogenetically. If *Triaenodes* is to continue being broadly defined, a genus *Ylodes* would render *Triaenodes* paraphyletic. Therefore, monophyletic *Ylodes* should stand as no more than a subgenus of *Triaenodes*.

In this work, I erected three new subgenera: the Neotropical species constitute the new subgenus *Nototriaena*, some Australian species comprise the new subgenus *Neotriaena*, and some West African species are assigned to the new subgenus *Microtriaena*. As a consequence, the genus *Triaenodes* is divided into seven monophyletic subgenera as follows: *Ylodes* (15 species), *Nototriaena* NEW SUBGENUS (24 species), *Neotriaena* NEW SUBGENUS (18 species), *Austrotriaena* (10 species), *Microtriaena* NEW SUBGENUS (6 species), *Triadenodella* (57 species), and *Triaenodes* (92 species). Twenty-five species groups also are recognized in this genus. A phylogeny of the species in subgenus *Ylodes* was not included in this study.

### Biogeography and evolution

The genus *Triaenodes* occurs in all major faunal regions except Antarctica. However, the distributions of the seven subgenera are quite uneven. No *Triaenodes* species have been found in New Zealand or New Caledonia. Subgenus *Ylodes* is Holarctic. Subgenera *Nototriaena* and *Neotriaena* have been found in only in the Neotropical and Australasian regions, respectively. Subgenus *Microtriaena* is distributed mostly in the Afrotropical region, with two species outside Africa, one each in the Nearctic and Oriental regions. In subgenus *Austrotriaena*, the *T. boettcheri* Group is confined to the Oriental region and the other seven species of this subgenus to the Australasian region. Subgenus *Triadenodella* has been found in the Old World in two major
biogeographical regions, the Afrotropical and Australasian regions. Subgenus *Triaenodes* is broadly distributed over all major faunal regions except the Neotropical region and Antarctica.

Morse (1981) presented evidence that the Leptoceridae are at least 65 million years old. He outlined that the Triplectidinae and the primitive leptocerine tribe Leptorussini represent an Australian-Neotropical biogeographic region distribution, with a vicariance producing a lineage of Leptocerinae in the rest of the world. Because species of Leptocerinae now occur in the Australian and Neotropical biogeographic regions, Morse’s (1981) hypothesis necessitates several subsequent dispersals into them. An example is the tribe Triaenodini (including the genera *Adicella*, *Erotesis*, and *Triaenodes*), which is now widely distributed globally. Within *Triaenodes*, the basal lineage *Nototriaena* occurs alone in the Neotropical biogeographic region. Therefore, it seems that the subgenus *Nototriaena* became segregated from the remainder of the genus by vicariance early in its evolution and that primitive biogeographic phenomenon has not been subsequently obscured by dispersals. This suggests that the isolation of North America from Africa, South America, India and Antarctic-Australia, between 80 and 45 mybp (the break-up Pangaea) (Brown and Gibson, 1983) dates the origin of the genus *Triaenodes* at a point perhaps not much before that time.

Holzenthal mentioned in his Ph.D. dissertation (1985) that the Neotropical species of *Triaenodes* (here constituting the new subgenus *Nototriaena*) form a monophyletic group that is perhaps most closely related to the Holarctic subgenus *Ylodes* based on his personal communication with K.L. Manuel. The cladogram of the phylogenetic relationships among the six subgenera resulting from this study (Fig. 2.1) supports their thoughts, inferring that *Ylodes* was the next clade to evolve after the evolution of basal clade *Nototriaena*.
The cladogram of phylogenetic relationships among the six subgenera (Fig. 2.1) infers that the subgenus *Neotrianea* is a more primitive group than the subgenus *Austrotiaena*. Furthermore, the endemic Australasian subgenus *Neotrianea* shows various elaborate male genitalic structures. These results and observations support Morse’s (1981) hypothesis that the Australasian region was until relatively recently isolated from other habitable land since the late Cretaceous Period. The Australasian-Oriental biogeographic distribution of subgenus *Austrotiaena* suggests that the Australasian plate approached the Oriental region more recently to receive these immigrants.

**Perspectives**

In summary, this research is the first comprehensive phylogenetic revision of the World *Triaenodes* species. It is based mostly on the male genitalia because they show much more conspicuous diversity among all other body characters, it is easy to recognize the differences in them among species, and the males of most species were available. This investigation provides a framework for subsequent biological research in the genus *Triaenodes*. Even so, the phylogenetic cladogram presented in this dissertation leaves many branches with unresolved relationships among species of several groups. Tests of these phylogenetic hypotheses should include study of other male characters, female and immature morphology, and molecular data, providing additional evidence to support or falsify the proposed clades and to solve the remaining problems. In particular, the subgenus *Ylodes* species needs more study to confirm its monophyly and to discover relationships among its species.

Future discovery of the immatures and females of *Triaenodes* species not only will contribute data for resolving diagnostic and phylogenetic issues, but also will add to our understanding of their life histories and habitats and pollution tolerances, further facilitating the use of these species for biomonitoring. Because benthic macroinvertebrates such as *Triaenodes* collectively have a broad range of pollution tolerances, these data will give valuable information for
estimating the relevance of their presence in a sample. The fact that larvae of *Triaenodes* species occur globally and generally have low tolerance values means that these species are among the first species to be affected by pollution and are therefore good resources for monitoring water quality throughout the world.

According to the ‘Trichoptera World Checklist (Morse, 1999)’, the distribution of *Triaenodes* among the biogeographic regions is quite uneven: the Australasian region has 72 species, the Afrotropical region 50 species, the Oriental region 43 species, the Nearctic region 26 species, the Neotropical region 25 species, the East Palearctic region 21 species, and the West Palearctic region 8 species. Recently, Malicky (2005) described 19 additional species from the Oriental region without phylogenetic analysis. Clearly, the Oriental region and the East Palearctic region need more the faunas research. Also, only two species (*Triaenodes pellucta* and *T. unanmis*) have been founded in Korea (unpublished data). Therefore, one outcome from this research is its encouragement to seek new species and new distribution records from the Oriental region and the East Palearctic region, including my motherland.
APPENDICES
Figures 1.1-1.3. 1, *Triaenodes* (*Triaenodes*) *bicolor* Curtis wings, A, right forewing; B, right hind wing; 2, Generalized *Triaenodes* species genitalia; 3, *Triaenodes* (*Triaenodes*) *melaca* Ross head.
Figure 2.1 Cladogram of the relationships among the subgenera of the genus *Triaenodes*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values.
Figure 2.2 Cladogram of species in the *Triaenodes* subgenus *Nototriaena*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figure 2.3 Cladogram of species in the *Triaenodes* subgenus *Neotriaena*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figure 2.4 Cladogram of species in the *Triaenodes* subgenus *Austrotriaena*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figure 2.5 Cladogram of species in the *Triaenodes* subgenus *Triaenodella*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figure 2.6 Cladogram of species in the *Triaenodes* subgenus *Microtriaena*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figure 2.7 Cladogram of species in the *Triaenodes* subgenus *Triaenodes*. Numbers not in parentheses are character numbers, corresponding with those in Table 1.1. Numbers in parentheses are bootstrap values. Bold letters are species group names.
Figures 3.1-3.2. Male genitalia; 1, *Triaenodes (Nototriaena) abrupta* Flint; 2, *Triaenodes (Nototriaena) peruana* Flint and Reyes. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.3. Male genitalia; 3, *Triaenodes (Ylodes) levanidovae* Morse and Vshivkova; from Vshivkova et al., 1997, pl. 120, figs. 5-10. A, left lateral view; B, dorsal view; C, ventral view; D, phallus, left lateral view; E, left inferior appendage, left lateral view.
Figures 3.4-3.5. Male genitalia; 4, *Triaenodes (Neotriaena) dysmica* Neboiss and Wells; 5, *Triaenodes (Neotriaena) volda* Mosely. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.6-3.7. Male genitalia; 6, *Trienaodes (Neotriaena) jubata* Neboiss; 7, *Trienaodes (Neotriaena) mataranka* Neboiss and Wells. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.26-3.27. Male genitalia; 26, *Triaenodes (Austrotriaena) fijiana* Mosely, dorsal and ventral view; redrawn from Mosely, 1941, figs. 6-7; 27, *Triaenodes (Austrotriaena) lanceolata* Kimmins, dorsal and ventral view; redrawn from Kimmins, 1957a, figs. 16B-C. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.28-3.29. Male genitalia; 28, *Triaenodes (Austrotriaena) manni* Banks; 29, *Triaenodes (Austrotriaena) trifida* Kimmins, redrawn from Kimmins 1957a, figs. 15A-C. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.30-3.31. Male genitalia; 30, *Triaenodes (Triaenodella) forficata* Neboiss and Wells; 31, *Triaenodes (Triaenodella) notalia* Neboiss and Wells. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.32-3.33. Male genitalia; 32, *Triaenodes* (*Triaenodella*) *probolia* Neboiss and Wells; 33, *Triaenodes* (*Triaenodella*) *vespentina* Neboiss and Wells. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.34-3.35. Male genitalia; 34, *Triaenodes* (*Triaenodella*) *wannonensis* Neboiss and Wells; 35, *Triaenodes* (*Triaenodella*) *cuspiosa* Neboiss and Wells. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.39-3.41. Male genitalia; 39, *Triaenodes* (*Triaenodella*) *bifida* Jacquemart, left lateral view; redrawn from Jacquemart, 1966, fig. 3; 40, *Triaenodes* (*Triaenodella*) *falculata* Kimmins, dorsal and ventral view; redrawn from Kimmins, 1956, figs. 2B-C; 41, *Triaenodes* (*Triaenodella*) *serrata* Ulmer. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.42-3.44. Male genitalia; 42, *Triaenodes* (*Triaenodella*) *sicula* Barnard, lateral and dorsal view; redrawn from Barnard, 1934, figs. 35j-i; 43, *Triaenodes* (*Triaenodella*) *corynotra* Neboiss and Wells; 44, *Triaenodes* (*Triaenodella*) *legona* Mosely, dorsal and ventral view; redrawn from Mosely, 1939a, figs. 35 and 38. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.45-3.46. Male genitalia; 45, *Triaenodes (Triaenodella) nymphaea* Neboiss and Wells; 46, *Triaenodes (Triaenodella) torresiana* Neboiss and Wells. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.49-3.50. Male genitalia; 49, *Triaenodes* (*Triaenodella*) *nigrolineata* Kimmins; dorsal and ventral view; redrawn from Kimmins, 1962, figs. 61B-C; 50, *Triaenodes* (*Triaenodella*) *doryphora* Neboiss and Wells; redrawn from Neboiss and Wells, 1998, figs. 131-133. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.68-3.69. Male genitalia; 68, *Triaenodes (Triaenodella) corallina* Kimmins, dorsal and ventral view; redrawn from Kimmins, 1962, figs. 65B-C; 69, *Triaenodes (Triaenodella) verberata* Neboiss and Wells; redrawn from Neboiss and Wells, 1998, figs. 86-88. A, left lateral view; B, dorsal view; C, ventral view.
Figures 3.70-3.72. Male genitalia; 70, *Triaenodes (Microtriaena) contartus* Jacquemart and Statzner; redrawn from Jacquemart and Statzner, 1981, figs. 1-4; 71, *Triaenodes (Microtriaena) florida* Ross; 72, *Triaenodes (Microtriaena) fortunio* Schmid. A, lateral view; B, dorsal view; C, ventral view; E, right inferior appendage, right lateral view.
Figures 4.1-4.3. Male genitalia; 1, *Triaenodes* (*Trienasodes*) *imakus* Gibbs; 2, *Triaenodes* (*Triaenodes*) *longispina* Jacquemart; redrawn from Jacquemart, 1966, figs. 1A-B; 3, *Triaenodes* (*Triaenodes*) *tanzania* Olah; redrawn from Olah, 1986, figs. 4A-C. A, left lateral view; B, dorsal view; C, ventral view; E, right inferior appendage.
Figures 4.4-4.6. Male genitalia; 4, *Triaenodes* (*Triaenodes*) *uncata* Kimmins; redrawn from Kimmins, 1962b, figs. 76-79; 5, *Triaenodes* (*Triaenodes*) *clara* Jacquemart; 6, *Triaenodes wambana* Mosely; dorsal and ventral view, right inferior appendage; redrawn from Mosely, 1939, figs. 40-43. A, left lateral view; B, dorsal view; C, ventral view; D, phallus, dorsal view; E, right inferior appendage, dorsal view.
Figures 4.7-4.9. Male genitalia; 7, *Triaenodes* (*Triaenodes*) *darfurica* Mosely; 8, *Triaenodes* (*Triaenodes*) *hirsuta* Jacquemart; redrawn from Jacquemart, 1966, figs. 2A-B; *Triaenodes* (*Triaenodes*) *allax* Neboiss and Wells; redrawn from Neboiss and Wells, 1998, fig. 75. A, lateral view; B, dorsal view; C, ventral view; E, right inferior appendage.
Figures 4.13-4.15. Male genitalia; 13, *Triaenodes* (*Triaenodes*) *resima* Neboiss and Wells; redrawn from Neboiss and Wells, 1998, figs. 66-68; 14 *Triaenodes* (*Triaenodes*) *odysseus* Maicky; redrawn from Malicky, 2005, plate 6; 15, *Triaenodes* (*Triaenodes*) *telefominica* Kumanski; redrawn from Kumanski, 1979, figs. 61, 63-64. A, left lateral view; B, dorsal view; C, ventral view; D, phallus, left lateral view.
Figures 4.16-4.17. Male genitalia; 16, *Triaenodes* (*Triaenodes*) *agrophe* Neboiss and Hur, sp. nov.; 17, *Triaenodes* (*Triaenodes*) *tribulosa* Neboiss and Hur, sp. nov. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.18-4.20. Male genitalia; 18, *Triadenodes (Triadenodes) mondoana* Kimmins; 19, *Triadenodes (Triadenodes) excisa* Kimmins; dorsal and ventral views, redrawn from Kimmins, 1957a, figs. 14B-C; 20, *Triadenodes (Triadenodes) picea* Kimmins; redrawn from Kimmins, 1957a, figs. 13B-C. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.21-4.22. Male genitalia; 21, *Triaenodes (Triaenodes) silvanus* Malicky; redrawn from Malicky, 2005, plate 2; 22, *Triaenodes (Triaenodes) furcella* Ross; from Ross, 1959, figs. 3A-B.
A, left lateral view; B, dorsal view; C, ventral view; D, phallus, left lateral view.
Figures 4.23-4.24. Male genitalia; 23, *Triaenodes (Triaenodes) injusta* (Hagen); from Ross, 1944, figs. 841A-B; 24, *Triaenodes (Triaenodes) cumberlandensis* Etnier and Way. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.25-4.26. Male genitalia; 25, *Triaenodes (Triaenodes) marginata* Sibley; from Ross, 1944, figs. 850A-C; 26, *Triaenodes (Triaenodes) inflexa*; from Morse, 1971, figs. 7A-B and 7E. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.27-4.28. Male genitalia; 27, *Triaenodes (Triaenodes) baris* Ross; from Ross, 1944, figs. 847A-B; 28, *Triaenodes (Triaenodes) flavescens* Bank; from Ross, 1944, figs. 846A-B. A, left lateral view; B, dorsal view.
Figures 4.29-4.30. Male genitalia; 29, *Triaenodes* (*Triaenodes*) *phalacris* Ross; from Ross, 1944, figs. 845A and 845C; 30, *Triaenodes* (*Triaenodes*) *smithi* Ross; from Ross, 1959, fig. 1A. A, left lateral view; C, ventral view.
Figures 4.31-32. Male genitalia; 31, *Triaenodes (Triaenodes) tarda* Milne; from Ross, 1944, figs. 849A-B; 32, *Triaenodes (Triaenodes) ignita* (Walker); from Ross, 1944, figs. 842A-C. A, left lateral view; B, dorsal view; C, right ventral view.
Figures 4.33-35. Male genitalia; 33, *Triaenodes (Triaenodes) adelophe* Neboiss and Hur, sp. nov.; 34, *Triaenodes (Triaenodes) rhopalota* Neboiss and Hur, sp. nov.; 35, *Triaenodes (Triaenodes) aurea* Kimmins; dorsal and ventral view, redrawn from Kimmins, 1962, figs. 66B and 66C. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.41-42. Male genitalia; 41, *Triaenodes (Triaenodes) helo* Milne; from Flint, 1966, fig. 4a; 42, *Triaenodes (Triaenodes) perna* Ross; from Ross, 1944, figs. 844A and 844C. A, left lateral view; C, ventral view.
Figures 4.46-47. Male genitalia; 46, *Triaenodes (Triaenodes) dipsia* Ross; from Ross, 1944, figs. 848A and 848C; 47, *Triaenodes (Triaenodes) melaca* Ross; redrawn from Ross, 1947, pl. VII, fig. 37. A, left lateral view; C, ventral view.
Figures 4.48-50. Male genitalia; 48, *Triaenodes (T. ochracea)* Betten and Mosely; 49, *Triaenodes (T. aba)* Milne; from Ross, 1944, fig. 843A; 50, *Triaenodes (T. nox)* Ross; redrawn from Ross, 1941, figs. 77-77A. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.51-52. Male genitalia; 51, Triaenodes (Triaenodes) new species A; 52. Triaenodes (Triaenodes) tridonta Ross; from Ross, 1938, fig. 94. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.53-54. Male genitalia; 53, *Triaenodes (Triaenodes) socolopia* Neboiss and Hur, sp. nov.; 54, *Triaenodes (Triaenodes) ustulata* Kimmins; dorsal and ventral view, redrawn from Kimmins, 1962, figs. 67B-C. A, left lateral view; B, dorsal view; C, ventral view.
Figures 4.55-57. Male genitalia; 55, *Triaenodes (Triaenodes) bicolor* Curtis; 56, *Triaenodes (Triaenodes)* new species C; 57, *Triaenodes (Triaenodes) taenia* Ross; from Ross, 1938, fig. 93. A, left lateral view; B, dorsal view; C, ventral view; D, phallus, left lateral view.
Figures 4.58-60. Male genitalia; 58, Triaenodes (Triaenodes) fantasia Schmid; redrawn from Schmid, 1994, figs. 15-17; 59, Triaenodes (Triaenodes) trivulcio Schmid; redrawn from Schmid, 1994, figs. 18-20; 60, Triaenodes (Triaenodes) intricata Neboiss; redrawn from Neboiss and Wells, 1998, figs. 60-61. A, left lateral view; B, dorsal view; C, ventral view.
Table 1.1 Synapomorphies of *Triaenodes* species groups and outgroup character states.

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<th>Outgroup Character State</th>
<th>Synapomorphy</th>
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<tr>
<td>1</td>
<td>M stem in forewing</td>
<td>Conspicuous and complete</td>
<td>Inconspicuous and always incomplete</td>
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<td>2</td>
<td>Fork 2 in forewing</td>
<td>Sub-truncate</td>
<td>Sub-triangular</td>
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<td>3</td>
<td>Sclerotized connection of basal plate of inferior appendages with phallic shield</td>
<td>Connection complete</td>
<td>Basal plate short and not connected with phallus</td>
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<td>4</td>
<td>Pair of recurved process on basal plate of inferior appendages</td>
<td>Absent</td>
<td>Present</td>
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<td>5</td>
<td>Recurved process on basal plate of inferior appendage</td>
<td>Long and slender or short and laterally compressed</td>
<td>Sickle-shaped</td>
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<td>6</td>
<td>Laterodorsal process of inferior appendage</td>
<td>Absent</td>
<td>Present</td>
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<td>7</td>
<td>Recurved phallotheca spine</td>
<td>Absent</td>
<td>Present</td>
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<td>8</td>
<td>Recurved process on basal plate of inferior appendage</td>
<td>Not short and laterally compressed</td>
<td>Short and laterally compressed</td>
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<td>9</td>
<td>Recurved process of inferior appendage</td>
<td>Not hidden, except parallel with inferior appendage</td>
<td>Hidden in lateral view</td>
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<td>10</td>
<td>Main body of inferior appendages</td>
<td>Oval concavity on apical edge absent</td>
<td>Large oval concavity on apical edge</td>
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<td>11</td>
<td>Phallus</td>
<td>Positioned normally with a pair of strips</td>
<td>Positioned dorsally with a pair of basal chitinous supports</td>
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<td>12</td>
<td>Mesal basodorsal process of each inferior appendage</td>
<td>Thick, slender or capitate, positioned more nearly erect</td>
<td>Fingerlike, evenly curved, positioned close to main body of inferior appendage</td>
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<td>13</td>
<td>Mesal basodorsal process of each inferior appendage</td>
<td>Thick or slender, but not capitate</td>
<td>Capitate / derivatives</td>
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<td>14</td>
<td>Recurved process on basal plate of inferior appendage</td>
<td>Long</td>
<td>Short</td>
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<td>15</td>
<td>Phallus</td>
<td>Without distinctive lateral ridges</td>
<td>With distinctive lateral ridges for resting or guiding recurved process</td>
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<tr>
<td>16</td>
<td>Recurved process on basal plate of inferior appendages</td>
<td>Not extending to apices of inferior appendages and thick</td>
<td>Long and slender which extending well beyond inferior appendages</td>
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<td>17</td>
<td>Mesal basodorsal process of each inferior appendage</td>
<td>Erect</td>
<td>Curved caudad and ventrad</td>
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<td>18</td>
<td>Pair of recurved process on basal plate of inferior appendages</td>
<td>Present</td>
<td>Secondarily absent</td>
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Table 1.1 Synapomorphies of *Triaenodes* species groups and outgroup character states (Continued).

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<th>Synapomorphy</th>
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<td>19</td>
<td>Basal plate of inferior appendages</td>
<td>Strong</td>
<td>Weak</td>
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<td>20</td>
<td>Male antennal scape with scent organ</td>
<td>Absent</td>
<td>Present</td>
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<td>21</td>
<td>Phallicata</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>22</td>
<td>Mesal basodorsal process of each inferior appendage</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>23</td>
<td>Parameres</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>24</td>
<td>Paramere</td>
<td>Two</td>
<td>Three</td>
</tr>
<tr>
<td>25</td>
<td>Paramere</td>
<td>Two</td>
<td>One</td>
</tr>
<tr>
<td>26</td>
<td>Tapered distal part of inferior appendage</td>
<td>Absent</td>
<td>Present</td>
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<td>27</td>
<td>Basoventral angle of preanal appendages</td>
<td>Absent</td>
<td>Present</td>
</tr>
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<td>28</td>
<td>Distal part of inferior appendage</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>29</td>
<td>Basoventral projection of preanal appendages</td>
<td>Absent</td>
<td>Present</td>
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<td>30</td>
<td>Apex of phallus</td>
<td>Without deep cleft (shallow or slight)</td>
<td>With deep cleft</td>
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<td>31</td>
<td>Parameres</td>
<td>Apex sclerotized</td>
<td>Apex more heavily sclerotized</td>
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<tr>
<td>32</td>
<td>Preanal appendage</td>
<td>Fully developed</td>
<td>Vestigial</td>
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<td>33</td>
<td>Distal part of inferior appendage</td>
<td>Not incurved</td>
<td>Strongly incurved which can make a concavity on inner margin</td>
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<td>34</td>
<td>Subapicomesal process on inferior appendages</td>
<td>Absent</td>
<td>Present (upturned and strongly sclerotized)</td>
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<td>35</td>
<td>Mesal basodorsal process</td>
<td>Moderately long to short process</td>
<td>Very long and slender recurved spine located at each side on inferior appendage</td>
</tr>
<tr>
<td>36</td>
<td>Pair of long and parallel spines of abdominal segment IX</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>37</td>
<td>Mesal basodorsal process</td>
<td>Apex without concave</td>
<td>Apex with concave</td>
</tr>
<tr>
<td>38</td>
<td>Sclerotized process from phallobase</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>39</td>
<td>Mesal basodorsal process of each inferior appendage</td>
<td>Not divided</td>
<td>Subdivided</td>
</tr>
<tr>
<td>40</td>
<td>Mesal basodorsal process</td>
<td>Not humped dorsally</td>
<td>Humped dorsally</td>
</tr>
<tr>
<td>41</td>
<td>Lateral basodorsal lobe</td>
<td>Without a pair of long apical setae</td>
<td>With a pair of long apical setae</td>
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</table>
Table 1.1 Synapomorphies of *Triaenodes* species groups and outgroup character states (Continued).

<table>
<thead>
<tr>
<th>#</th>
<th>Structure</th>
<th>Outgroup Character State</th>
<th>Synapomorphy</th>
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<tbody>
<tr>
<td>42</td>
<td>Upper part of tergum X</td>
<td>Not bilobed</td>
<td>Bilobed</td>
</tr>
<tr>
<td>43</td>
<td>Upper part of tergum X</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>44</td>
<td>Distal part of inferior appendages</td>
<td>Pointed or rounded</td>
<td>Obliquely truncate</td>
</tr>
<tr>
<td>45</td>
<td>Lower part of tergum X</td>
<td>Without recurved spine-like process</td>
<td>With recurved spine-like process</td>
</tr>
<tr>
<td>46</td>
<td>Mesal basodorsal process of inferior appendages</td>
<td>Not divided or shallowly divided at rounded angle</td>
<td>Deeply divided at acute angle</td>
</tr>
<tr>
<td>47</td>
<td>Mesal basodorsal process of inferior appendages</td>
<td>Two slender branches or slender upper branch without beak-shaped apex and down-turned lower branch</td>
<td>Comprising long curved branch [upper branch] with beak-shaped apex and triangular branch [lower branch] towards the base</td>
</tr>
<tr>
<td>48</td>
<td>Mesal basodorsal process of inferior appendages</td>
<td>upper branch slender and lower branch broad</td>
<td>Both branches slender</td>
</tr>
<tr>
<td>49</td>
<td>Mesal basodorsal process of inferior appendages</td>
<td>Two slender branches or slender upper branch with beak-shaped apex and down-turned lower branch</td>
<td>Divided into slender curved upper branch and down-turned lower branch</td>
</tr>
<tr>
<td>50</td>
<td>Down-turned lower branch of mesal basodorsal process of inferior appendages</td>
<td>Not subdivided</td>
<td>Subdivided</td>
</tr>
<tr>
<td>51</td>
<td>Recurved process of inferior appendages</td>
<td>Slender with rounded apex</td>
<td>Club-shaped</td>
</tr>
<tr>
<td>52</td>
<td>Apex of mesal basodorsal process of inferior appendages</td>
<td>Rounded</td>
<td>Obliquely truncate</td>
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<tr>
<td>53</td>
<td>Apex of mesal basodorsal process of inferior appendages</td>
<td>Not forked</td>
<td>Forked</td>
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<tr>
<td>54</td>
<td>Upper part of tergum X</td>
<td>Absent, undivided or bifid lobe</td>
<td>Apically trifid lobe</td>
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<tr>
<td>55</td>
<td>Lower part of tergum X</td>
<td>Long and slender lobe</td>
<td>Short and rounded lobe</td>
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<tr>
<td>56</td>
<td>Mesal basodorsal process of inferior appendage</td>
<td>Present</td>
<td>Secondarily absent</td>
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<td>57</td>
<td>Apicomesal lobe</td>
<td>Present</td>
<td>Absent</td>
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<tr>
<td>58</td>
<td>Base of recurred process</td>
<td>Scarcely extending anterad into phallocrypt</td>
<td>Extending anterad well into phallocrypt</td>
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<td>59</td>
<td>Hook at an anterior angle of recurred process</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>60</td>
<td>Small spine patch of recurred process</td>
<td>Absent</td>
<td>Present</td>
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</table>
Table 1.1 Synapomorphies of *Triaenodes* species groups and outgroup character states (Continued).

<table>
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<th>#</th>
<th>Structure</th>
<th>Outgroup Character State</th>
<th>Synapomorphy</th>
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<tr>
<td>61</td>
<td>Recurved process guides laterally on lower part of tergum X</td>
<td>Absent</td>
<td>Present</td>
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<tr>
<td>62</td>
<td>Mesodorsal process of inferior appendage</td>
<td>Absent</td>
<td>Present</td>
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<tr>
<td>63</td>
<td>Distal part of inferior appendages</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>64</td>
<td>Recurved process of inferior appendages</td>
<td>Subequal (not left side small)</td>
<td>Left side small</td>
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<tr>
<td>65</td>
<td>Inferior appendages</td>
<td>Pointed or truncated posteroventral apex</td>
<td>Rounded posteroventral apex</td>
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<tr>
<td>66</td>
<td>Lower part of tergum X</td>
<td>Slightly excavate or with rounded apices</td>
<td>Apically deeply excavate with acute apices</td>
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<td>67</td>
<td>Upper part of tergum X</td>
<td>Single or divided pointed</td>
<td>Divided thick and truncate</td>
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<tr>
<td>68</td>
<td>Upper part of tergum X</td>
<td>Not inflated centrally</td>
<td>Inflated centrally</td>
</tr>
<tr>
<td>69</td>
<td>Distal part of inferior appendage</td>
<td>Short, digitate</td>
<td>Elongate, slender (extremely long)</td>
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Table 1.2 Character state data matrix of genus *Triaenodes* species. Plesiomorphy = 0; synapomorphy = 1. Characters indicated by bars in Figures 2.1-2.7.
Table 1.2 Character state data matrix of genus Triaenodes species. Plesiomorphy = 0; synapomorphy = 1. Characters indicated by bars in Figures 2.1-2.7 (Continued).
Table 1.2 Character state data matrix of genus Triadenodes species. Plesiomorphy = 0; synapomorphy = 1. Characters indicated by bars in Figures 2.1-2.7 (Continued).

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Table 1.2 Character state data matrix of genus Triaenodes species. Plesiomorphy = 0; synapomorphy = 1. Characters indicated by bars in Figures 2.1-2.7 (Continued).

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