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A REVISION OF THE SUBGENUS *PSEUDOFICALBIA* OF THE GENUS *URANOTAENIA* IN SOUTHEAST ASIA (DIPTERA: CULICIDAE).

by

E. L. Peyton

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to

STANLEY J. CARPENTER, FRANKLIN S. BLANTON

and

PEDRO GALINDO

in acknowledgment of their inspirational teaching of mosquito systematics and their contribution to the study of American mosquitoes.

MEDICAL ENTOMOLOGY STUDIES - X.

A REVISION OF THE SUBGENUS *PSEUDOFICALBIA* OF THE GENUS *URANOTAENIA* IN SOUTHEAST ASIA (DIPTERA: CULICIDAE)[1]

By

E. L. Peyton[2]

ABSTRACT

This revision of the subgenus *Pseudoficalbia* Theobald, genus *Uranotaenia* Lynch Arribálzaga of Southeast Asia deals with 42 species. The taxonomic treatment of the subgenus includes a revised morphological description, followed by a review of the distribution, taxonomic discussion, internal classification and bionomics. Treatment of individual species follows essentially the same format. A new internal classification with separate discussions and descriptions of 5 groups is presented. The 5 groups, with world mosquito faunal regions as defined by Belkin (1962), are as follows: *harrisoni* series (Indomalayan), *bicolor* series (Ethiopian, Indomalayan, Malagasy, North Australian, Oriental, Papuan and South Pacific), *bimaculata* series (Indomalayan, Oriental and Palaearctic), *maxima* series (Indomalayan, Nearctic, Oriental and Palaearctic), *recondita* series (Indomalayan, North Australian, Oriental and Papuan). Where known, extralimital species are assigned to the groups defined for Southeast Asia.

Of the 42 species treated, 13 are described as new and 29 are revalidated and redescribed. The 13 new species are: *abdita* (Cambodia and Thailand), *abstrusa* (Philippines), *albipes* (Thailand), *approximata* (Thailand), *confusa* (Philippines and Sulawesi, Indonesia), *enigmatica* (Thailand), *harrisoni* (Mindoro Island, Philippines and Sabah, Malaysia), *moufiedi* (Sabah, Malaysia), *nocticola* (Thailand), *patriciae* (Peninsular Malaysia, Singapore and Thailand), *propinqua* (Malaysia), *quasimodesta* (Sabah, Malaysia) and *reinerti* (Sabah, Malaysia). Seventy-six full-page plates of illustrations are provided of the following: adult habitus parts (16 species), pupa (35 species), larva (37 species) and male terminalia (40 species). A majority of these are presented here for the first time. Keys to the adults, pupae and fourth stage larvae of Southeast Asian species are provided.

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New synonyms proposed here are: *kalabahensis* Haga and *lagunensis* Baisas (= *bicolor* Leicester). Lectotypes for *bicolor* Leicester, *fusca* Leicester, *lutescens* Leicester, *maxima* Leicester, *modesta* Leicester, and *papua* Brug are designated. *Uranotaenia luteola* Edwards and *recondita* Edwards are excluded from the fauna of Southeast Asia.

INTRODUCTION

The subgenus *Pseudoficalbia* was originally described by Theobald (1911) as a distinct genus based on the single Ethiopian species *inornata* (Theobald), and in 1912 Theobald again applied the name as new and included *nepenthes* Theobald, *nigripes* Theobald and *pandani* Theobald, in addition to *inornata*. Edwards (1912) suggested that *Pseudoficalbia* "should not be considered even as a subgenus" and from that date until Peyton (1972) the subgenus had not been accorded formal rank by definition, even though there are numerous published references to the *Pseudoficalbia* either as a subgenus or as a non-defined (except Edwards' 1932) group. Peyton (1972) gave an extensive historical review of the genus *Uranotaenia* and revalidated the subgenus *Pseudoficalbia*. In Peyton (1972) the subgenus was defined in all stages for the first time and a new scheme of internal classification somewhat similar to that developed by Reid and Knight (1961) for the subgenus *Anopheles* Meigen, genus *Anopheles* Meigen was proposed. The proposed infrasubgeneric division is further developed in this revision with descriptions and discussion of additional groups not covered in Peyton (1972).

The subgenus is diverse and widespread in Southeast Asia and adjacent areas. Although there are several excellent regional papers on the genus *Uranotaenia*, which include several species of *Pseudoficalbia*, there is no single definitive reference dealing with *Pseudoficalbia* as a subgenus. Some significant regional treatments for Southeast Asia are as follows: Baisas 1935 (Philippines), Barraud 1926, 1934 (India, Ceylon and Burma), Bonne-Wepster 1954 (Indonesia and New Guinea), Borel 1930 (Indochina), Delfinado 1966b (Philippines), and Leicester 1908 (Malaya). Other important references to species of the subgenus are: Belkin 1953, 1962 (South Pacific), Belkin and McDonald 1956 (southwestern U. S. A.), Edwards 1941 (Ethiopian), Hopkins 1952 (Ethiopian) and Galindo, Blanton and Peyton 1954 (American). Only 3 of the above (Belkin 1953, 1962; Edwards 1941; and Galindo, Blanton and Peyton 1954) attempted to divide the species of the genus into groups. However, some of the earlier attempts at dividing species into natural groups were severely limited by an incomplete knowledge of species occurring beyond the regions treated and a lack of information on many of the life stages, especially the immatures. A great majority of the early descriptions of species from Southeast Asia were based almost entirely on the adult, usually the female. For example, Leicester (1908) described 18 species from Malaya, without describing or illustrating a single male terminalia or immature stage and most of these have remained undescribed until this revision. The latter discovery of several of these stages has resulted in the synonymy of a few widely used names (see also Peyton 1972). The adults of many species of *Pseudoficalbia* are without striking features as often seen in the nominate subgenus *Uranotaenia*. Several are very similarly marked and are not easily separated without accompanying associated stages. Others are apparently indistinguishable in adult habitus features and are recognized for certain only in the male terminalia or immature stages. Several species with wide geographical

ranges exhibit considerable variation in adult ornamentation and have often been confused with similar but distinct species or in some cases treated as distinct species. Consequently, many forms can still be easily confused and can not be separated on the basis of previous keys and descriptions. There is little information in previous treatments of almost every Southeast Asian species on the range of morphological variation which is essential in determining the specific status of closely similar forms and interpreting the diversity of various species. The present interpretation of most species treated is based upon a critical examination of the original and subsequent descriptions in the literature, combined with a detail comparative study of all available types, numerous topotypic and other specimens, including many with associated immature stages from a wide geographical range.

This study revises the subgenus *Pseudoficalbia* on a much broader regional basis. It is restricted to Southeast Asia rather than the entire Indomalayan and Oriental regions because specimens of several very poorly known Indian forms could not be obtained. However, the coverage includes most species reported from India and Sri Lanka and the one species from Palaearctic Japan, since these also occur in Southeast Asia. Species from India not included in this revision are briefly discussed for comparative purposes. In this revision, 42 species of the subgenus *Pseudoficalbia* are recognized and of these, 13 are new and 29 are revalidated and redescribed. In treating the previous nominal species, I am following Peyton (1972) but propose 2 additional synonyms based on new material made available after that date. These are: *kalabahensis* and *lagunensis* (= *bicolor*). The 13 additional new species recognized are: *abdita* (Cambodia and Thailand), *abstrusa* (Philippines), *albipes*, *approximata*, *enigmatica* and *nocticola* (Thailand), *confusa* (Philippines and Sulawesi, Indonesia), *harrisoni* (Mindoro Island, Philippines and Sabah, Malaysia), *moufiedi*, *quasimodesta* and *reinerti* (Sabah, Malaysia), *patriciae* (Peninsular Malaysia, Singapore and Thailand), and *propinqua* (Malaysia). Lectotypes for *bicolor*, *fusca*, *lutescens*, *maxima*, *modesta* and *papua* are designated.

MATERIAL AND METHODS

A considerable portion of the *Uranotaenia (Pseudoficalbia)* material for this study was accumulated at the Southeast Asia Mosquito Project (SEAMP) (now the Medical Entomology Project (MEP)), Department of Entomology, Smithsonian Institution. Most of this material came from collections made by personnel of the U. S. Army Component, SEATO Medical Research Laboratory, Bangkok, Thailand; the Mosquitoes of Malaysia Project, University of Malaya; U. S. Army Medical Units in South Vietnam, Japan, Malaysia, the Ryukyus and the Philippines. The most significant of the Philippines material includes the World War II collections of E. S. Ross, and K. L. Knight, L. E. Rozeboom and J. L. Laffoon. Numerous additional specimens have been obtained from recent collections by MEP in Sri Lanka through the "Biosystematic Studies of the Insects of Ceylon Project" directed by K. V. Krombein; in Java, Indonesia by S. Ramalingam; in Nilgiri Hills, southern India by B. N. Mohan; in Cambodia by J. M. Klein; in Papua New Guinea, by N. V. Dobrotworsky; in Ryukyus by K. Tanaka; in Lesser Sundas, Indonesia by T. Kurihara and from loans made to the project by the British Museum (Natural History) (BMNH); Field Museum of Natural History; California Academy of Sciences (CAS), San Francisco; Academy of Natural Sciences, Philadelphia; Bernice P. Bishop Museum, Honolulu; Instituut Voor Tropische Hygiene, Amsterdam and South

African Institute for Medical Research, Johannesburg (through Botha de Meillon). I have re-examined most of the existing types or topotypic specimens of previous nominal species of *Uranotaenia* originally described or subsequently reported from Southeast Asia except for the types of *hirsutifemora* Peters and *hongayi* Galliard and Ngu. The majority of types of the Indomalayan and Oriental regions are in the BMNH. Included among the type material are several specimens identified by Edwards, Barraud, Leicester and others from various localities. All of these specimens have been re-examined and confirmed and are included in the distribution data. In my efforts to develop a scheme for the natural classification of the genus *Uranotaenia* I examined small numbers of specimens of every available stage of all species in the National Museum of Natural History (USNM), BMNH or other sources through loans, gifts or exchanges from as many parts of the world as possible. This has made it possible to extend the range of some of the various groups defined for Southeast Asia into most zoogeographical regions of the world.

The format followed here is essentially the same as that followed in earlier publications of the SEAMP. The synonymy section includes all of the significant references to the taxonomy of the species. It does not include references to faunal check lists or other abbreviated references unless the reference has significant bearing upon the identity of the taxon, such as misidentifications, erroneous distribution and so on. A few references to comprehensive ecological observations are also included. Within the parentheses following each citation the symbols ♂, ♀, P, L and E indicate that the publication deals with at least some part of the male, female, pupa, larva or egg respectively; an asterisk following the symbol indicates that at least some portion of the stage was illustrated. Abbreviations used in the distribution section are the same as in the synonymy but with the following additions, p = pupal skin and l = larval skin. Abbreviations for references conform to the "BIOSIS 1974 List of Serials," Bio-Sciences Information Service of Biological Abstracts, Philadelphia, Pennsylvania.

Species assigned to each series are treated in alphabetical order. Illustrative plates of pupa, larva and male terminalia are presented in the same order to facilitate ease of comparison between species and series. The synonymy is followed by a diagnosis, in which each species is described in detail, and includes the female, male, pupa, larva and egg (when known). For the most part morphological terminology employed follows Belkin (1962), particularly the chaetotaxy of the pupal and larval stages. A few terms of the male terminalia are those established by the SEAMP starting with Bram (1967). Additional terminology, where applicable, follows Knight (1970, 1971), Knight and Laffoon (1970, 1971) and Laffoon and Knight (1973). I have introduced a new term for the larva. The term "tracheal filament" is applied to the caudoapical sclerotized filament on each trachea which is present in some species and was first described by Montschadsky (1930) for *unguiculata* Edwards. The term is expressed as "TF" on the illustrations (Figs. 5, 9, 13, 75).

Each species is usually accompanied by 2 plates illustrating the pupa, larva and male terminalia. Additional plates are provided for adult habitus features of several species to illustrate special thoracic ornamentation or other features. At least one plate of each stage is fully labeled for a better understanding of the terms and abbreviations used in the text. The illustrations of the male terminalia are presented with terga IX, X and proctiger removed as a unit from the rest of the terminalia so that the relationship between these very important structures can best be seen. A lateral view of an aedeagal plate is drawn above the tergal view of the aedeagus to provide a clearer view

of the arrangement of apical teeth, some of which are often obscured in tergal view.

Species descriptions are followed by a type-data section for the species. The status of the type-specimens, holotype, lectotype or syntypes, including stages or other associated specimens of all nominal forms (if clearly indicated in the original or subsequent descriptions) are included and specified. The type-localities are as stated in the original descriptions unless subsequently proven to be in error. All other data presented in the original description are included along with a discussion of conflicting information data observed on the labels of a few types.

Distribution records are indicated as follows: countries are in capital letters; islands, provinces and primary administrative districts are in italics; and place names have the first letter capitalized. The number of specimens examined from each island or province follows the last place name of the island or province. Two slightly different styles of punctuation are used in the presentation of distribution data for countries occupying a single land mass and divided into provinces and for countries divided into several separate land masses (usually islands), which are further divided into states or provinces, such as Malaysia, the Philippines, etc. A semicolon separates distinct localities within a country, island or province. A comma between semicolons separates a series of names taken from a collection record representing a single collection locality, these are often more precise than a single name entry. Localities in the literature not confirmed by my examination of specimens are placed at the end of the list and where appropriate their validity is discussed. The spelling of provincial and locality names was taken from the Official Standard Names Gazetteers of The United States Board on Geographic Names, prepared by the Defense Mapping Agency Topographic Center and the U. S. Department of Interior. Locality names not found in the gazetteers were spelled according to the collection data-sheets or from the labels on the specimens.

Information in the BIONOMICS section of each species is taken from the collection data-sheets, labels attached to the specimens and from personal observations. Biological data from published literature are also given and the sources are cited. To make the data presented on the immature habitat more meaningful I have included the total number of collections examined from a particular habitat in parentheses following the listed habitat. Habitats listed in the literature and not confirmed by an examination of specimens are listed separately.

Southeast Asia, in this study, is composed of Assam, Andaman and Nicobar Islands, Bangladesh, Burma, Cambodia, Hainan, Indonesia (west of Wallace's line), Laos, Malaysia, Philippines, Ryukyu Islands, Singapore, southern China, Taiwan, Thailand and Vietnam. With the exception of Southeast Asia all major faunal areas referred to in this revision follow the "World Mosquito Faunal Areas" of Belkin (1962).

TAXONOMIC TREATMENT

GENUS *URANOTAENIA* LYNCH ARRIBÁLZAGA

Uranotaenia Lynch Arribálzaga 1891: 375. Logotype: *Uranotaenia pulcherrima* Lynch Arribálzaga (Neveu-Lemaire 1902: 227).
(Complete synonymy for the genus is given in detail by Stone et al.

1959 and Stone 1961).

Generally, species of the genus *Uranotaenia* are easily recognized by the following characters. *Adult.* Palpus very short, rarely more than 0.15 length of proboscis, with a single segment beyond palpifer; wing membrane with extremely minute and numerous microtrichia which are not visible under ordinary magnification, vein scales usually all broad and small, truncate or rounded apically, cell R_2 always shorter than vein R_{2+3} and never longer than cell M_2, vein M usually bare on basal 0.75 dorsally, rarely with a few scattered scales, vein 1A always sharply curved apically and ending before fork of Cu; female with a single large spermatheca. *Pupa.* Paddle with inner half deeply excavated towards base, toothed or with filamentous fringe on inner and outer margins. *Larva.* Seta 1-C arising on a distinct apical process of the median labral plate; 14-C always near cephalic border at base of maxilla; maxillary suture absent; segment VIII usually with a sclerotized plate bearing a single row of comb scales on posterior margin; siphon with a single pair of subventral or sublateral setae (1-S) arising beyond basal 0.25; siphon usually with a few to many pecten teeth.

For a more complete diagnosis of the genus see Belkin (1962). Mattingly (1971) presents excellent keys to the various stages of the genus.

SUBGENUS *PSEUDOFICALBIA* THEOBALD

Pseudoficalbia Theobald 1911: 272. Haplotype: *Ficalbia inornata* Theobald.
Pseudoficalbia Theobald, 1912: 89. Logotype: *pandani* Theobald 1912: 90 (Howard, Dyar and Knab 1917: 899).

FEMALE. Minute to moderately large sized species. *Head.* Proboscis usually shorter than forefemur (0.73-1.10); labium somewhat swollen apically; 1 or more pairs of labial basal setae present; palpus 0.10-0.18 of proboscis; antennal pedicel usually with a few minute setae dorsomesally; flagellum usually conspicuously longer than proboscis (1.10-1.82); flagellomere 1 with a few small scales basomesally; interocular space long and narrow or broadly and deeply V-shaped posterodorsally; ocular setae 4-8; decumbent scales broad, flat (rarely moderately broad), usually dull colored, never bright irridescent or metallic, rarely with sharply defined pale ocular line, never forming frontal tuft; erect scales present, individual scales with long narrow basal stems and broadly expanded apices, varied in number, length and arrangement, most often distributed over entire vertex. *Thorax.* Scutal integument varied in color, a paired dorsocentral bare line and a paired supra-alar bare line present; scales usually mostly narrow, curved, rather sparse, a few species with small patches of broad scales on anterior promontory, scales on lateral margin anterior to wing root narrow (except species of Section B) (the Ethiopian *shillitonis* series has all scutal scales broad and no bare lines); dorsocentral and supra-alar setae strongly developed; acrostichal setae present (except for some species of *shillitonis* series); scutellar scales broad on both lobes (rarely narrow in a few species of *maxima* series); median lobe of scutellum usually with 4 strong marginal setae, outer lobes usually with 3 strong marginal setae; mesopostnotum bare; paratergite bare (except *spiculosa* Peyton and Rattanarithikul); pleuron varied, scales usually present on some sclerites, most often on sternopleuron *(stp);* pleural scales always small, broad and appressed (except for narrow scales on *ppn* in a few species of *maxima* series);

anterior pronotum *(apn)* with or without scales and with 2 strong upper and 1 strong lower setae, rarely 1 or 2 extra strong setae in some species; posterior pronotum *(ppn)* with or without scales, with 1 or more setae present on upper posterior corner; spiracular area *(sp)* with 1, 2 setae; postspiracular area *(psp)* usually bare, rarely with a few scales; propleuron *(ppl)* with 1-11 setae; prealar area *(pra)* never separated from sternopleuron by a suture, usually with 1 seta, rarely more; sternopleuron *(stp)* with 6-26 setae on upper and posterior margins; mesepimeron *(mep)* with 1-13 upper setae and 1 well developed lower seta. *Wing.* Scales usually dark, pale scales when present restricted to basal portion of vein R, never bright irridescent or metallic; cell R_2 0.36-0.77 of R_{2+3}; alula with or without scales. *Legs.* Femora with a few stout setae at apex; forefemur with setae on anteroventral and posterodorsal margins, varied in number and arrangement according to species, additional setae on various surfaces often present; midfemur with a few setae on basal 0.5 of dorsal margin, additional setae present or absent according to species; hindtarsomere 1 length 0.94-1.40 of tibia; claws of all legs short, simple and subequal (Fig. 2). *Abdomen.* Terga with or without pale scaled bands, bands when present usually basal (except *albipes* and Ethiopian species of *annulata* series); laterotergite with scales. *Genitalia.* Not studied in detail, appear to be very similar in most species; cercus and postgenital plate short and broad, insula with a small patch of setae; with a single large spermatheca.

MALE. Essentially as in female. *Head.* Proboscis never with long setae dorsally; labium usually more distinctly swollen; antennal flagellum slightly shorter than female, sparsely to strongly plumose; flagellomeres 12 and 13 moderately long, usually each about 2.0-3.0 the length of flagellomere 11; erect scales often slightly shorter and less numerous. *Wing.* Scales usually less numerous; cell R_2 often slightly shorter. *Legs.* Setae of femora as in female but occasionally more numerous; tibiae and tarsi never modified or with modified setae or scales; claws of midleg modified, anterior one always enlarged, posterior one reduced (Fig. 2); claws of foreleg and hindleg short, simple and subequal (species of the *maxima* series have the claws of foreleg similar to those of midleg). *Abdomen.* Pale scaling of terga, when present, usually more extensive. *Terminalia.* Very short and inconspicuous; segment VIII long and wide containing retracted terminalia; tergum IX moderately long and sclerotized, apical margin varied according to series, broadly rounded, produced at middle or rarely slightly emarginate, without distinct lateral lobes, with or without setae, surface finely spiculate at least laterally, basal emargination varied but usually quite broad; tergum X lightly sclerotized, usually complete dorsally but often weak and indistinct tergomesally, usually at least partially extending beyond apical margin of tergum IX but occasionally not reaching apical margin of tergum IX or the apical margins of both fused and continuous tergomesally, often with distinct median apical emargination producing short broad or long finger-like tergolateral lobes or occasionally without emargination and produced into a single broad median apical lobe; basimere short and broad, entire surface finely spiculate, tergomesal surface with numerous setae of varied development, lateral and ventral surfaces with stronger but fewer setae, scales restricted to a few on lateral and ventral surfaces, basal mesal lobe well developed, with a varying number of long stout setae tergoapically, often the more apical seta of the group arising on a distinct finger-like process, usually 1, 2 long stout setae on sternoapical margin, distinctly removed from the more tergoapical group; distimere variable, usually rather slender and tapered to narrow apex, occasionally (Section B)

rather stout and distended on tergal subapical margin; spiniform varied, small, stout, acutely pointed or blunt, minute and inapparent or rarely apparently absent; aedeagus rather simple, composed of 2 lateral sclerotized plates, each bearing a varying number of teeth apically and joined by a narrow sclerotized median tergal and sternal (except *nivipleura* Leicester) transverse bridge; ventral parameres very strongly developed, broad at base; proctiger almost completely membranous, without sclerotized paraprocts, cercal setae present or absent.

PUPA. *Cephalothorax.* All setae present, varied in development; 6-CT single, usually very strongly developed; 8-CT close to but posteromesad of trumpet. *Respiratory Trumpet.* Varied in length and development, index rarely more than 7.0, usually widely separated and closer to wing pad than to middorsal line, rarely closer to middorsal line than to wing pad; tracheoid area present or absent, usually reduced to short area on anterobasal side; pinna usually diagonally truncate; meatus rarely slit. *Abdomen.* Integument of segments II-VIII with a few minute spicules at least posteromesally; seta 1-I moderately to strongly developed and with secondary branching; 2-II single, usually well developed, varied in position; 5-IV-VI often strongly developed; 6, 9-VII rarely dorsal; 9-VIII well developed, single or branched, usually inserted at posterolateral corner; 1-IX present or absent. *Paddle.* Varied in shape, usually rather broad; outer and inner margins toothed or with filamentous spicules; outer and inner parts varied in width, outer part often wider than inner; 1-P present or absent, 2-P present in some species of the *bicolor* series.

LARVA. *Head.* Varied in shape, with or without ocular bulge, rarely very darkly pigmented; median labral plate with distinct apicolateral processes bearing seta 1-C, processes varied in shape and distance apart; 1-C single, varied in development, minute and inapparent, stout spine-like or foliform and expanded apically; 4-6-C usually placed well forward on anterior 0.33 of head 5-C rarely approaching middle, each varies considerably in position; 4-C rarely anterior to level of 6-C, occasionally distinctly posterolaterad of 6-C, 5-C (except *maxima*) and 6-C not stout spike-like, apical 0.25 or more always strongly attenuate, single or branched; mentum toothed. *Antenna.* Varied, never long; seta 1-A small, single or branched, position varied, 2-4, 6-A simple, never modified. *Thorax.* Setae 1-3-P on a small common sclerotized tubercle, 3-P often long and strongly developed, 13-P rarely present, 14-P single or multiple branched, often exceptionally well developed; 8, 9-M, 7, 9-T well developed and strongly barbed but rarely strongly plumose. *Abdomen.* Setae 6, 7-I, II usually strongly developed and barbed, nearly equal in development (except for 7-II which is usually greatly reduced in species of Section B), both inserted on a common weakly sclerotized plate; other setae varied according to species; comb scales always present, usually in a single row on posterior margin of sclerotized plate, rarely in a small patch and without plate, scales varied in shape, length and character of fringe. *Segment X.* Saddle complete or incomplete; seta 4-X varied, with 4, 5 or 9 pairs of setae, usually on simple grid, and usually surrounded by weak sclerotization which is rarely prolonged basally or joined to saddle midventrally; accessory saddle seta rarely present. *Siphon.* Well developed; usually with an acus; pecten teeth usually present (absent? in *browni* Mattingly) with or without fringe, never exceptionally long and broad; seta 1-S varied in development and position but never on basal 0.25; valves usually small; 13-S minute and inapparent; tracheae well developed, occasionally terminating in a distinct sclerotized filament in some species.

EGG. Not adequately described; apparently not resistant to desication; laid in boat-shaped rafts (*anhydor* Dyar and *colocasiae* Edwards), on the water surface and laid singly (*novobscura* Barraud and *ascidiicola* de Meijere) on the water surface (current information on the eggs of *Uranotaenia* species is summarized in Mattingly 1970).

DISTRIBUTION. Species of *Pseudoficalbia* occur principally in subtropical and tropical regions of the Old World, with the exception of some island groups in the Pacific and Atlantic. It is absent from the New World except for a small relict complex of 2 subspecies of the *maxima* series found in southwestern United States and Mexico. The Arctic areas are free of *Pseudoficalbia*. Only *novobscura* and *unguiculata* are known to occur beyond 27° N. with *novobscura* reported as far north as Tokyo, Japan. By far the greatest diversity and abundance of species is centered in the Indomalayan and Oriental regions. Southeast Asia is particularly rich in species and no reasonably large island or portion of the mainland is without representative species. Our current knowledge of distribution of many species is severely limited by the paucity of collections from several major countries. Only Peninsular Malaysia, Thailand, and some islands of the Philippines have been heavily collected and this is directly reflected in the greater number of species reported from these localities. Several species are known only from isolated collections or some show widely disjunct distribution. These patterns will surely change as more collections are made and it is anticipated that many additional species will be found.

DISCUSSION. *Uranotaenia (Pseudoficalbia)* is one of the most poorly known of all major groups of mosquitoes. The subgenus has attracted little attention since it was first described by Theobald in 1911, mainly because it is of little known economic importance. In addition most species are extremely small and the adults are rather drab in ornamentation; with many looking very much alike superficially. Although without striking features, the adults of most species are rather well characterized by ornamentation of the head, thorax, legs, wing and abdomen. Adults can generally be separated to species on external features, but these features are often of little use in characterizing infrasubgeneric groups. The female terminalia are of little apparent practical value in differentiating species or subgenera. The male terminalia are very important at the subgeneric, section and series level using terga IX, X and proctiger, basal mesal lobe of basimere, distimere, spiniform and the aedeagus but are of limited value in differentiating a number of species. The immature stages are extremely diverse and offer many good characters for subgeneric, group and specific determinations. These are often of paramount importance in the diagnosis of species with extremely similar adults and male terminalia.

I have not recognized any subspecies in this review primarily because of a lack of evidence of behavioral or distributional patterns that correlate with morphological variations. Most collections of several widely distributed species are represented by very small samples from widely scattered localities. A very complex problem is involved in at least 2 forms treated here and when sufficient material from various islands and intermediate areas becomes available, a case might be made for the separation of the Okinawan form of *novobscura* and the Philippine form of *lagunensis* (= *bicolor* here). These 2 vary slightly from island to island in one or more characters but essentially conform to the species assigned. The immature stages are not so well known, and I do not know the full value of differences in the branching of some of the setae, especially since there is some evidence to suggest that branching of individual setae is often influenced by environmental factors. The factors,

other than geographical isolation, which affect these insular forms are not clear. Based on the material available, it seems best to recognize these small differences as variations of a single species.

Several adult characters treated in the descriptions and used in some key couplets deserve further discussion since several of these have not been adequately described in earlier works. Many of the adults of *Pseudoficalbia* are inadequately described in the literature. I have therefore given relatively complete descriptions here.

Some characters are much more qualitative than quantitative but are occasionally useful. This applies especially to relative lengths of proboscis, palpi, antennal flagellum, wing cells and tarsomeres. Setae of the femora are described in detail and are generally based on a fair sample of specimens. These are often of specific value and are essentially similar in both sexes, however, setae of the legs are subject to at least some damage due to collecting methods. The number of setae on the femora was derived, for the most part from reared specimens in good condition. Generally, exact numbers of setae are not critical. However, the placement and arrangement on the femur, especially in those species with numerous setae, are often significant and a few species such as *hirsutifemora*, for example, might prove difficult to indentify if the femora are damaged.

Internal classification. Peyton (1972) divided the subgenus *Pseudoficalbia* into 2 major groups designated as Sections A and B. In this article, Section B was treated in some detail, since it was considered annectant between the subgenera *Uranotaenia* and *Pseudoficalbia*. The species of Section B were further divided into 2 series and each was defined in all stages. The 2 series defined for Section B were the *annulata* and *maxima* series. The *maxima* series was the only one represented in Southeast Asia, and the *annulata* series was exclusively Ethiopian. Another Ethiopian group, the *shillitonis* series (= group D of Edwards 1941) was also briefly discussed. I still support this scheme as a valid means of dividing the subgenus into what appear to be very natural groups. I add the definition of 4 additional series for Section A in this revision, making a total of 7 recognized for the world. Series are based primarily on characters of the male terminalia, larva and pupa in that order of importance. However, the Ethiopian *shillitonis* series is based on the adult stage since only a few of the immature stages are known. All known species are assignable to either Sections A or B, and it also appears that all known species will fit equally well into the 7 series recognized here. The recognition of major groups as Sections and series appears to be very similar to that by Reid and Knight (1961) for the subgenus *Anopheles*. As in 1972, I feel that none of these groups deserve consideration as subgenera but that each is a distinct super-group above the traditional species groups level and this hypothesis is strengthened by the geographical distribution of each group. The series recognized here are of equal rank and are as follows: *annulata* series (Ethiopian, = Edwards' 1941 group B, in part), *bicolor* series (Ethiopian, Indomalayan, Malagasy, North Australian, Oriental, Papuan and South Pacific, includes Edwards' 1941 group C), *bimaculata* series (Indomalayan, Oriental and Palaearctic), *harrisoni* series (Indomalayan), *maxima* series (Indomalayan, Nearctic, Oriental and Palaearctic), *recondita* series (Indomalayan, North Australian, Oriental and Papuan), and the *shillitonis* series (Ethiopian = Edwards' 1941 group D). As discussed under the series treated here, species within the series could in many cases be treated as species groups on a regional basis when convenient to do so.

BIONOMICS. Very little information has been published on the bionomics

of *Pseudoficalbia* species. Much of the data presented here under the series and species discussions are new.

The range of habitats utilized by the immature stages of *Pseudoficalbia* is great. The majority of species utilize small restricted natural container type habitats, both on or above ground level, such as: small fresh water crab holes, rock holes or pools, tree holes, bamboos, leaf axils, plant parts lying on the ground, inflorescences of plants and *Nepenthes* pitchers. Other species are found in more exposed ground pools in swamps and marshes, stream margins, stream pools, animal foot or hoof prints, cave pools, seepages, temporary ground pools and ditches. A few of these also utilize artificial containers on occasion and some species utilize a variety of both categories. Individual species vary greatly in specific requirements and tolerance of environmental conditions, particularly light, cover, vegetation and organic content. No species has yet been found in habitats with an appreciable salt content. Some evidence suggests a correlation between the general class of habitat utilized and some of the series. These are described in more detail under the series and individual species.

Larvae of a few species of *Pseudoficalbia* rest and feed parallel to the water surface and have movements and the appearance of early instars of anophelines. Most species that utilize plant containers and crab holes hang down from the water surface, spend considerable time feeding on the bottom and have an appearance and movements similar to many species of *Aedes* Meigen. The larvae of several species develop very slowly and require 10-30 days in rearing containers to mature, the pupal stage usually lasts 2 or more days.

Egg laying habits have been described for 4 species; 2 lay their eggs in rafts and 2 lay them singly on the water surface. It would seem that the 2 types of egg laying habits would be suggestive of at least 2 types of habitats such as possibly ground water habitats and plant containers, but this does not appear to be the case. The 2 species reported to lay eggs in rafts are *colocasiae* and *anhydor*; *colocasiae* is found principally in a wide variety of dead or living plant containers; *anhydor* is found in ground water. The 2 species laying eggs singly on the water surface are *ascidiicola* and *novobscura*, both utilize plant containers. The 4 species are representatives of 3 different series: *anhydor* (*maxima* series), *colocasiae* (*bicolor* series), and *ascidiicola* and *novobscura* (*bimaculata* series).

Few observations have been reported on the biting habits of *Pseudoficalbia* species. Chapman (1964) fed a colony of *anhydor* very successfully on toads and a bullfrog and they apparently would not feed upon an exposed arm, salamander or chicken. Davis and Philip (1931) found chicken blood in the gut of several specimens of the Ethiopian *annulata* Theobald. Hsiao and Bohart (1946) report that *novobscura* is attracted to toads in Japan. Service (1965) found by precipitin testing of blood-meals of 50 wild-caught females of *mashonaensis* Theobald that they had fed on reptiles (4%), birds (24%), bovids (18%) and man (29%). Corbet and Ssenkubuge (1962) found *Uranotaenia* spp., including *U. (P.) nigromaculata* Edwards, to be attracted to mammals, birds and reptiles but do not give details species by species. These seem to be the only confirmed observations on the feeding habits of *Pseudoficalbia* species. Reported here for the first time, are specimens of *nivipleura* biting a pig, 2 females of *bicolor* collected off an exposed human leg in the evening and a single female of *gouldi* taken in a human biting collection between the hours of 0500-0600. It is not known for certain that either of the 2 females of *bicolor* were actually biting and took blood. Adults of several species rest on damp rocks

or other moist surfaces near the breeding sites and are often found in large numbers. Many species come readily to light and are occasionally found inside houses resting on walls near a light source.

A Group B virus (Jugra) was isolated by A. Rudnick in 1972 from a pool of *Uranotaenia* spp. collected at Tanjong Roback, Selangor, Malaysia (Berge 1975).

KEYS TO THE SUBGENERA OF *URANOTAENIA*

ADULT

Prealar area separated from sternopleuron by a suture; alula bare; erect head scales usually absent or, when present, usually restricted to a few small stout ones on occiput or rarely a few long slender ones on vertex. . . . . *Uranotaenia*

Prealar area not separated from sternopleuron by a suture; alula with a few broad dorsomarginal scales (except Section B) or erect head scales with long slender basal stems and broadly expanded apices, numerous, and covering most of the vertex. *Pseudoficalbia*

MALE TERMINALIA

Lateral plates of aedeagus distinctly connected dorsally only; basal mesal lobe of basimere poorly developed or occasionally apparently absent; distimere very short and stout, usually with tergal subapical margin distended. . . . . *Uranotaenia*

Lateral plates of aedeagus distinctly connected dorsally and ventrally (except *nivipleura*); basal mesal lobe of basimere well developed, usually produced tergoapically into a very distinct finger-like lobe; distimere moderately long, usually slender and tapered to narrow apex, occasionally (Section B) rather stout and distended on tergal subapical margin. . . . . *Pseudoficalbia*

PUPA

Trumpets set close together (nearer to middorsal line than to wing pad), (except *wysockii* Belkin), always (?) strongly tracheoid on basal 0.25 or more. . . . . *Uranotaenia*

Trumpets set far apart (nearer to wing pad than to middorsal line), (except *anhydor*, *syntheta* Dyar and Shannon and *montana* Ingram and de Meillon); indistinctly tracheoid on anterior basal 0.3 or less (except Section B and *harrisoni*). . . . . *Pseudoficalbia*

LARVA

Setae 5 and 6-C very stout and spine- or spike-like, apex acute or often fringed (except *wysockii*), always set far back on head, with 6 on level with or posterior to antennal base and 5 approaching

middle; grid of segment X always (?) distinctly joined midventrally to saddle. . . . . *Uranotaenia*

Setae 5 (except *maxima*) and 6-C not stout, spine- or spike-like, apical 0.25 or more strongly attenuate, usually set far forward on anterior third of head, rarely far back approaching middle; grid of segment X rarely joined (*anhydor*, *painei* Edwards, *harrisoni*, and *abstrusa*) midventrally to saddle. . . *Pseudoficalbia*

KEYS TO THE SECTIONS OF THE SUBGENUS *PSEUDOFICALBIA*

ADULT

Alula with a few broad dorsomarginal scales; interocular space long and narrow, median pair of ocular setae (interoculars) not distinctly set between the eyes. . . . . Section A

Alula bare; interocular space broadly and deeply V-shaped posterodorsally, interocular setae set distinctly between the eyes. Section B

MALE TERMINALIA

Lateral plates of aedeagus with one or more large, conspicuous teeth or processes; distimere usually slender, slightly curved, broad at extreme base and tapered to narrow apex, never distended on tergal subapical margin. . . . . Section A

Lateral plates of aedeagus with, at most, a few small inconspicuous teeth or hooks; distimere rather straight, stout, at least slightly distended on tergal subapical margin. . . . . Section B

PUPA

Trumpet without slit in meatus, indistinctly tracheoid on anterior basal 0.3 or less (except *harrisoni*, with trumpet index of 3); index rarely 5 or more. . . . . Section A

Trumpet with slit in meatus, usually distinctly tracheoid on basal 0.3 or more; index usually 5 or more. . . . . Section B

LARVA

Seta 7-II very stout, usually single, occasionally 2 or more branched, near equal in degree of development to 7-I and 6-II; setae 5, 6-C usually rather weak. . . . . Section A

Seta 7-II a tuft of 2-5 branches, distinctly shorter and weaker than 7-I and 6-II; setae 5, 6-C conspicuously stout but not spine-like (except 5-C of *maxima*). . . . . Section B

KEYS TO THE SPECIES OF *PSEUDOFICALBIA*

ADULT*

1. Alula with a few broad dorsomarginal scales; scutum with or without a lateral marginal line of pale scales, scales always narrow. . . 2
Alula bare; scutum with a distinct broad lateral marginal line of white scales, some of which are distinctly broad. . . . . *maxima* (p. 178)

2(1). Terga II-VI with narrow apical white bands, VII with median apical white patch. . . . . *albipes* (p. 64)
Terga II-VII uniformly dark scaled or, 2 or more terga with basal pale bands or basolateral patches. 3

3(2). Tarsi with distinct basal and apical white bands; decumbent head scales uniformly black. . . . . *xanthomelaena* (p. 118)
Tarsi uniformly dark; decumbent head scales rarely all black. . . . 4

4(3). Abdomen with terga uniformly dark scaled. 5
Abdomen with pale basal bands or basolateral patches of scales on 2 or more terga. 29

5(4). Scutal integument with 5 distinct, large brownish black spots; one pair over wing root, one pair on scutal fossae and a large spot on prescutellar space. . . . . *quinquemaculata* (p. 115)
Scutal integument without large dark spots or with at most 3 distinct large dark brown or black spots. 6

6(5). Scutal integument with a very distinct, large oval, bare, shiny supra-alar dark spot, with at least a narrow pale area on anterior margin separating it from darker areas of scutum. 7
Scutal integument without a large distinct oval, shiny supra-alar dark spot, but the area may occasionally appear slightly darker than the surrounding dark areas. 8

7(6). Anterior pronotum without scales; erect head scales numerous, very conspicuous, evenly distributed over entire vertex; when present, scales on posteromesal margin of supra-alar dark spot light or dark brown; midscutellar lobe with 4, 5 long stout marginal setae; remigium of wing usually with a few pale ochreous or grayish scales or entirely pale grayish white. . . . . *novobscura* (p. 96)
Anterior pronotum with a few (3-6) broad grayish translucent scales at middle; erect head scales few, restricted mostly to a marginal row on occiput and on ocular line, those on ocular line very small and inconspicuous; scales on posteromesal margin of supra-alar dark spot grayish white; midscutellar lobe usually with 3, rarely 4 long, stout, marginal setae; remigium completely dark scaled. *bimaculata* (p. 69)

*~~*Uranotaenia hongayi*~~ is insufficiently known to be included in the above key; males of *albipes* and *quinquemaculata* unknown.

8(6). Forefemur with a row of 15-20 closely set, very short, stout, spiniform setae on basal 0.6 of anteroventral margin; *pra* with 2-5 setae; *mep* with a median patch of grayish translucent scales. *rossi* (p. 159)

Forefemur without very short, stout, spiniform setae on anteroventral margin; *pra* usually with 1 seta, rarely 2; *mep* with or without a patch of scales. 9

9(8). Pleural integument with a distinct, broad, dark band across upper half or with 2 or more distinct dark areas involving at least upper *stp* and whole of *mep*, which strongly contrast with the remaining very pale areas; if occasionally there is little contrast with *mep* then it has a median patch of shiny colorless scales. 10

Pleural integument uniform in color, or occasionally a few of the darker species with *ppn* or *psp* and upper edge of *stp* indefinitely darker but when this occurs *mep* always without a median patch of scales. 18

10(9). Midfemur with numerous setae encircling middle; *apn* and *ppn* with dark grayish scales; *mep* with a median patch of shiny colorless scales. . . . . *yaeyamana* (p. 174)

Midfemur without numerous setae encircling middle; *apn* rarely with scales, *ppn* and middle *mep* always bare. 11

11(10). Anterior and posterior pronotum uniformly pale yellow or yellowish brown, strongly contrasting with dark areas of *stp* and *mep*. . 12

Anterior and posterior pronotum dark. 13

12(11). Scutal integument uniformly dark rust brown with a very strong delineation between lateral margin and upper margin of pale pleuron; *ppl* with 5, 6 setae; upper *mep* with 4, 5 setae; midfemur without dense setae on basal 0.33. . . . . *reinerti* (p. 116)

Scutal integument bicolorous, distinctly lighter on acrostichal and lateral marginal lines, delineation between lateral margin and upper margin of pleuron not strongly indicated; *ppl* and upper *mep* each with 2 setae; midfemur densely covered with fine setae on all aspects of basal 0.33. . . . . *moufiedi* (p. 86)

13(11). Scutum with a distinct lateral marginal line of narrow gray-white scales; pleuron devoid of scales. 14

Scutum without a lateral marginal line of gray-white scales; pleuron with at least a small patch of light translucent scales on upper 0.5 of *stp*. 16

14(13). Scutal fossa with a rather large, oval dark brown or black shiny, bare spot, which is accentuated by the surrounding gray-white scales; a small dark supra-alar spot usually present. . *propinqua* (p. 106)

Scutal fossa without a dark bare spot; supra-alar area not darker. 15

15(14). Scutal integument uniformly dark brown or brownish black, except for pale narrow lateral marginal line. . . . . *modesta* (p. 83)

Scutal integument very light brown, except for very pale narrow

lateral marginal line, acrostichal line a little lighter in color than outer dorsocentral area. . . . . *patriciae* (p. 103)

16(13). Midfemur densely clothed on all aspects of basal 0.25 with short delicate setae, usually 4-7 much longer setae dorsally; *apn* with a few broad light brown scales; *stp* with a closely set row of 20-22 strong setae along upper and posterior margins, with 5-8 across upper margin. . . . . *maculipleura* (p. 79)

Midfemur with at most 4, 5 long delicate dorsal setae on basal 0.25, *apn* bare; *stp* with 9-14 rather weak setae on upper and posterior margins, with only 3, 4 across upper margin. 17

17(16). Scutal integument uniformly light yellowish brown, covered with dark bronzy brown scales which strongly contrast with light integument; metapleuron uniformly pale grayish; hindtarsomere 1 about 1.2 of tibia. . . . . *pseudomaculipleura* (p. 109)

Scutal integument mostly dark brown, narrowly and indefinitely lighter on acrostichal line, covered with light grayish or bronzy brown scales which are never darker than integument; metapleuron darker on lower 0.5; hindtarsomere 1 about 1.0 of tibia. *quasimodesta* (p. 112)

18(9). Integument of scutum and mesopostnotum dark reddish or rust brown except for occasional narrow pale lateral marginal line, very sharply contrasting with a uniformly pale yellow or yellowish orange pleuron. 19

Integument of scutum and mesopostnotum usually light or pale brown with no contrast or only slight contrast with pleuron, if dark reddish brown then pleuron also darker. 20

19(18). Scutum with integument narrowly pale yellowish on lateral margin and with a narrow lateral marginal line of long narrow white or yellowish scales to anterodorsocentral line; *apn* without scales. *nivipleura* (p. 92)

Scutum with integument uniformly dark, without pale lateral scales; *apn* with a few light brown scales. . . . . *confusa* (p. 129)

20(18). Interocular space with a double row of small, broad grayish translucent scales extending to frons; femora distinctly grayish white or white ventrally; *apn* and *stp* without scales. . . . . *gouldi* (p. 50)

Interocular space without a row of scales; femora usually light brown ventrally never distinctly grayish white; *apn* or *stp* occasionally without scales but never both without. 21

21(20). Wing cell R_2 equal in length to cell M_2 or barely shorter; *apn* without scales. 22

Wing cell R_2 distinctly shorter than cell M_2; *apn* rarely without scales. 23

22(21). Anterior pronotum with 3 strong upper setae; *ppl* with 2 setae; *pra* with 2 setae; *stp* with 4 marginal setae and with a few scattered shiny transparent scales on upper portion only. . . . . *harrisoni* (p. 29)

Anterior pronotum with 2 strong upper setae; *ppl* with 3 strong, 1-3 weaker setae; *pra* with 1 seta; *stp* with a marginal row 10-11 setae and with a patch of shiny translucent scales which narrowly extend down posterior margin to upper margin of mesomeron. *lui* (p. 76)

23(21). Decumbent head scales uniformly black or slate gray; erect scales few, restricted mostly to a row on occiput, none on anterior half of vertex; abdominal sterna pale creamy yellow. . *moultoni* (p. 88)
Decumbent head scales light brown or pale grayish with scales on ocular line and laterally at least faintly grayish white; erect scales numerous and distributed over most of vertex; abdominal sterna dark or light grayish brown, especially on terminal segments. . 24

24(23). Lower *apn* with 2, 3 long stout setae and usually 1-2 short weaker ones; midfemur densely setose on basal 0.33 with the more delicate setae concentrated on ventral surface; *stp* with a group of 3-6 very fine opaque setae on midanterior margin just above midanterior angle (extremely difficult to detect at some angles). . . . . *pylei* (p. 155)
Lower *apn* with a single long stout seta but may have a few small weak setae in addition; midfemur without a concentration of setae on basal 0.33; *stp* without fine setae on anterior margin. 25

25(24). Integument of scutum and mesopostnotum a very light, pale brown or yellow; pleuron uniformly pale grayish, almost whitish brown, both sharply contrasting with darker abdominal terga. 26*
Integument of scutum and mesopostnotum dark brown or scutum occasionally light brown with narrow darker median and submedian lines or with a few broad scales on anterior margin and *stp* without scales; pleuron uniformly dark brown or a dingy brown with indefinite darker areas, but never uniformly pale, scutum and mesopostnotum with little or no contrast with abdominal terga. 27*

26(25). Anterior pronotum with numerous light brown scales, lower margin with one long, stout and 4-8 small weak setae; head with a distinct narrow ocular line of dull grayish white scales; *ppn* with a distinct patch of 10 or more broad light brown translucent scales on upper posterior corner. . . . . *sumethi* (p. 170)
Anterior pronotum without scales and only one long, stout seta on lower margin; decumbent head scales uniformly dull grayish; *ppn* with 2-4 broad light brown translucent scales on upper posterior corner. . . . . *nocticola* (p. 149)

27(25). Scutum with 3 small patches of broad pale grayish or bronzy translucent scales on anterior promontory at acrostichal and dorsocentral lines; *stp* without a patch of scales. . . . . *obscura* (p. 57)

*Occasional specimens of *obscura* are rather light in color, but always have a few broad translucent scales on the anterior margin of the scutum which the others do not.

Scutum without broad scales on anterior promontory; *stp* with a patch of scattered grayish translucent or transparent scales on upper 0.33 or more, with a few extending down posterior margin. . . 28

28(27). Midfemur with numerous long setae encircling middle between 0.45-0.70; *ppn* without scales. . . . . *hirsutifemora* (p. 136)
Midfemur without setae encircling middle 0.45-0.70; *ppn* with a few light grayish translucent scales. . . . . *abstrusa* (p. 35)

29(4). Femora distinctly gray-white or pearly white ventrally; maxillary palpus at least 2.0 the length of antennal flagellomere 1; abdominal terga II-VII with large basolateral patches of creamy white scales. 30
Femora never distinctly gray-white or pearly white; maxillary palpus never more than 1.5 the length of flagellomere 1; abdominal terga II-VII without distinct basolateral patches of creamy white scales, but with distinct basal pale bands on 2 or more terga. 31

30(29). Basolateral pale scale patches of terga triangular with apex reaching to or beyond 0.5 of lateral width of each tergum and without dorsal extension; prosternum without a line of scales. . . *gigantea* (p. 72)
Basolateral pale scale patches of terga not triangular, much less than 0.5 the width of each tergum, occasionally with narrow dorsal extension on some terga; prosternum with a distinct narrow line of scales near to median suture. . . . . *ascidiicola* (p. 66)

31(29). Pleural integument with several distinct dark brown or black areas or dark areas involving at least *apn* and *ppn* which strongly contrast with the remaining very pale areas, or predominantly dark brown. 32
Pleural integument uniformly pale, usually yellow, pale grayish brown or whitish; *psp* and extreme upper edge of *stp* may appear indefinitely darker in a few specimens of *jacksoni* but there is little or no contrast. 37

32(31). Pleural integument predominantly dark brown with an indefinite pattern of narrow pale marginal areas on some sclerites, lower 0.5 of *stp* dark, a narrow lighter brown line across upper 0.3 of *stp* and a slightly broader light brown line across middle *mep*, a very distinct pale grayish line across lower edge of *mep* and upper edge of mesomeron; *stp* with two separate patches of scales, one small patch on lower 0.6 of posterior margin. . . . . *bicolor* (p. 41)
Pleural integument with a distinct pattern of dark and light areas or spots, lower 0.25 or more of *stp* always pale; mesomeron entirely pale; *stp* with a patch of scales on upper 0.5 and usually with a narrow continuous extension down posterior margin. . . 33

33(32). Anterior pronotum, *ppn*, *psp* and extreme upper edge of *stp* dark, remaining sclerites very pale in color. 34
As above, but *stp* with 2 large distinct dark spots, or upper 0.5 dark; *mep* entirely dark or with distinct upper and lower dark spots. . 35

34(33). Terga III-VI with complete pale ochreous basal bands, each conspicuous and near equal in width; *stp* with 14-17 setae on upper and posterior margins; lower *mep* seta long and stout, at least twice the length of upper *stp* and *mep* setae; ocular setae 6-7. *ohamai* (p. 152)

Terga with complete pale ochreous basal bands on IV-VI but very narrow and conspicuous only on V, VI; *stp* with 7-11 setae on upper and posterior margins; lower *mep* seta short and weak, not longer than setae on upper *stp* or *mep*; ocular setae 4-5. *approximata* (p. 38)

35(33). Sternopleuron dark on upper 0.25 and with a large midanterior dark spot; *ppl* dark; *psp* bare; paratergite bare. 36

Sternopleuron with one dark area involving upper 0.5 or more; *ppl* pale; *psp* with a small posterior patch of grayish scales; paratergite with a few grayish translucent scales on posterior 0.5. *spiculosa* (p. 162)

36(35). Mesepimeron dark except for very narrow pale margins and with a median patch of grayish white translucent scales. *stricklandi* (p. 166)

Mesepimeron with a broad median pale area separating an upper and lower dark spot, without median scales. . . . . *koli* (p. 145)

37(31). A few scales on anterior margin of scutum grayish white or white; lower *mep* seta long, stout, at least 1.5 the length of upper *stp* and *mep* setae; erect head scales long, greater than 0.5 the length of antennal flagellomere 2, dense; hindtarsomere 1 about 1.1 or less the length or tibia. 38

Scales on anterior margin of scutum light brown or dark brown; lower *mep* seta short, weak, not longer than setae on upper *stp* and *mep*; erect head scales short and rather sparse, less than 0.5 the length of antennal flagellomere 2; hind tarsomere 1 at least 1.3 the length of tibia. 39

38(37). Terga III-VII with complete, narrow creamy white basal bands, with those on V-VII each of uniform width to lateral margins; *stp* without a patch of delicate opaque setae on midanterior margin; midfemur without setae on midanterior surface. . . . . *abdita* (p. 125) *enigmatica* (p. 133)

Terga III-VII with incomplete, narrow ochreous basal bands which are usually narrowed laterally and do not quite reach lateral margins; *stp* with a patch of 3-6 very delicate opaque setae on midanterior margin just above anterior angle; midfemur with a patch of 4-7 long setae on midanterior surface. . . . . *jacksoni* (p. 141)

39(37). Terga IV-VI with broad basal ochreous bands occupying over 0.25 the length of each terga, each band conspicuously broadened laterally and usually not reaching lateral margin; terga II, III, VII usually with narrow bands; tergum VIII entirely creamy white; *ppn* without scales. . . . . *lutescens* (p. 53)

Terga IV-VI with very narrow basal ochreous bands occupying less than 0.25 the length of each terga, conspicuous only on V, VI and of uniform width to lateral margin; when present, bands on terga III,

VII only faintly indicated, VIII light brown; *ppn* with a distinct upper posterior patch of scales. . . . . *demeilloni* (p. 47)

PUPA*

1. Outer margin of paddle fringed with long filamentous spicules. . . . 2
Outer margin of paddle with very short stout serrations. 11

2(1). Paddle very small, not longer than segment VIII, inner margin straight from about basal 0.15 to apex; seta 9-VI-VIII large, with very stout, barbed, darkly pigmented branches; 9-VIII 2.0 or more the length of paddle (Fig. 20). . . . . *ascidiicola* (p. 66)
Paddle large, considerably longer than segment VIII, inner margin distinctly rounded; seta 9-VI-VIII not large or with very stout, barbed, darkly pigmented branches; 9-VIII much less than length of paddle. 3

3(2). Paddle elliptical, about as wide as long, outer part extending latero-apically well beyond inner part and about 2.0 the width of inner part (Fig. 46). . . . . *xanthomelaena* (p. 118)
Paddle not elliptical, longer than wide, outer part extending at most only slightly beyond inner part apically, much less than 2.0 the width of inner part. 4

4(3). Paddle dark brown, marginal spicules strong; outer part narrower than inner part (Fig. 44). . . . . *quasimodesta* (p. 112)
Paddle pale yellowish brown, occasionally dark at base, marginal spicules, weak, delicate; outer part at least as wide as inner, usually wider. 5

5. Seta 9-VIII located dorsally and distinctly anteromesal to posterolateral corner of segment; 4-VI more than 0.6 the length of segment (Fig. 38). . . . . *patriciae* (p. 103)
Seta 9-VIII located at posterolateral corner of segment, or ventral; 4-VI not more than 0.6 the length of segment. 6

6(5). Seta 9-VIII located anteroventral to posterolateral corner of segment; integument dark brown (Fig. 32). . . . . *moultoni* (p. 86)
Seta 9-VIII located at posterolateral corner of segment; integument lighter. 7

7(6). Respiratory trumpet broad, index less than 3.0 (Fig. 28) *maculipleura* (p. 79)
Respiratory trumpet rather slender, index greater than 3.0. 8

*_Uranotaenia hongayi_ is insufficiently known to be included in the above key; pupa of *albipes, confusa, gigantea, moufiedi, quinquemaculata* and *reinerti* unknown.

8(7). Midrib of paddle uniformly light or dark brown from base to apex; seta 5-VII as long as or longer than 1-VII. 9
Midrib of paddle not uniformly pigmented entire length, usually evanescent apically; seta 5-VII minute, much less than length of 1-VII, not significantly greater than 2-VII. 10

9(8). Seta 1-P present; outer part of paddle usually produced slightly beyond inner part apically; 3-II, III without strong brush tip; seta 5-IV, V about as long as each succeeding segment (Fig. 36). *novobscura* (p. 96)
Seta 1-P absent; outer part of paddle not produced beyond inner part apically; 3-II, III usually with strong brush tip appearance; seta 5-IV, V each, usually conspicuously longer than succeeding segment (Fig. 22). . . . . *bimaculata* (p. 69)

10(8). Seta 5-IV, V single strong, longer than each segment, usually curved or hooked apically, paddle fringe of long spicules (Fig. 30). *modesta* (p. 83)
Seta 5-IV, V single, stiff not curved or hooked, not more than 0.75 the length of each segment; paddle fringe spicules short (Fig. 40). *propinqua* (p. 106)

11(1). Inner margin of paddle with strong apically hooked spicules; respiratory trumpet with distinct slit in meatus, index about 3.0 (Fig. 4). . . . . *harrisoni* (p. 29)
Inner margin of paddle without strong hooked spicules; respiratory trumpet without slit in meatus or if present, index greater than 3.0. 12

12(11). Respiratory trumpet with distinct slit in meatus, distinctly tracheoid on basal 0.35-0.40 (Fig. 76). . . . . *maxima* (p. 178)
Respiratory trumpet without slit in meatus, indistinctly tracheoid on anterobasal 0.33 or less. 13

13(12). Paddle with a conspicuous deep apical emargination, with inner and outer parts pointed apically; seta 1-P absent (Fig. 42). *pseudomaculipleura* (p. 109)
Paddle with at most a very shallow apical emargination, inner and outer parts never both pointed apically; seta 1-P present. . . . 14

14(13). Outer margin of paddle with broad saw-like teeth, which are blunt apically; seta 1-V stout, single, 1.5-2.0 the length of segment VI (Fig. 16). . . . . *lutescens* (p. 53)
Outer margin of paddle with fine spicules; seta 1-V single or branched, never stout and as long as segment VI. 15

15(14). Seta 9-IV-VIII long, very stout, single to triple, progressively longer to VIII; on VII it is as long as or longer than segment VIII and inserted near posterolateral corner; 1-P strong, hooked apically (Fig. 18). . . . . *obscura* (p. 57)
Seta 9-IV-VI short, single, subequal, usually very weak, strong or weak on VII but never inserted at posterolateral corner or as long as segment VIII; 1-P not stout and hooked apically. 16

16(15). Seta 5-IV-VI longer than each succeeding segment; 2-II significantly longer than segment III; 6-CT exceptionally long, usually more than 2.0 of respiratory trumpet. 24
Seta 5-IV significantly shorter than segment V, 5-V, VI not longer than each succeeding segment; 2-II less than length of segment III; 6-CT about 1.0 or less of trumpet. 17

17(16). Seta 5-V-VII single, stout, about as long as each succeeding segment; outer part of paddle produced apically beyond inner part; I-IX absent (Fig. 26). . . . . *lui* (p. 76)
Seta 5-V-VII branched or single; weak and significantly shorter than each succeeding segment; outer part of paddle not distinctly produced apically beyond inner part; 1-IX present. 18

18(17). Seta 1-II single or double; 8-CT single or double (Fig. 34). *nivipleura* (p. 92)
Seta 1-II 4-9 branched; 8-CT 3-12 branched. 19

19(18). Respiratory trumpet very short, conspicuously expanded apically, bell-shaped, pinna with lateral margin produced into a distinct leaflet, extending beyond an otherwise truncate end (Fig. 14). *gouldi* (p. 50)
Respiratory trumpet not as above. 20

20(19). Seta 8-CT 8-12 branched; 9-CT 6-9 branched; 7-I 5-7 branched; 1-CT 4-6 branched; 4-CT 6-10 branched; 5-CT 7-10 branched; 12-CT 4,5 branched (Fig. 6). . . . . *abstrusa* (p. 35)
Seta 8-CT 3-6 branched; 9-CT single to 4 branched; 7-I single to 4 branched; 1-CT single to triple; 4-CT single to 5 branched; 5-CT single to 5 branched; 12-CT single to triple. 21

21(20). Seta 5-IV single or double; 9-VIII with 2-7 stout, barbed, darkly pigmented branched. 22
Seta 5-IV 3-5 branched; 9-VIII with 2-6 simple, weak branches, not darkly pigmented. 23

22(21). Seta 5-IV-VI stout, usually double, rarely single or triple, barbed, darkly pigmented; inner part of paddle not wider than outer and slightly angled from about 0.5 to apex (Fig. 8). *approximata* (p. 38)
Seta 5-IV-VI weak, single or double, simple, not darkly pigmented; inner part of paddle distinctly wider than outer and evenly rounded to more rounded apex (Fig. 12). . . . . *demeilloni* (p. 47)

23(21). Seta 1-IX absent; 2-P absent; 5-II lateral to 2-II and closer to 4-II than to 3-II; segments VIII, IX and genital pouch dark brown; spicules on inner apical margin of paddle sharp (Fig. 54). *hirsutifemora* (p. 136)
Seta 1-IX present; 2-P present; 5-II mesal to 2-II and closer to 3-II than to 4-II; terminal segments pale yellowish brown; spicules on inner apical margin of paddle blunt (Fig. 10). . *bicolor* (p. 41)

24(16). Seta 2-III-VII long, very stout, spike-like, darkly pigmented. . . 25
Seta 2-III-VII short, usually weak, spiniform but never stout spike-like. 26

25(24). Seta 2-III-VII anterior to 3, 4-III-VII and closer to middle of segment than to posterior margin; 5-II, III near posterior margin of segment; 1-III, IV, 9-VIII with barbed, forked branches; 6-VII ventral; 5-CT with normal branches (Fig. 52). . . . . *enigmatica* (p. 133)
Seta 2-III-VII never anterior to 3, 4-III-VII, inserted closer to posterior margin than to middle of segment; 5-II, III near middle of segment; 1-III, IV, 9-VIII with simple branches; 6-VII dorsal; 5-CT with long, stout, acutely pointed branches (Fig. 64). *pylei* (p. 155)

26(24). Integument of segments III-VIII usually strongly spiculate over entire dorsal, ventral and lateral surfaces, strongest and always conspicuous on lateral margin and on segments VII, VIII. 27
Integument of segments III-VIII with median dorsal and ventral spicules, never strongly spiculate on lateral margins. 28

27(26). Seta 6-VI as long as or longer than segment VII; 5-IV-VI each longer than 2 succeeding segments; 9-VII shorter and weaker than 6-VII (Fig. 48). . . . . *abdita* (p. 125)
Seta 6-VI less than length of segment VII; 5-IV, V each less than length of 2 succeeding segments, 5-VI about as long as 2 succeeding segments or less; 9-VII longer and stronger than 6-VII (Fig. 68). *spiculosa* (p. 162)

28(26). Seta 9-VIII with 5-12 strongly barbed branches, some branches often with numerous terminal branches or fringe. 30
Seta 9-VIII single to 4 branched, branches simple or at most with a few scattered barbs. 29

29(28). Seta 9-VIII with a single strong branch as long as or longer than paddle and 1-3 much shorter weaker branches on one side; 6-VII strong single or double, located dorsally; 3-VII stiff, single (Fig. 66). *rossi* (p. 159)
Seta 9-VIII single or branched, significantly shorter than paddle and when branched each branch equal in thickness, with branches toward center progressively longer; 6-VII weak, single or double, located ventrally; 3-VII weak, usually double (Fig. 74). *yaeyamana* (p. 174)

30(28). Inner margin of paddle with 8-15 long, very stout, uncurved, widely spaced spicules from at least basal 0.5 to apex (Fig. 58). *koli* (p. 145)
Inner margin of paddle without long stout widely spaced spicules, spicules stronger and concentrated near apex and usually only on apical 0.33, always minute when basal to this. 31

31(30). Seta 5-IV-VI double or triple, rarely single on one side or one segment; 10-CT with distal branches and without middle fringe. 32
Seta 5-IV-VI single; 10-CT single with a conspicuous barbed lateral fringe at or slightly beyond middle (Fig. 72). . . *sumethi* (p. 170)

32(31). Seta 5-VII much longer than segment VIII; 6-VI significantly shorter than segment VII; 8-CT with 10-14 simple branches (Fig. 56). *jacksoni* (p. 141)
Seta 5-VII shorter than segment VIII; 6-VI longer than segment VII; 8-CT with 6-10 barbed branches. 33

33(32). Seta 1-II with 7-12 branches; 6, 9-VII single to 4 branched, simple, not longer and stronger than 8-VII and less than 0.5 of segment VIII (Fig. 62). . . . . *ohamai* (p. 152)
Seta 1-II with 14-29 branches; 6, 9-VII near equal, with 2-4 stiff branches, usually lightly barbed, longer and stronger than 8-VII and usually 0.5 or more of segment VIII. 34

34(33). Setae 11-CT, 3-I-III strongly brush-tipped; 9-VIII longer than segment VII (Fig. 60). . . . . *nocticola* (p. 149)
Setae 11-CT, 3-I-III not brush-tipped, with only a few distal branches; 9-VIII not longer than segment VII (Fig. 70). . *stricklandi* (p. 166)

LARVA*

1. Seta 1-C narrow at base and distinctly expanded apically, blade-like, club-like or foliform; apical process of median labral plate with a distinct angular apical projection on basomesal side of 1-C (Fig. 47). 2
Seta 1-C very weak, minute, inapparent; apical labral process more or less rounded, without apicomesal projection (Fig. 21). . . . 14

Seta 1-C conspicuous, strong at base and tapered to apex, spine-like; apical labral process rounded or angular but without distinct apical projection on basomesal side of 1-C (Figs. 3, 5). . . . 27

2(1). Segment X with complete saddle. 3
Segment X with incomplete saddle. 8

3(2). Seta 5-III-VI with 3 or more stout branches; one or more distal pecten teeth long, simple. 4
Seta 5-III-VI single, weak or stout spine-like; pecten teeth short with apical spicules. 6

4(3). Seta 13-P stout, stellate with 4-7 branches; 9-III-VI single, short stout, much less than 0.5 the length of each segment (Fig. 67). *spiculosa* (p. 162)
Seta 13-P absent; 9-III-VI single, stout, longer than 0.5 the length of each segment. 5

5(4). All pecten teeth simple, spine-like; integument of thorax and abdomen with dense fine setiform spicules (Fig. 51). . . *enigmatica* (p. 133)

*_Uranotaenia hongayi_ is insufficiently known to be included in the above key; larva of _albipes_, _hirsutifemora_, _moufiedi_, _quinquemaculata_ and _reinerti_ unknown.

Apical 1-3 distal pecten teeth simple, spine-like, remainder with strong spicules apically; integument of thorax with scattered, minute, stout, acute spicules (Fig. 47). . . . . *abdita* (p. 125)

6(3). Seta 5-C with 3-9 branches; mentum with 13-19 teeth; 5-III-VI, 9-II-V single, exceptionally long, stout, acutely pointed. 7
Seta 5-C single; mentum with 9-11 teeth; 5-III-VI minute, weak, single or double; 9-II-V short, stout, single (Fig. 71). *sumethi* (p. 170)

7(6). Seta 14-P with 5-12 stout branches, each branch barbed to apex, ends acute or frayed; 1-A single (Fig. 61). . . . . *ohamai* (p. 152)
Seta 14-P with 16-24 branches, each branch barbed to near apex, ends finely pointed; 1-A double (Fig. 57). . . . . *koli* (p. 145)

8(2). Segments I-VII with several stout stellate setae of 15 or more branches; 2-III-VII with 9 or more branches (Fig. 63). . . . *pylei* (p. 155)
Segments I-VII without stout stellate setae of 15 branches; 2-III-VII single or double. 9

9(8). Seta 5-C single; 2-I with 3-5 stout branches. 10
Seta 5-C with 2-9 branches; 2-I single or double, minute or long, stout, spine-like. 11

10(8). Comb with 13-18, apically rounded, laterally and apically spiculate scales; 5-III-VI and 9-II-VI single, short, weak; 3-VII single, much longer than 1-VII (Fig. 65). . . . . *rossi* (p. 159)
Comb with 8-11 apically pointed, laterally spiculate scales; 5-III-VI and 9-II-VI single, long, stout; 3-VII with 3-4 branches, only slightly longer than 1-VII (Fig. 59). . . . . *nocticola* (p. 149)

11(9). Seta 6-IV-VI single; 6-M short, weak, 2-4 branched; 9-II-V single short, weak (Fig. 49). . . . . *confusa* (p. 129)
Seta 6-IV-VI with 2-4 branches; 6-M single, long, strong; 9-II-V single, long, stout, acutely pointed, spine-like. 12

12(11). Apical 2-4 pecten teeth long simple spine-like, slightly detached from others; 6-V, VI, double, branches subequal; dorsal postero-lateral margin of saddle on X with 2-4 exceptionally long, stout spicules in addition to many much smaller spicules. 13
All pecten teeth with distinct apical spicules, none detached; 6-V, VI with 3-4 unequal branches; dorsal posterolateral margin of saddle on X with short, stout, near uniform spicules (Fig. 69). *stricklandi* (p. 166)

13(12). Seta 2-I, II slightly longer than antenna; 4a-X with 4-7 branches (Fig. 73). . . . . *yaeyamana* (p. 174)
Seta 2-I, II not longer than antenna; 4a-X with 8-11 branches (Fig. 55). . . . . *jacksoni* (p. 141)

14(1). Siphon shorter than segment X, index 2.0 or less; seta 4-X on very dark strongly sclerotized boss; pecten teeth 2-6. 15

Siphon longer than segment X, index 2.0 or more; seta 4-X not on strongly sclerotized boss, but with sclerotized barred area; pecten teeth 9-28. 17

15(14). Segment VIII with a large sclerotized plate with a row of 4-7 comb scales on posterior margin; setae 1, 3-II-VI minute, weak, not inserted on sclerotized basal plates (Fig. 45).
xanthomelaena (p. 118)
Segment VIII without sclerotized plate, comb scales 2-5 in an irregular row or small patch; setae 1, 3-II-VI with 3-9 long, very stout branches, each inserted on conspicuous sclerotized basal plate. 16

16(15). Setae 8-M, 2, 3, 7-T, 1, 3-II-VII with 6-9 stout stiff branches; head 1.7-2.0 as long as wide (Fig. 19). . . . . *ascidiicola* (p. 66)
Setae 8-M, 2, 3, 7-T and 1, 3-II-VII with 2, 3 stout stiff branches; head only slightly longer than wide. . . . . *gigantea* (p. 72)

17(14). Head small, long and narrow; seta 4-X with 9 pairs of setae; 8-S with 3 very long barbed branches (Fig. 31). . . . . *moultoni* (p. 88)
Head larger, not long and narrow, usually broad and rounded or with very prominent ocular bulge; seta 4-X with 5 pairs of setae; 8-S without long barbed branches. 18

18(17). Siphonal index less than 3.5. 24
Siphonal index 4.0 or greater. 19

19(18). Saddle of segment X incomplete; pecten teeth and base of seta 1-S not reaching 0.5 of siphon; seta 6-M long, stout, single (Fig. 21).
bimaculata (p. 69)
Saddle of segment X complete; pecten teeth reaching at least 0.5 and 1-S inserted beyond 0.5 of siphon; seta 6-M minute, single or branched. 20

20(19). Comb scales each with 1-4 stout basolateral denticles, rounded apically; setae 6, 7-I, II with stout acute ends; 7-C with 5-9 branches (Fig. 41). . . . . *pseudomaculipleura* (p. 109)
Comb scales without stout denticles basally, pointed apically; setae 6, 7-I, II with fine filamentous ends; 7-C single. 21

21(20). Siphon, and saddle of segment X pale brown or pale yellowish brown; seta 1-S longer than siphon and inserted on distal 0.76-0.90 of siphon; 4-P with 5-7 branches; 6-III-V with 2-5 branches (Fig. 37).
patriciae (p. 103)
Siphon and saddle dark rust-brown at least on middle portion; seta 1-S less than length of siphon and never inserted beyond 0.72 from base of siphon; 4-P with 1-4 branches; 6-III-V single. . . 22

22(21). Seta 1-S double, greater than 0.5 the length of siphon; 6-III long, strong, equal to length of 7-II or more; 2, 4-VIII noticeably longer than 3-VIII (Fig. 43). . . . . *quasimodesta* (p. 112)
Seta 1-S with 3-5 branches and much less than 0.5 of siphon; 6-III weak much shorter than 7-II; 2, 4-VII shorter than 3-VIII. 23

23(22). Seta 1-A single, strong; 1-X single or double; 4a, b-X triple (Fig. 29). *modesta* (p. 83)
Seta 1-A double, weak; 1-X 3-6 branched; 4a, b-X double (Fig. 39). *propinqua* (p. 106)

24(18). Saddle of segment X complete; seta 4-C multiple branched; 1-A 2-4 branched. 25
Saddle of segment X incomplete; setae 4-C and 1-A single (Fig. 33). *nivipleura* (p. 92)

25(24). Seta 7-C with 4-12 branches; 6-M long, stout; 1-S with 3-5 weak branches. 26
Seta 7-C single; 6-M minute, weak; 1-S double, stiff (Fig. 27). *maculipleura* (p. 79)

26(25). Comb scales each with 1, 2 short, stout, basolateral denticles; seta 14-P double to 5 branched; 3, 4-P double to 6 branched (Fig. 35). *novobscura* (p. 96)
Comb scales without short, stout basolateral denticles; seta 14-P single; 3, 4-P single (Fig. 25). . . . . *lui* (p. 76)

27(1). Thorax and abdomen with numerous stout, multiple branched, stellate setae; 5-C very stout, spike-like (Fig. 75). . . . *maxima* (p. 178)
Thorax and abdomen without stout, multiple branched, stellate setae; 5-C not stout and spike-like. 28

28(27). Seta 1-C long, strong, but slender, tapered to fine point, distance between bases much less than length of individual seta; 4-X with 4 pairs of setae (Fig. 3). . . . . *harrisoni* (p. 29)
Seta 1-C short, stout, acutely pointed, distance between bases much greater than length of individual seta; 4-X with 5 pairs of setae. 29

29(28). Comb plates joined dorsally; pecten teeth 2-9; seta 7-I, II double to 5 branched (Fig. 17). . . . . *obscura* (p. 57)
Comb plates not joined dorsally; pecten teeth 11-30; 7-I, II single. . 30

30(29). Setae 4, 7-P, 8-M and 6-I, II single (Fig. 15). . . . . *lutescens* (p. 53)
Setae 4, 7-P, 8-M and 6-I, II at least double. 31

31(30). Seta 8-M double or triple; 7-T double to 4 branched; saddle index less than 1.0; siphon index 2.0-2.6; trachea without terminal sclerotized filament. 32
Seta 8-M with 4-7 branches; 7-T 5-10 branched; saddle index greater than 1.0; siphon index at least 2.8; trachea terminating in a sclerotized filament. 33

32(31). Comb scales and pecten teeth terminating in a distinct simple spine; 9-T single (Fig. 11). . . . . *demeilloni* (p. 47)
Comb scales and pecten teeth without a terminal spine longer than rest of fringe; 9-T double or triple (Fig. 7). . *approximata* (p. 38)

33(31). Seta 6-C located considerably laterad of 5-C and on level with or posterior to 7-C; antenna with stout conspicuous spicules dorsally and ventrally; seta 14-C a very broad pigmented spine. 34
Seta 6-C not noticeably laterad of 5-C and considerably anterior to 7-C; antenna with at most a few small scattered inconspicuous spicules; 14-C stout and frayed apically (Fig. 9). . *bicolor* (p. 41)

34(33). Seta 6-C on diagonal line with and about midway between 5, 7-C; 7-M double to 4 branched; 1-S inserted on basal 0.43-0.48 of siphon (Fig. 13). . . . . *gouldi* (p. 50)
Seta 6-C not on line with 5, 7-C, inserted about on level with and mesal to 7-C; 7-M single; 1-S inserted on basal 0.51-0.56 of siphon (Fig. 5). . . . . *abstrusa* (p. 35)

SECTION A, Peyton (1972)

For characters see key on p. 13.

harrisoni series

DISCUSSION. Only one species is currently known for the series. The species appears to be an isolated relict, showing no apparent relationship to any of the other known groups or species of the genus. In comparison with the other described series of Section A, this series is best characterized by the male terminalia, pupa and larva. In adult habitus features it does not differ significantly from the adult of the other series of Section A. However, a few general features for the adult are presented below.

ADULT. Proboscis longer than forefemur (♂); decumbent head scales uniformly pale, without distinct ocular line of pale scales; erect scales moderately long, about 2.5-3.0 the apical width, usually sparsely covering vertex; scutal scales uniformly dark; dorsocentral setae moderately strong, length less than half the width of scutum; *apn* devoid of scales, with 3 strong upper setae; pleuron without a distinct patch of scales; *ppl* with 2 setae; *stp* with 4 setae; *pra* with 2 setae and upper *mep* with 1 seta; wing without distinct pale scale patches or lines; cell R_2 near equal in length to cell M_2; midfemur without rows or patches of setae; claws of male forelegs small and subequal, anterior claw of midleg enlarged, strongly curved.

MALE TERMINALIA. *Tergum IX convex apically, without setae or lobes; tergum X a complete, weakly sclerotized band extending well beyond margin of tergum IX, with narrow median emargination but without distinct, independent lateral lobes;* basal mesal lobe of basimere with strong setae on tergal margin but without strong setae on sternoapical margin; distimere with prominent spiniform; aedeagus with prominent, curved teeth on apicosternal margin; paramere barlike, not greatly expanded basally; *proctiger without cercal setae.*

PUPA. Seta 6-CT distinctly closer to 7-CT than to 5-CT and noticeably shorter than 7-CT and trumpet; *trumpet short, index about 3.0, expanded on apical half, tracheoid on basal 0.25, with deep meatal cleft and distinct slit;* seta 10-CT minute, significantly shorter than 12-CT; seta 2-II inserted far laterad of 5-II and close to 4-II; 1-IX present; paddle with conspicuous median apical emargination and with small toothlike serrations on outer margin, inner

margin with a few greatly enlarged, widely spaced, strong and hooked teeth; inner part distinctly wider than outer part; 1-P present, 2-P absent.

LARVA. *Seta 1-C moderately long, strong, spine-like, bases set very close together,* arising from a small rounded apical process of the median labral plate; mentum with 13 teeth; seta 1-P single; 3-P with 8-10 branches; 4-P with 3-5 branches; 7-P strong, single; 13-P present; 14-P multiple branches; 6-I-II with 4, 5 strong branches; 7-II long, stout, single, 2-X with 7-8 branches; 3-X single; *4-X with 4 pairs of multiple branched setae on grid;* plate of segment VIII very large.

URANOTAENIA (PSEUDOFICALBIA) HARRISONI NEW SPECIES
(Figs. 3, 4)

FEMALE. *Head.* Proboscis about 1.1 mm (forelegs missing on the single available female); prementum pale beige scaled, a few small setae at apex; 1 pair of labial basal setae; palpus about 0.1 of proboscis and equal to antennal flagellomere 1; clypeus pale yellow; antennal pedicel pale grayish brown (inner aspect not visible but no apparent setae or scales); flagellum about 1.2 of proboscis or exceeding proboscis by combined length of flagellomeres 12, 13; Flm 1 about equal to Flm 2 and with 2, 3 pale brown scales near base; flagellar whorls each with 5, 6 setae; 1 long, stout interocular and 5 ocular setae; decumbent scales uniformly pale grayish or creamy brown; erect scales moderate in length, few, unevenly distributed over vertex. *Thorax.* Scutal integument light yellowish brown; scales sparse, very narrow (some seta-like), curved, uniformly light grayish brown; prescutellar space bare; scutellum light brown (denuded); mesopostnotum light brown, slightly darker medially; paratergite light brown; pleuron uniformly light yellowish brown; *apn* devoid of scales, with 3 strong darkly pigmented upper setae; *ppn* with 1 weak seta and no apparent scales (rubbed?, see ♂ below); *sp* with 1 weak seta; *ppl* with 2 setae and no scales; *stp* with 4 weak marginal setae (1 upper and 3 posterior), and with a few scattered shiny transparent scales on upper 0.5, very difficult to detect in certain lights; *pra* with 2 setae; *mep* with a single upper seta. *Wing.* Scales light brown on anterior veins, pale grayish translucent on posterior veins; cell R_2 about 0.57 of R_{2+3} and equal to or barely shorter than cell M_2. *Legs.* Coxae and trochanters same color as pleuron; C-I with a few light golden translucent scales anteriorly; C-II with a few transparent scales anterolaterally; C-III without scales; mid- and hindfemora light brown scaled dorsally, light grayish ventrally, with only 1-3 inconspicuous dorsal setae; tibiae and tarsi light brown scaled; hindtarsomere 1 about 1.3 of tibia, tarsomere 4 about 3.3 of tarsomere 5. *Abdomen.* Terga uniformly light bronzy brown scaled, with very weak purple-green reflections; laterotergite without apparent scales; tergum I devoid of scales except for a very small dorsal patch; sterna uniformly grayish or dingy brown scaled.

MALE. Essentially as in female except for sexual differences and in those few characters missing or damaged in the single female specimen. *Head.* Proboscis about 1.1 of forefemur; 2, 3 pairs of labial basal setae; antennal flagellum about equal to or barely longer than proboscis; Flm 12, 13 long, with 13 longest and equal to more than combined length of flagellomeres 9-11; flagellar whorls strongly plumose, each with 20 or more setae. *Thorax.* Scutal integument light but more brownish in type ♂; scutellum light grayish brown, scales brown, restricted to a small patch on midlobe and 2, 3 moderately broad scales on lateral lobe, midlobe with 5 strong marginal setae and 1, 2 small

weak setae, lateral lobe with 3 strong marginal setae and 2 small weak setae; pleuron light grayish brown; *ppn* with 3, 4 flat grayish scales on dorsal border; forefemur with 8 conspicuous setae on posterodorsal margin and about 5 similar setae on anteroventral margin; midfemur without marginal setae. *Terminalia* (Fig. 4). Tergum IX without setae or lobes, apical border more or less convex, or with only a very slight indentation at middle; tergum X a complete weakly sclerotized band extending beyond margin of tergum IX with narrow median emargination but not produced into distinct independent lobes; basimere with few long stout tergolateral setae, setae on tergomesal surface weak, sparse; basal mesal lobe of basimere well developed with 3 long, stout setae on tergal margin and 4-6 much smaller setae, the largest and most apical of the group arising from a prominently extended fingerlike process; distimere tapered and gently curved from base, spiniform prominent; aedeagus broad, plates widely separated and joined by a prominent tergal and sternal bridge, sternal bridge broadly expanded at middle, each plate with 5, 6 short, stout recurved teeth on apicosternal margin; proctiger without cercal setae.

PUPA (Fig. 4). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly light brown. *Cephalothorax.* Seta 6-CT single, shorter than 7-CT; 7-CT with 2-4 branches. *Respiratory Trumpet.* Dark brown. *Abdomen.* Seta 6-I-II with 2-4 stout branches; 7-I-II with 2-6 stout branches; 1-II small with 7-11 delicate branches; 1-III-VI, becoming progressively longer and stronger to VI, each with 6-10, 4-8, 5, 6 and 6-8 branches respectively; 6-III-V with 2-4 branches; 6-VI with 3-6 branches; 6-VII located ventrally with 5-8 branches; 5-IV-VI approximating the length of each succeeding segment and with 2, 3 lightly barbed branches which occasionally exhibit a few secondary terminal branches; 9-VIII short, with 6-11 finely barbed branches. *Paddle.* Midrib darkly pigmented; outer margin with small sharp serrations from about basal 0.3 to apex, inner margin with 4-5 large, strong, apically hooked teeth and with a few small spicules apically.

LARVA (Fig. 3). Chaetotaxy as figured. Diagnostic characters as follows: *Head.* Shape more or less quadrate, light brown, with prominent rounded apicolateral projection above antennal bases; labral emargination narrow, with bases of seta 1-C set very close together; lateral anteroventral margin of cranium with strong spine-like serrations; seta 1-C slender, simple; 4-C single, close to midline and near clypeolabial suture; 5-C single, minute; 6-C single or double, minute, set far anterolaterad of 5-C near anterior border and slightly above level of 4-C; 7-C set posterolaterad of antennal base, with 13-18 lanceolate branches; 11-C prominent, with 6-10 branches; 14-C a long stout pigmented spine; mentum with 13 teeth. *Antenna.* Short, stout, index about 3.0-3.5, a few minute spicules dorsally; seta 1-A with 3-5 lateral branches on one side of a stout main stem; 2, 3-A long, stout, darkly pigmented. *Thorax.* Seta 1-P single with lightly frayed tip; 7-P long, stout, single; 13-P with 2, 3 weak branches; 14-P with 8-13 branches; 13-M, 8-T stellate. *Abdomen.* Seta 6-I-II with 4, 5 barbed branches; 3, 4-I, 1, 3, 13-II and 1, 13-III-VI with flattened, lanceolate, unpigmented branches; 3-VIII with 5-6 strongly barbed branches which are split into a varied number of uneven end branches; plates of segment VIII very large, closely approximated dorsally; comb scales 8-10, each scale a strong pointed spine with fine lateral spicules on basal 0.5, one scale near middle 1.5 to 2.5 the length of those to each side. *Segment X.* Saddle complete, with numerous very fine spicules on posterolateral margin, integument sculptured, light brown; 2-X with 7-10 branches of graduated lengths; 4-X with 4 pairs of setae on grid which is narrowly connected to

saddle midventrally, each seta (4a-d-X) with 6-9 branches. *Siphon.* Short, of uniform width, index about 2.0-2.3; pecten teeth 11-13, extending well beyond middle of siphon, each tooth lightly fringed on both sides, apical fringe slightly stronger; 1-S with 9-13 branches, inserted at about middle of siphon.

TYPE-DATA. Holotype male with slides of associated pupal and larval skins, and terminalia with the following information: PHILIPPINES, Mindoro Island, *Oriental,* Victoria District, San Antonio, 9 July 1969, B. A. Harrison and K. Mongkolpanya, collectors, collection number 470-7, terminalia preparation number 70/101, SEAMP accession number 192, collected as a larva from a small freshwater crab hole, at the edge of a seepage spring, bordering a cultivated field; 1 paratype male (470-6) with slide of associated pupal and larval skins, same data as holotype; 2 paratype larvae, Mindoro, *Oriental,* Victoria District, Matungao, 16 July 1969, collection number 476 and 2 larvae, San Pedro, 18 July 1969, collection number 512, both collected by Y.-M. Huang and E. L. Peyton from small freshwater crab holes in mountainous terrain in a secondary rainforest; and the following paratypes all from Mindoro, *Occidental,* San Jose, collected from crab holes located in forest or jungle, on various dates in 1945 by E. S. Ross: 1 female with associated pupal and larval skins on 2 separate slides, 21 March; 2 males (in very poor condition) with slides of terminalia, 3 March; 1 larva, 15 February; 2 larvae, 26 February; 4 larvae, April; and 2 larvae, May. The holotype and majority of paratypes are deposited in the USNM. Two paratype slides of whole larvae will be deposited in each of the following: BMNH and California Academy of Sciences.

DISTRIBUTION. Material examined in addition to the type-series: 1♂ and 3 l, 2 p without associated adults from:

MALAYSIA. *Sabah,* Jesselton, 1♂.

PHILIPPINES. *Mindoro: Oriental - Victoria,* San Pedro, 2 l, 2 p; *Mindoro: Occidental,* San Jose, 1 l.

DISCUSSION. This is one of the smallest known species in Southeast Asia. Although the adult is rather drab in color and superficially resembles several other small unornamented species of the subgenus, it can be distinguished without difficulty from most. In general coloration it appears closest to *lui* Lien but is readily distinguished from it by the characters presented in the key. The single female of *harrisoni* is in poor condition, retaining only one mid- and one hindleg and a few other characters which are questionable. However, 2 males are from associated rearings and are in excellent condition. Salient points in *harrisoni* are as follows: absence of scales on *apn;* 3 strong upper *apn* setae; *pra* with 2 setae and a single small seta on *ppn* and upper *mep,* 4 weak setae on *stp;* wing cell R_2 about equal to length of cell M_2. The short antennae of male and female are also significant.

The pupa and larva are unique in several characters and are readily separated from all known species. The unusual hooked serrations on the inner margin of pupal paddle are known elsewhere only in the Ethiopian *montana* Ingram and de Meillon, and the form of the trumpet differs from all known species of the subgenus. The peculiar larval head, including the general shape, setal development and placement, have no equal in the genus. Seta 1-II-VI with the flattened lanceolate branching is also unusual. This species is dedicated to Dr. Bruce A. Harrison in recognition of his work on mosquitoes in Southeast Asia.

BIONOMICS. The species has been found only in small freshwater crab holes (10) along the edge of seepages or shallow forest streams. It does not appear to be common in any area and requires considerable effort to collect the immature stages. In 1969, great numbers of crab holes were examined by

Y.-M. Huang and E. L. Peyton in the Victoria District of Mindoro but only a very small number contained larvae or pupae of this species and most produced only a single specimen. In one such collection several larvae of *rossi* Delfinado were also encountered. The larvae of this species are small and have a typical anopheline resting and feeding attitude, just below the water surface, and are easily mistaken for anopheline larvae. It was not observed if surface feeding was similar to that of the anophelines but larvae isolated in rearing cups for about 2 weeks were never observed dropping to the bottom and when disturbed would only move across the water surface in typical anopheline movements. The adult male from Malaysia was attracted to a light in the evening and collected off a wall by D. H. Colless in 1956. The widely disjunct distribution of this species is probably due wholly to the absence of collections from freshwater crab holes on the islands between Mindoro and Sabah.

bicolor series

DISCUSSION. Although represented in the Oriental and Indomalayan regions by only 7 species, this series contains a greater number of species than any of the others currently recognized. Representatives occur in several geographic regions which include the Ethiopian, Indomalayan, Malagasy, North Australian, Oriental and South Pacific. The series could be viewed as representing the typical *Pseudoficalbia* since it includes all of the Ethiopian species originally included in Edwards' (1941) group C, including the "Haplotype" *inornata* (Theobald) (= *fusca* (Theobald)). It probably also includes a majority of the species of Section A of Peyton (1972) of *Pseudoficalbia* of the Malagasy and Ethiopian regions, but several of these are insufficiently known at present to assign them. Mattingly *in* Mattingly and Brown (1955: 89) suggested a close relationship between the 3 Seychelles species of *Pseudoficalbia* and Belkin's (1953) Section C_2 of *quadrimaculata* Edwards of the Solomon Islands and related Papuan species, and that on evidence then available it seemed, "best to regard the Seychelles species as a Malagasy group with Malayan affinities." I agree with this view. While it seems quite clear that species from the above listed faunal regions belong to the *bicolor* series as defined and are therefore apparently phylogenetically related, it is just as evident that the species within the series are further represented by several distinct, independent, species groups with definite zoogeographic limits. Although I have not attempted to define groups below the series level, principally because of difficulties in defining the adult stage, I do recognize the existence of such possible groupings within the series on the basis of similarities in one or more life stages. It is believed that an attempt to define these on the basis of small differences in characters not yet fully known or understood would at best be tenuous and would serve no useful purpose. As an example, I believe that *obscura* Edwards of the Oriental, Indomalayan and Papuan regions is very closely related to *atra* Theobald and *diagonalis* Brug of Papua and *quadrimaculata* of the Solomon Islands, and that these 4 species represent a distinct species group, in the traditional sense, within the *bicolor* series. This group could be defined by the following; in the adult: a few small broad scales on anterior margin of scutum, sternopleuron without a patch of scales, tergum IX of male only slightly produced at middle on apical margin; in the pupa: seta 1-P strong, 2-P weak; and in the larva: seta 6-C inserted near clypeolabial suture, comb plates connected dorsally. Further, it seems to me, that *painei* Edwards of the Fiji Islands is more similar to the Indomalayan and Oriental *abstrusa*, *bicolor*,

gouldi Peyton and Klein and probably *approximata*, *demeilloni* Peyton and Rattanarithikul and *lutescens* but these become a little more difficult to define than the *atra* group. As can be seen in the illustrations of the male terminalia of *abstrusa* and *gouldi*, tergum IX is only moderately produced at the middle, somewhat intermediate between the *atra* group and the very strongly produced tergum IX of the others. In addition the adult of *gouldi* is without scales on the sternopleuron. The Ethiopian *fusca* group is more similar to the latter group than to the *atra* group. However, much of this is based on general similarities in the immature stages and to a somewhat lesser extent in the male terminalia. While pupal and larval characters are recognized as probable indicators of affinities at the series level, I am not confident that these and other characters provide a true index of affinities below this level. I am therefore reluctant to attempt a definition of what could appear to be somewhat superficial species groups. Extralimital species which appear to belong to the *bicolor* series are: *atra*, *browni*, *colocasiae*, *diagonalis*, *fusca*, *mashonaensis*, *nepenthes*, *nigripes*, *nigromaculata*, *ornata* Theobald, *painei*, *pandani* and *quadrimaculata*. All of these belong to Section A of Peyton (1972) and the series is rather easily separated from the other series of Section A defined here. The most distinctive characters for the series is the development of tergum IX of the male terminalia, for it is without known exceptions. The presence of pupal seta 2-P is known only in this series but it is absent in some species, a very well developed pupal seta 1-IX is present in all species. The stout rather widely spaced, spine-like seta 1-C of the larva serves to separate all species from other series of Section A of the Indomalayan and Oriental regions. The adults are not strongly distinguished from the adults of other series, especially when treated as a group and some superficially resemble those of the *recondita* series rather closely. The generally shorter erect head scales, the distinctly shorter, weaker, dorsocentral and supra-alar setae of the scutum and the lower number of ocular setae usually distinguish the adults of this series from those of the *recondita* series.

Species of the *bicolor* series utilize a wide variety of natural and artificial habitats. Some are restricted to such natural container habitats as bamboo, tree holes, leaf axils, and *Nepenthes* pitchers while others are found in rock pools, ground or stream pools, forest swamps, marshes or seepage pools, large fallen leaves of various kinds, coconut shells and various discarded artificial containers. Egg laying habits have been described for only one species. Paine (1943) described the eggs of *colocasiae* as laid in small parallel-sided rafts, similar to that of *Culex* Linnaeus but less in number. Mattingly (1970) discusses the egg laying habits of this species and several others of the genus *Uranotaenia*.

ADULT. *Head.* Proboscis 0.85-1.10 of forefemur; antennal flagellum of female 1.25-1.55 of proboscis; ocular setae 5 (rarely 6 on *obscura*), an extra minute interocular seta present; *erect scales short, less than 0.5 the length of antennal flagellomere 1*, usually numerous. *Thorax.* Scutal scales varied in color, never white on margin, usually uniformly narrow, curved, a few small broad scales on anterior margin at dorsocentral and acrostichal line in a few species; *dorsocentral and supra-alar setae only moderately long and stout, less than 0.5 the width of scutum* never exceptionally long and stout as in *recondita* series or as in most species of the *bimaculata* series; pleuron uniformly pale or with distinct darker areas on some sclerites; *apn* with or without scales; *ppn* usually with scales (except *lutescens* and occasionally *bicolor*); *ppl* with 3-5 setae; *stp* with 5-12 setae on upper and posterior margins, with or without scales; upper *mep* with 2-5 setae, lower seta very weakly

developed in some species. *Wing.* Cell R_2 0.38-0.48 of R_{2+3} and distinctly shorter than cell M_2. *Legs.* Hindtarsomere 1 always longer than tibia (1.14-1.40).

MALE TERMINALIA. *Tergum IX distinctly produced apicomesally, mesal projection varied in length and width, short, very broad and rounded apically, long narrow, truncate or rounded apically, intermediate, or rarely long, narrow and tapered from base to very narrow, rounded, apex* (Ethiopian *mashonaensis*, Edwards (1941: 59) defines it as "finger-like process"); without setae; *tergum X complete, usually as a narrow weakly sclerotized band tergomesally where it is fused with and produced the same as tergum IX, apical margins of both continuous along the produced portion; neither extending beyond the other, without lateral lobes;* basal mesal lobe of basimere well developed, often darkly pigmented with several long, stout, setae grouped tergoapically and with or without a long, stout seta on sternoapical margin; distimere usually rather slender, straight or slightly curved, with *more or less blunt or rounded apex with a narrow membranous, apical, lateral, flange or hood from under which the stout, acute spiniform arises* (except *abstrusa* and *gouldi*); plates of aedeagus usually closely approximated, never widely separated, usually (Indomalayan and Oriental species) with a more or less continuous apical, tergosternal, marginal row of strong, straight or slightly curved, simple, pointed teeth, usually the more tergomesal teeth less curved, directed apically or apicolaterally, and usually not as distinctly separated from the more strongly curved teeth on apicosternal margin as in *recondita* and others; *proctiger without cercal setae.*

PUPA. *Cephalothorax.* Seta 6-CT never exceptionally long and strong as in *recondita* series, often shorter than 7-CT and rarely longer than respiratory trumpet, inserted nearer to 7-CT than to 5-CT; respiratory trumpet varied, rarely darkly pigmented, without expansion near base on anterior surface. *Abdomen.* Seta 2-II mesal or lateral to 5-II, usually strong, rarely approaching length of segment III; 6-VI never significantly longer than 6-V; *1-IX strongly developed. Paddle.* Inner and outer margins with stout, spiculate serrations; inner part wider or rarely narrower than outer part; 1-P present; *2-P frequently present,* usually minute.

LARVA. *Head.* Apical process of median labral plate prominent, usually broadly rounded or slightly angled apicomesally, *never with distinct apicomesal projection on basomesal side of seta 1-C. 1-C stout, spine-like, inserted within a distinct socket on labral process,* bases separated by more than length of individual seta; 5-C single, 6-C single or double, both simple or barbed, 7-C usually branched (1-10); mentum with 15-27 teeth. *Antenna.* Usually slender; with or without spicules; never darkly pigmented; seta 1-A single or rarely double. *Thorax.* Seta 1-P single, 3-P with 2-7 branches, 4-P single to 7 branched, 7-P usually single or double (1-4), 14-P single or rarely double; 1-M, T weak; 5-T small, weak. *Abdomen.* Without stout stellate setae; 6-I-II single to 4 branched, ends acuminate; 5, 9-III-VI, never stout or spine-like; 6-III-VI usually significantly shorter than 6-II; comb plate usually large, (except *approximata*) complete dorsally in some species; 1, 2-VIII inserted on a common triangular sclerotized plate in some species; 4, 5-VIII widely separated, but never as conspicuously separated as in the *recondita* series. *Segment X.* Usually lightly imbricate, with or without spicules on posterolateral margin; seta I-X stout, double to 6 branched (all Indomalayan and Oriental species); 4-X with 5 pairs of setae branched as follows: 4a-X 1, 2, b 1-3, c 1, 2, d 1-3, e 1-5, 4e-X often greatly reduced. *Siphon.* Seta 1-S subventral.

URANOTAENIA (PSEUDOFICALBIA) ABSTRUSA NEW SPECIES
(Figs. 5, 6)

Uranotaenia philippinensis Delfinado 1966a: 37 (in part, distribution data only).
Uranotaenia lagunensis of Delfinado 1966b: 45 (in part, L*. figs. 81-3).

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark brown scaled, with a few small setae at apex and a paired dorsal submedian row of a few small inconspicuous apically directed setae on apical 0.5; 1 pair of labial basal setae; palpus about 0.11 of proboscis and about equal to antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, light yellowish brown laterally, with a few minute setae dorsomesally; flagellum about 1.36 of proboscis or exceeding proboscis from about base of flagellomere 11; Flm 1 about equal to Flm 2 and with a few light brown scales basomesally; flagellar whorls each of 6 setae; 1 long, strong and 1 weak interocular and 4 ocular setae; decumbent scales dark brown without pale ocular line, faintly grayish with weak blue-green reflections at sides; erect scales rather large, numerous, covering most of vertex, dark bronzy brown. *Thorax.* Scutal integument uniformly dark chestnut brown; scales rather dense, narrow, curved, uniformly light bronzy brown; prescutellar space largely scaled, with a small posterior bare space; scutellum light brown, scales light grayish brown with very weak bluish green reflections on midlobe; mesopostnotum dark brown, lighter on basolateral corners; paratergite dark brown; pleuron uniformly brown, very little contrast with scutum; *apn* with numerous inconspicuous grayish translucent scales; *ppn* with 1 strong seta and 4-8 inconspicuous grayish translucent scales on upper posterior corner; *sp* with 1 seta; *ppl* with 3 setae of near equal development; *stp* with 3, 4 upper and 6-8 weaker irregularly spaced posteromarginal setae and with a small inconspicuous patch of sparsely arranged shiny transparent scales on upper 0.33 and a single row extending down posterior margin (difficult to detect in some lights); upper *mep* with 2, 3 setae. *Wing.* Scales dark brown; cell R_2 about 0.44 of R_{2+3}. *Legs.* Coxae and trochanters light brown; C-I with a few very inapparent grayish translucent scales on anterior surface; C-II, III with at most a few scattered transparent scales; femora dark brown scaled dorsally, light grayish brown with strong purple-green reflections at some angles ventrally, without conspicuous grouping of setae; forefemur with 3, 4 setae on anteroventral margin beyond middle, 9-12 setae on posterodorsal margin from basal 0.3 to near apex; midfemur with 6, 7 setae on basal 0.6 of dorsal margin, 12-14 conspicuous setae scattered on anterior and posteroventral margin, occasionally a few minute inapparent setae also visible on ventral margin; hindfemur with 2, 3 conspicuous dorsal setae beyond middle and a few minute, very inapparent setae on ventral margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.3 of tibia, tarsomere 4 about 3.0 of tarsomere 5. *Abdomen.* Terga uniformly dark brown scaled, not much darker than thorax, with bronzy or weak bluish green reflections depending on angle of light; laterotergite with a few transparent scales; sterna light dingy brown with pale brown or grayish scales, usually indefinitely darker on sterna VII, VIII.

MALE. Essentially as in female except for sexual differences. *Head.* Antennal flagellum strongly plumose, whorls each of more than 20 setae, about 1.1 of proboscis or exceeding proboscis by less than length of flagellomere 13; flagellomeres 12, 13 about equal. *Terminalia* (Fig. 6). Tergum IX very broadly produced in middle, rounded on apical margin, basal emargina-

tion broad, deep; tergomesal surface of basimere with numerous long, strong setae and a few scattered short, weak setae; basal mesal lobe of basimere with 7-9 long, stout, tergoapical setae and 4-7 weak basal setae, 1, 2 weak setae on sternoapical margin; distimere rather strong, more or less straight, tapered to pointed apex, with numerous rather long, stiff setae on apical 0.33; spiniform stout, acute, not arising from under a membranous hood; plates of aedeagus each with 6-9 short, slightly curved teeth, in a single or irregular double row on apical margin, with the most tergal 1, 2 teeth strongest, occasionally a few very small, stout submarginal teeth and a few minute, spiniform spicules basolateral to apical teeth.

PUPA (Fig. 6). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly pale brown. All setae except 1-I and 12-CT with simple branches. *Cephalothorax.* Setae 1, 2-CT with 4-6 branches, 3-CT with 4-7 branches, 4, 5-CT with 7-10 branches, 8-CT with 8-12 branches. *Respiratory Trumpet.* Pale brown, tracheoid on anterobasal 0.25; short, broad, slightly expanded, pinna produced and distinctly concave on lateral apical margin; index about 2.4-2.7. *Metanotum.* Seta 10-CT with 3-6 branches, 11-CT single or with several distal branches, 12-CT with 4-5 lightly barbed branches; alveolus of 13-CT present, occasionally with small raised spur; 6-I, II double; 1-II lightly dendritic with 3-5 stiff primary branches, 3-II, III double to 5 branches from beyond base; 1-III with 5-9 branches, 6-III-VI with 3-5 delicate branches; 1-IV, V with 5-7 branches, 5-IV with 5-8 branches, slightly shorter than 1-IV; 5-V with 5-7 branches, slightly shorter than 1-V; 1-VI with 4-7 branches, 5-VI with 3-6 branches, about equal to 1-VI; 1-VII with 4-6 branches, 5-VII with 4, 5 branches, slightly longer than 1-VII, 6-VII located ventrally, small with 3-6 very weak branches; 9-VIII with 4-6 weak branches. *Paddle.* Midrib pale brown on basal 0.8; outer margin serrate on apical 0.5; inner margin with a few very small spicules on apical 0.2; seta 2-P minute, rather inapparent.

LARVA (Fig. 5). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Pale yellow; seta 4-C with 3-5 delicate branches, 5, 6-C strong, barbed, 6-C conspicuously lateral to 5-C and on level with 7-C, 7-C with 6-10 lightly barbed branches, 11-C very small, with 3-5 weak branches, 14-C very stout, darkly pigmented, spine-like, area surrounding base darkly pigmented; mentum with 21-23 teeth. *Antenna.* Pale brown, with scattered stout, sharp spicules dorsally and ventrally on basal 0.75 with those middorsally distinctly stronger; seta 1-A single, stiff, about 0.5 of antenna. *Thorax.* Seta 3-P with 5-7 lightly barbed branches, 4-P triple, lightly barbed, 7-P double, lightly barbed; 1-M with 5, 6 branches; 7-M single, 8-M with 5-7 branches, 9-M with 4-6 branches, 14-M minute, dendritic; 1-T with 3-5 branches, 7-T with 5-8 branches, 9-T with 4-6 branches, 13-T with 5, 6 long weak branches. *Abdomen.* Seta 1-I minute, 3-I with 4, 5 branches, 6-I, II double, barbed, ventral branch shorter and weaker than dorsal branch; 1-II with 3-6 branches, 13-II with 3, 4 branches; 1-III with 4-6 branches, 6-III-VI with 3-5 simple branches, considerably shorter than 6-II, 13-III-V with 4, 5 branches; 1-IV with 4-6 branches; 1-V with 6, 7 branches; 1-VI with 5, 6 branches; 1-VII with 6 stiff lightly barbed branches, 3-VII with 5-7 stiff, lightly barbed branches, 13-VII with 3-5 stiff, lightly barbed branches; 1-VIII with 3, 4 finely barbed branches, inserted on small triangular sclerotized plate with 2-VIII, 3-VIII with 5, 6 barbed branches, 5-VIII with 4-7 finely barbed branches; comb scales 9-13 on a large sclerotized plate, each tapered to sharp point apically, finely fringed laterally to near apex, median scales slightly longer than those to each side. *Segment X.* Saddle complete,

pale yellowish brown, without conspicuous imbrications, except near posterior margin, posterior margin without spicules, but the more apical imbrications with a few minute spicules; seta 1-X double, very stout, strongly barbed, 2, 3-X double, 4a, b-X double, 4c-e-X single, 4e-X very short. *Siphon.* Pale yellowish brown, dark brown dorsally near base and on narrow basal ring; inconspicuously imbricate on basal 0.6, imbrications without spicules; index 3.7-4.9; pecten teeth 24-29, very inconspicuous, without pigmentation, each tooth very short, broad, rounded apically, about as wide as long, fringed apically with fine spicules, reaching to about 0.56 of siphon; seta 1-S with 7-9 stiff, finely barbed branches, inserted within distal 1-3 pecten teeth at 0.51-0.56 of siphon; trachea terminating in a distinct sclerotized filament.

TYPE-DATA. Holotype female with slide of pupal and larval skins, with the following collection data: PHILIPPINES, *Mindoro*, San Jose, 30 January 1945, E. S. Ross, collector, number C-63, collected as a larva from a forest swamp. Paratypes: 2 females, numbers C-67 (with larval skin), C-64 (with larval and pupal skins) each bearing paratype label of *Uranotaenia philippinensis* Delfinado, 1 male number C-61 (with larval and pupal skins), 3 fourth stage larvae on slides, all with same data as holotype; 6 females (2 on slides), 7 males, same data as holotype except 22 February 1945, without number; 1 female, 4 fourth stage larvae on slides, same data as holotype except 3 March 1945, without number; 4 females, 2 males, same data as holotype except February 1945, without number; 1 female, same data as holotype except 29 January 1945, without number; 1 female, with terminalia on slide, bearing paratype label of *Uranotaenia philippinensis* Delfinado, same data as holotype except 9 March 1945, without number. The 3 above specimens labeled as paratypes of *philippinensis* are not the same as the type of *philippinensis* which is treated here as a synonym of *obscura* Edwards (see further comments under discussion).

The holotype and paratypes are deposited in the USNM. Paratypes of 2♂, 2♀ and 1 larva will be deposited in the BMNH and 2♂, 2♀ and 1 larva will be deposited in the California Academy of Sciences. The holotype is in good condition. The paratypes are in good to fair condition.

DISTRIBUTION. Material examined (including type-series): 20♂, 21♀, 19 L; 9 with associated skins (9 l, 8 p), 16 unassociated skins (10 l, 16 p).

PHILIPPINES. *Mindoro*: *Occidental* - San Jose, 10♂, 16♀, 8 L, 14 l, 16 p. *Luzon: Pampanga* - Clark Air Force Base, 4♂, 1♀, 4 L, 6 l, 6 p. *Zambales* - Subic Naval Base, Kalayaan River, 4♂, 4♀, 7 L, 2 p. *Mindanao; Cotabato*-Kabacan, 2♂.

DISCUSSION. The small uniformly dark brown adult of this species, is without striking features and could be confused with a few other brown unmarked species. Superficially it resembles *hirsutifemora* and *obscura* but there is no suggested relationship between the 3. The male terminalia and immature stages differ significantly from both of these. The immature stages resemble those of *gouldi* but the 2 are easily separated on a number of characters, and the adults of *gouldi* are quite different.

The adult differs from the adult of *obscura* and *hirsutifemora* primarily in the characters in the adult key, and other differences found under the descriptions of each.

Delfinado (1966a) confused the adult of this species with *philippinensis* (= *obscura*) (Peyton 1972). In Delfinado (1966b) the larva was confused with that of *lagunensis* (= *bicolor*). The paratype series of *philippinensis* in the USNM contains 2 females and 3 males of *abstrusa*. These specimens and the type of *philippinensis* are not conspecific. It appears that Delfinado did not

include these in any significant way in the description except for a reference to the pleuron which reads, . . . "Few translucent scales on posterior lobes and sternopleura (in older specimens these scales may be rubbed off but always present on anterior pronotal lobes)." Actually this character is one of the more significant for separating *abstrusa* and *philippinensis* (= *obscura*). The sternopleuron is devoid of scales on the type of *philippinensis* and other specimens of *obscura*. One of the above female paratypes, number C-64, San Jose, Mindoro P. I., 30 January 1945, E. S. Ross, has a slide with the associated pupal and larval skins, but it is labeled in Delfinado's handwriting as *Uranotaenia lagunensis*. Apparently Delfinado did not have the slide available or overlooked it when preparing the description of *philippinensis*. In Delfinado (1966b: 45) the larva of *lagunensis* was described as, "The larva has the head h-5 & 6 less modified and shows marked individual variations in the branching of abdominal hairs, the size and shape of siphon, and the presence of spicules along caudal margin of saddle. These variations are particularly noticeable among specimens breeding in forest swamps and hoof prints." Actually she described the larva of both *lagunensis* (= *bicolor*) and *abstrusa*, since she illustrated (figs. 81-3) the larva of *abstrusa*. It appears the illustration may have been made from slide C-64. The variations mentioned are precisely the differences observed in the 2 species. Larval slide C-64 is from a forest swamp and those from hoof prints were probably *lagunensis*. Baisas (1974, Fig. 79a) reproduced Delfinado's (1966b) illustration of the larva of *lagunensis* (= *abstrusa*).

Three of the above paratype adults of *philippinensis* are in poor condition and could easily be confused with *obscura* even though there are a few scales on the sternopleuron. The absence of broad scales on anterior margin of scutum was not mentioned in the description of *philippinensis*, which may help further to explain the confusion.

BIONOMICS. Immature collections have been examined from the following habitats: stream pool (4), forest swamp (2), shaded pool (1), creek (1). Larvae were found in association with *lagunensis* in 2 stream pool collections. No other data are available on the bionomics of this species.

URANOTAENIA (PSEUDOFICALBIA) APPROXIMATA NEW SPECIES
(Figs. 7, 8)

FEMALE. Very similar to *demeilloni* except for the following. *Head*. Proboscis about 0.91-0.95 of forefemur; decumbent scales darker brown with grayish sheen on vertex, grayish with blue green reflections at sides, without pale ocular line; erect scales more numerous, rather evenly distributed over vertex. *Thorax*. Scutal scales more uniformly light or dark bronzy brown; pleuron light grayish or whitish brown with distinct darker areas as follows: *apn, ppn, psp* and extreme upper edge of *stp;* scales on *apn* and *ppn* distinctly grayish with weak bluish green reflections; *ppn* with 1 seta and usually less than 5 (3-8) scales on upper posterior corner; *stp* with scales more numerous, forming a distinct patch of slightly overlapping scales on upper 0.3 but quite inapparent in some lights due to transparency of individual scales. *Abdomen*. Pale scaled basal tergal bands less conspicuous, absent on III, very faint or absent on IV, VII, readily apparent on V, VI only, usually not quite reaching lateral margin on either, VIII light grayish brown with weak bluish reflections.

MALE. Very similar to male of *demeilloni* and differing only in head and thoracic ornamentation as in female. *Terminalia* (Fig. 8). Terga IX, X with

apical margins produced into a long, moderately broad, median, apically truncate lobe; a small inconspicuous tubercle on tergolateral surface of tergum IX; tergomesal surface of basimere with numerous short, weak setae, 3, 4 long strong setae sternoapical to basal mesal lobe; basal mesal lobe of basimere with 2 long stout, widely separated tergomesal setae on small distinct processes, 2, 3 similar slightly weaker setae in a row basal to these near tergal margin; 6-8 scattered, short, weak basal setae; distimere rather stout, long, slightly curved, of near uniform width to near tapered blunt apex; spiniform small, stout, acute, arising from under a distinct membranous hood; plates of aedeagus each with 2 stout, slightly curved apicolaterally directed, subapical, tergomesal teeth, 3 curved, subequal teeth on apicosternal margin and 0-2 small lateral, subapical teeth.

PUPA (Fig. 8). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown. *Cephalothorax.* Seta 1-CT single or double, 2, 3-CT single to triple, 4-CT single or double, 5-CT double or triple, 6-CT only slightly longer than 7-CT, 8-CT with 2-4 simple branches. *Respiratory Trumpet.* Yellowish brown; index 3.2-3.7, not noticeably expanded apically; indistinctly tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT single, bifid or trifid, 11-CT strong, single or bifid, usually barbed near middle, 12-CT single, weaker than 11-CT, alveolus of 13-CT not apparent. *Abdomen.* Seta 6-I-VII single, located dorsally on VII; 1-II very small, usually weakly dendritic with 2-4 primary forked branches or with 3, 4 simple branches, 2-II strong, shorter than 3-II, 3-II, III strong, single to triple; 1-III small, with 3-5 weak branches; 1-IV double or triple, stiff, considerably longer than 1-III, 5-IV-VI double, rather stout, darkly pigmented, usually with a few lateral barbs near middle, about 0.75 the length of each succeeding segment; 1-V single or double, stiff; 1-VI single or double, stiff; 1-VII single, 5-VII single or double, stiff, about 0.75 of segment VIII; 9-VIII with 3-5 strong, pigmented, sparsely barbed branches, as long as or slightly longer than segment VIII. *Paddle.* A darkly pigmented line across basal portion; midrib faintly pigmented from base to apex; very broad, slightly tapered apically; inner margin rounded to base and not as abruptly excavated basally as most other species of the subgenus; outer part as wide as or wider than inner part; outer margin with serrations from about basal 0.25 to apex; inner margin with numerous small sharp spicules of varied lengths from about basal 0.3 to apex and several smaller submarginal spicules toward middle; seta 2-P absent.

LARVA (Fig. 7). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown, dark brown on collar; seta 4-C double, inserted posterolaterally to 6-C, 5, 6-C simple, bases of 5-C considerably farther apart than those of 6-C, 7-C double or triple, branches stiff, simple, 11-C minute, single to triple, 14-C single, weak; mentum with 21-23 teeth. *Antenna.* Pale brown, without spicules; seta 1-A single. *Thorax.* Seta 3-P double to 4 branched, lightly barbed, 4, 7-P double, lightly barbed, 14-P single, 1-M, T with 3-5 branches, 8-M double, 9-M with 3, 4 branches; 14-M minute, dendritic; 7-T with 3, 4 branches, 9-T double or triple. *Abdomen.* Seta 6-I, II double, strongly barbed; 1-II-IV small, with 3, 4 weak branches, 13-II-IV with 3, 4 weak branches; 6-III double or triple, strong, lightly barbed, considerably longer than 6-IV, 6-IV-VI triple or rarely double, lightly barbed; 1-V, VI double or triple, 13-V double or triple; 1-VII minute, double; 1-VIII small, double or triple, with 2-VIII not inserted on sclerotized plate, 3-VIII with 6, 7 lightly barbed branches; comb scales 9-11 on a small, oval, weakly sclerotized plate, each rather long broad, slightly tapered api-

cally, with conspicuous uniform fringe of long slender spicules on lateral and apical margins. *Segment X.* Saddle complete, pale brown, lightly imbricate apically; without spicules on posterolateral margin, but the apical imbrications with numerous long slender spicules and a few stronger ones which extend beyond or arise very near posterior margin of saddle and occasionally appear as marginal; index less than 1.0; seta 1-X double, stout, lightly barbed, 2,3-X double, branching well beyond base, 4a-c-X double, long, 4d, e-X single, very short. *Siphon.* Light brown; indistinctly imbricate on basal 0.5; short, broad, index 2.5-3.0; pecten teeth 16-20 in an irregular row, each broad, longer than wide, with a conspicuous lateral and apical fringe of long slender spicules, apical spicules slightly longer, pecten reaching to about 0.50-0.57 of siphon; seta 1-S with 6-8 simple branches, inserted at about 0.55-0.58 from base of siphon and usually slightly beyond distal pecten tooth.

TYPE-DATA. Holotype female with slide of pupal and larval skins with the following collection data: THAILAND, *Chiang Mai,* Chiang Dao, Ban Sop O Nok, 17 July 1970, Kol Mongkolpanya and Anun Poosiri, collectors, collection number 4548-8, SEAMP accession number 241, collected as a larva from a bamboo pot at an elevation of 600 m. Allotype male with slides of terminalia and pupal and larval skins, same data as holotype, except number 4548-3, SEAMP terminalia preparation number 71/22. Paratypes: 3 males, 4 females, with slides 4548-1, -2, -4, -7, -9; 1 male, 1 female (both mounted on slide) with associated pupal and larval skins, same data as holotype except numbers 4540-11, -14.

The holotype, allotype and paratypes are deposited in the USNM. Paratypes of 1 male, 1 female with pupal larval skins will be deposited in the BMNH. The holotype and allotype are in excellent condition.

DISTRIBUTION. Material examined (including type-series): 11♂, 8♀, 1 L; 19 with associated skins (17 l, 19 p).

THAILAND. *Narathiwat:* Waeng, 4♂, 1♀, 1 L, 5 l, 5 p. *Chiang Mai:* Chiang Dao, Ban Sop O Nok, 5♂, 6♀, 9 l, 11 p. *Kanchanaburi:* Ban Nong Plang Khong, 2♂, 1♀, 3 l, 3 p.

DISCUSSION. The adult of this species is rather similar to that of *demeilloni* and differs primarily in the ornamentation of the pleuron (see discussion under *demeilloni*). The immature stages are distinctive and are easily recognized. The reduced very weak lower *mep* seta of the adult is rather unusual for species of the subgenus and is found elsewhere only in *demeilloni* and *lutescens*.

BIONOMICS. This species appears to be rare in Thailand considering the thousands of collections made over the past 15 years. However, it also appears that it is widely distributed, since the 3 provinces in which collections were made, cover the entire length of the country from the extreme southern province of Narathiwat to the northern province of Chiang Mai, a distance of approximately 1,400 km. The province of Kanchanaburi lies near midway between these 2 provinces. It has been collected from bamboo habitats a total of 5 times. Two of these collections are recorded only as bamboo and the others as bamboo pots or cup. In the 2 collections of the type-series, the bamboo pots were cut, cured, open internodes strategically placed by personnel of the SEATO Medical Research Laboratory, Bangkok for periodic collections of mosquito larvae. The collections are recorded at elevations of 160-600 m. All of the adults were reared from immature stages.

URANOTAENIA (PSEUDOFICALBIA) BICOLOR LEICESTER
(Figs. 2, 9, 10)

Uranotaenia bicolor Leicester 1908: 225 (♂, ♀); Barraud 1934: 83 (♂, ♀).
Uranotaenia fusca Leicester 1908: 227 (♂, ♀, preoccupied by Theobald 1907); Edwards 1922: 436 (synonymy).
Uranotaenia leicesteri Edwards 1913: 239 (*nom. nov.* for *fusca* Leicester); Edwards 1922: 460 (synonymy).
Uranotaenia kalabahensis Haga 1925: 43 (♀). NEW SYNONYMY.
Uranotaenia lutescens of Barraud 1926: 344 (♀, in part, Andaman Is. record, misidentification); Borel 1930: 129 (♂*, ♀, L*).
Uranotaenia luteola of Edwards in Barraud 1934: 80 (♀, *in* part, Andaman Is. record, misidentification).
Uranotaenia lagunensis Baisas 1935: 70 (♂*, ♀, L*); Delfinado 1966b: 45 (in part, ♂*, ♀, L, P, except figs. 81-3). NEW SYNONYMY.
Uranotaenia (Pseudoficalbia) bicolor Leicester, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.85 of forefemur; prementum dark brown scaled, with a few minute apically directed setae on distal dorsal and ventral margins and a few small setae at apex; 1 (1, 2) pair of labial basal setae; palpus about 0.12 of proboscis and slightly less than antennal flagellomere 1 (0.87); clypeus dark brown; antennal pedicel light brown mesally, light yellowish laterally, with 4, 5 minute setae dorsomesally; flagellum about 1.25-1.35 of proboscis or exceeding proboscis from about base of flagellomere 12 or 11; Flm 1 slightly longer than Flm 2 and with a few light brown scales basomesally; flagellar whorls each with 6 setae; 1 long, strong and 1 weak interocular and 4 ocular setae; decumbent scales mostly dark brown with grayish sheen, an indistinct, narrow ocular line of about 1 row of gray-white scales and a few similar scales at sides; erect scales large, numerous, covering most of dorsal surface, dark brownish black. *Thorax* (Fig. 2). Scutal integument light yellowish or orange-brown, often faintly darker on prescutellar space, supra-alar area and scutal fossa; dorsocentral and supra-alar bare lines present but ill-defined; scutal scales narrow, curved, variable in color, light grayish, pale golden or bronzy brown, usually becoming darker posteriorly; prescutellar space bare on posterior 0.5; scutellum light brown with light or dark brown scales; mesopostnotum light brown, occasionally darker on narrow median dorsal line; paratergite dark brown; pleuron predominantly dark brown but with light grayish areas with ill-defined borders giving the appearance of a distinct dark and light pattern; a broad but ill-defined light line across lower *ppn*, upper 0.4 of *stp* and middle *mep;* a distinct narrow light line across lower edge of *mep* and upper edge of mesomeron; *apn* with a few loosely arranged grayish scales with faint bluish reflections; *ppn* with 1 long seta and usually 1-7 grayish scales with greenish reflections on upper posterior corner but often devoid of scales; *sp* with 1 long seta; *ppl* with 1 long, strong, and 3, 4 smaller setae and a few grayish translucent scales; *stp* with 10, 11 setae on upper and posterior margins, 5, 6 of these on the upper dark area and with a distinct broad line or patch of grayish translucent scales with faint blue-green reflections across the lighter area of upper 0.4 and a separate small patch of similar scales on lower 0.6 of posterior margin; upper *mep* with 4, 5 setae. *Wing.* Scales dark brown; cell R_2 about 0.48 of R_{2+3}. *Legs.* Coxae mostly light brown, slightly darker basally; C-I with a distinct patch of grayish brown scales on anterior surface; C-II with a small anterolateral patch

of shiny grayish translucent scales; C-III with a few less apparent scales on anterolateral and posterolateral surfaces; femora dark brown scaled dorsally, light grayish brown ventrally; forefemur with 4-7 short setae on anteroventral margin of distal 0.5, 11-13 setae on posterodorsal margin for most of length, 3, 4 small inconspicuous setae scattered along ventral margin; midfemur with 8-13 setae on basal 0.6 of dorsal margin, a few weak setae on ventral margin from base to near middle followed by 4-8 longer setae slightly beyond middle and frequently with a patch 6-18 setae near middle on anterior surface; hindfemur with a few minute inapparent setae on ventral margins, 1, 2 conspicuous setae on distal dorsal margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.3 of tibia, tarsomere 4 about 3.3 of tarsomere 5. *Abdomen.* Terga dark brownish black scaled with narrow creamy white scaled basal bands on II-VI, each not quite reaching lateral margin, tergum I with or without pale scales, usually with a very narrow basal band on VII but almost always partially or completely hidden by overlapping VI, VIII completely pale grayish; laterotergite with a few grayish translucent scales; sterna dingy brown with grayish brown translucent scales, becoming slightly darker brownish on terminal sterna.

MALE. Essentially as in female but scaling of abdominal terga much more extensive. *Head.* Proboscis about 0.95 of forefemur; antennal flagellum strongly plumose, whorls each of more than 20 setae, about 1.1 of proboscis, Flm 13 longer than Flm 12. *Wing.* Cell R_2 about 0.4 of R_{2+3}. *Legs.* Midfemur often with a few more conspicuous setae near middle, giving it a distinct "hairy" appearance, especially on anterior surface but also without setae on anterior surface. *Abdomen.* Terga I-VIII with broad creamy white basal bands, broadest on II-VI and covering 0.5 or more the length of each tergum, usually reaching lateral margin on one or more proximal terga; I occasionally completely creamy white; VIII with a few median apical pale scales in addition to basal band or occasionally completely pale grayish white. *Terminalia* (Fig. 10). Terga IX, X distinctly produced into a broad median apical lobe which is rounded on apicolateral corners and more or less truncate apically; with a small distinct tubercle on mid-tergolateral surface which often appears as a setal alveolus; tergomesal surface of basimere with very small, weak setae; basal mesal lobe of basimere with 2 long, stout, tergoapical setae, each on a distinct apical projection, 2, 3 stout, but slightly weaker setae basal to these, 4-7 short weak basal setae and without strong setae on sternoapical margin; distimere rather strong, of near uniform width to more or less blunt apex; spiniform stout, acute, arising from under a distinct membranous hood; plates of aedeagus each with 2 short stout straight, superimposed, apically directed, subapical, tergomesal teeth with the sternal-most smallest and partially obscured by the stronger tergal tooth, apicosternal margin with 3 equal curved, sternolaterally directed teeth, occasionally one plate with 2 or 4 teeth on apicosternal margin.

PUPA (Fig. 10). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown, darker on posterior 0.33 of scutal plate and on metanotum. All setae except 1-I with simple branches. *Cephalothorax.* Seta 1-CT single or double, 2-CT double to 4 branches, 3-CT double, 5-CT double or triple, 8-CT with 3-5 branches. *Respiratory Trumpet.* Light brown; index about 3.2-3.6, slightly expanded apically. *Metanotum.* Seta 10-CT single or with 2-4 branches from beyond base, 11-CT single, bifid or trifid, 12-CT with 2-4 distal branches, 13-CT usually present as a small pigmented spur. *Abdomen.* Seta 6-I-VI single or double; 1-II lightly dendritic, with 2-4 primary branches, 3-II single to triple; 1-III with 3-6 branches, 3-III

single or with 2-4 distal branches; 1-IV with 3, 4 branches, 5-IV with 3-5 branches, shorter than 1-IV; 1, 5-V double to 4 branched,about equal in length; 1-VI double or triple, 5-VI single to triple, usually longer than 1-VI, 1, 5-VII single or double, about equal in length, 6-VII located ventrally; 9-VIII with 3-5 simple branches, about 0.5 the length of segment. *Paddle.* Light brown at base; midrib pale brown from base to apex; outer margin serrate from about basal 0.33 to apex; inner margin with numerous strong, blunt spicules on about apical 0.33 and numerous very small, blunt, irregularly spaced submarginal spicules from about basal 0.4 to near apex; apex more or less rounded, not noticeably emarginate; seta 2-P minute.

LARVA (Fig. 9). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown, darker posterolaterally and on collar; seta 4-C double to 4 branched, 5, 6-C strong, finely barbed, 7-C with 4-6 simple branches, 11-C small, double to 4 branched, 14-C stout, brush-tipped; mentum with 23-27 teeth. *Antenna.* Pale brown, with a few very small, scattered, spicules dorsally and ventrally; seta 1-A single. *Thorax.* Seta 3-P with 4, 5 barbed branches, 4-P with 3, 5 barbed branches, 7-P usually double (2-4), strongly barbed, 8-P double or triple, with 1 branch about 2.0 the length of other branches, 14-P single; 1-M, T with 3, 4 branches and with 1, 2 branches longer than the others, 8-M with 5-7 branches, 9-M with 4-6 branches, 14-M minute, dendritic; 7-T with 6-9 branches, 9-T with 3-5 branches, 13-T with 4-6 branches. *Abdomen.* Seta 1-I minute, with 3-4 branches, 3-I with 3, 4 branches, with a median branch longer and stronger than the others, 6-I, II double, strongly barbed, ventral branch shorter than dorsal branch; 1-II triple, with median branch long, 3-II-VI long, single, 13-II-V with 3, 4 branches of unequal lengths; 1-III-VII with 3, 4 branches, usually with median branch longest, 6-III-VI with 4, rarely 3 branches, occasionally sparsely barbed; 3-VII triple, 13-VII with 3, 4 branches; 1-VIII single, inserted on small triangular sclerotized plate with 2-VIII, 5-VIII with 4, 5 branches; comb scales 8-12 on a large sclerotized plate, each scale rather long, tapered to sharp point, conspicuously fringed laterally with long fine spicules from base to about distal 0.7, the scales toward the middle of each row slightly longer than those at each end. *Segment X.* Saddle complete, pale brown, very lightly imbricate, with numerous strong and fine sharp spicules on posterolateral margin and a few submarginal spicules; seta 1-X double, rarely triple, very stout, darkly pigmented, lightly barbed, 2, 3-X double, dorsal branch shorter than ventral branch, 4a-d-X double, 4e-X single, very short. *Siphon.* Light yellowish brown, narrowly darker at base, lightly imbricate for most of length but inconspicuous distally, imbrications without spicules; index about 2.80-3.80, rather broad, not strongly tapered, with a distinct bulge midventrally; pecten teeth 20-30, each very short, broad, rounded apically, as wide as long, fringed with fine spicules laterally and longer sharp spicules apically, without pigmentation, very inapparent, reaching to about 0.56-0.61 of siphon; seta 1-S with 5-9 stiff, lightly barbed branches, inserted at about 0.54-0.58 from base of siphon, usually within distal 2-6 pecten teeth but occasionally slightly beyond distal tooth.

TYPE-DATA. There are 2 specimens marked "Co-type" (1♀, 1♂) in the BMNH with the following data on the underside of a circular label, "Larvae by Daniels, marshy bank of stream, Kuala Lumpur 24/4/03." The female was selected and labeled as Lectotype by E. L. Peyton, 17 December 1968, and is in excellent condition.

Two syntypes (1♀, 1♂) of *fusca* are in the BMNH with the following data: *U. fusca*, Fed. Malay States, G. F. Leicester, BM1912-350. These are both

in rather poor condition. I hereby select the female as lectotype.

Uranotaenia kalabahensis was originally described from 2 syntype females "bred from larvae by Lt. K. A. Aarstad at Kalabahi, Isle of Alor, Lesser Sunda Islands." One of these is in the BMNH labeled as "Type," presumably by Edwards, with the following data, "Kalaba, Sunda Is., Dr. Haga, BM 1925-108." The whereabouts of the other female is unknown. The female in the BMNH is in poor condition, as there is a pin through the middle of the pleuron, the legs on one side are missing or damaged and it appears to be teneral. The abdominal segments are partially retracted and the legs that remain are typically curled as in many newly emerged adults.

The holotype and allotype of *lagunensis* were lost during World War II. There are 2 specimens (1♂, 1♀) in the USNM from the type-locality, with data labels in pencil by Baisas. These 2 specimens do not have numbers corresponding to the type, but were collected at Los Banõs, Laguna, during the same month as the type. Baisas listed 8 males and 7 females as "Isotypes" without listing collection numbers. The 2 specimens in the USNM may be a part of this series, since Baisas usually deposited a few specimens of all his new species in the USNM, though not always of the type-series. The male is labeled as follows: "Loc. L. B. Coll. [Los Banõs College], 22 March 30, Lot 53, *Uranotaenia lagunensis*." The female is labeled the same except for 14 March 30. The specimens are in excellent condition except that they are a little paler in color.

DISTRIBUTION. Material examined: 514♂, 570♀, 364 L; 615 with associated skins (316 l, 615 p).

CAMBODIA. *Kompong Speu:* Kirirom, O-Tachat; Pichnil, Stung Chral; 5♂, 5♀.

INDIA. *Andaman Island:* 2♀. *Mysore:* Mudigere, 1♀.

INDONESIA. *Java:* Bogor, 5♂, 4♀. Lombak: Sesaot, 2♂, 1 lp. *Alor:* Kalabahi: 1♀. Flores 1 L.

MALAYSIA. *Malaysia: Sabah* - Beaufort; Rayoh, Tenom; Kemabong, Tenom; Sapulut, Pensiangan; Sandakan; Keningau; 33♂, 30♀, 4 l, 10 p. *Peninsular Malaysia:* Kepong; 1♂, 1♀. Chetah; 3♂, 5♀. *Perlis* - Golf Course; Bukit Bintang; 3♂, 2♀, 2 l, 4 p. *Selangor* - Ulu Gombak; Templer Park; Ulu Langat, Pansoon 14th mile Gombak Rd.; Bukit Ulu Bakau; Ulu Klang; Kuala Lumpur; Sungei Limbing; 24♂, 16♀, 3 l, 12 p. *Pahang* - Ulu Jempol; Kuantan; Kualu Lipis; Gunong, Benom; Chegar Perah; 38♂, 45♀, 2 L, 14 l, 29 p. *Kelantan* - Gua Musang; Bertam; 12♂, 13♀, 7 L, 7 l, 7 p. *Perak* - Chior, Forest Reserve; 21st mile Cameron Highlands Rd.; Kompong Kinjang, Chenderiang; Ipoh, Pulai; 5♀, 2 L. *Johore* - Hock Lee Estate, 15 miles from Lapis; 1♂, 1♀, 1 l, 1 p. *Kedah* - Kompong Bagan, Naka, 3♂, 7♀, 2 L, 1 p.

PHILIPPINES. *Palawan:* Panitan; Balsahan River; Irahuan River; 7♂, 13♀, 11 p. *Samar:* Osmena; Sohoton; 32♂, 39♀, 6 L. *Leyte:* Tacloban, 26♂, 13♀, 13 L, 8 l, 7 p. *Mindanao: Zamboanga* - Pasanco, 2♂, 1♀. *Lanao Del. N.* - Kolambugan, 2♂, 9♀, 1 l. *Cotabato* - Parang, 3♀. *Mindoro: Oriental* - Alcate; San Antonio; Minas; Mataptap; 24♂, 29♀, 32 L, 42 l, 53 p; *Occidental* - San Jose, 8♂, 6♀, 67 L, 13 l, 4 p. *Luzon: Zambales* - Olongapo; Subic Bay; 36♂, 36♀, 22 L, 11 l, 11 p. *Pampanga* - Clark Air Force Base; Pantaiwan Creek; 2♂, 2♀, 2 L, 3 l, 3 p. *Nueva Ecija* - Putlan; Kaointalan; 4♂, 13 L, 1 l, 4 p. *La Union* - Aringay, 6 L. *Cagayan* - Gattaran, 5 L. *Laguna* - Balian; Pangil; Los Banõs; Mt. Makiling; 36♂, 44♀, 2 L, 72 l, 73 p. *Mountain:* Baguio; Burgos; 5♂, 4♀, 2 l, 2 p.

SRI LANKA. *Sabaragamuwa:* Vaddagala, Sinharaja Forest Reserve, 1♂, 1♀, 15 L, 1 l, 1 p. *Southern:* Kanneliya, Sinharaja Forest Reserve, 19♂,

17♀, 20 L, 16 l, 34 p. *Western:* Labugama, 16♂, 19♀, 30 L, 11 l, 35 p.

THAILAND. *Songkhla:* Ton Nga Chang; Boriphat; 4♂, 11♀, 3 L, 7 l, 15 p. *Chanthaburi:* Khao Rong; Ban Bo Phu; Khao Sai Dao; Ban Tha Mai; 16♂, 30♀, 5 L, 11 l, 33 p. *Chumphon:* Ban Wang Phi, 1♂, 1 l, 1 p. *Nakhon Nayok:* Huay Ta Khong; Khao Yai; 4♂, 3♀, 2 L, 1 l, 6 p. *Ranong:* Huey Keo Rakung; Klong Set Ta Kuat; Khao Hin Chang; Ban Chatri; Khao Chatri; Khlong Bang Yang; 7♂, 4♀, 14 L, 5 l, 8 p. *Sara Buri:* Kaeng Noi, 2♂, 2♀, 1 l, 2 p. *Chiang Mai:* Doi Sutep; Chiang Dao; Chiang Dao, Ban Pa Miang; 1♂, 1♀, 1 L. *Chon Buri:* Khao Mai Kaeo; Huai Kum; Khao Mai Ha Wa; 10♂, 11♀, 14 L, 2 l, 22 p. *Trang:* Muang, 1♂. *Phrae:* Ban Phitan, 1♂. *Kanchanaburi:* Huai Mae Nam Noi; Ban Sai Yok; Huai Bong Ti; Khao Saeng; 14♂, 21♀, 7 L, 10 l, 35 p. *Narathiwat:* Khao Lau; Chang Tai; Ruso; Waeng; 29♂, 23♀, 7 L, 14 l, 50 p. *Satun:* Guan Ga Long, 1♀, 1 l, 1 p. *Nakhon Si Thammarat:* Chuang Khao, 2♂, 2♀, 5 L, 3 l, 4 p. *Phangnga:* Nam Tai, 5♂, 2♀, 5 l, 7 p. *Lampang:* Ban Rong Na; Ban Pha Daeng; 12♂, 11♀, 2 L, 1 l, 20 p. *Surat Thani:* Ko Samui, 34♂, 42♀, 35 L, 26 l, 66 p. *Krabi:* Khlong Thom; Ban Mai Kaen Tai; 1♀, 4 L, 1 l, 1 p. *Mae Hong Son:* Mae Sariang, Ban Mae Tia, 5 L. *Phuket:* Khao Prathin; Ban Huai Luk; Laen To Mayading; Ban Borae; 17♂, 26♀, 14 L, 15 l, 36 p.

Reported also from *Hainan*, CHINA, by Chu 1957 and from INDOCHINA by Borel (1930) as *lutescens*.

Barraud (1926) reported 2 females from the Andaman Islands and 3 males and 1 female from Malabar Coast as *lutescens* and later in Barraud (1934), Edwards (in footnote), re-evaluated the 1926 identification and decided these were new. He named Barraud's specimens from the Andaman Islands and Malabar Coast, INDIA as *luteola*. The 2 females from the Andaman Islands and 1 male from Malabar coast were apparently sent to Edwards for determination prior to the 1926 paper by Barraud and were not returned to Barraud. A female and male of *luteola* from Malabar Coast are in the BMNH and each is labeled "type." In 1968 the 2 females from the Andamans and 1 male from Malabar Coast were in the BMNH, pinned with minuten on a single long block of cork, labeled as *lutescens* (apparently by Edwards) and in a tray marked *lutescens*. There is little doubt these are the specimens first referred to as *lutescens* in 1926 and as *luteola* 1934, since the data correspond to those given in both articles. The 2 females are specimens of *bicolor* and the male is the same as the types of *luteola*. Subsequent to my examination of these specimens in 1968, Peter Mattingly cut an end of the cork piece with the male of *luteola* and sent it to me for study. The 2 females of *bicolor* remain together on the same cork block in the BMNH.

DISCUSSION. This is an easily recognized species but there is considerable variation in the adult stage, especially the thorax. There are also noticeable but subtle geographic variations in the color of the adult. The male terminalia and immature stages are less variable and are rather typical from all areas, though there are noticeable differences in development of larval setae associated with different habitats. The generally light brown scutum, banded abdominal terga, dingy brown sterna, predominently dark brown pleuron with indefinite lighter areas, 2 separate patches of scales on the sternopleuron and dark brown decumbent scales of vertex distinguishes the adult of this species from all other Indomalayan and Oriental *Pseudoficalbia*.

There is noticeable variation in the pale basal abdominal bands but some of this is due to contraction of segments, and most especially in reared specimens where some are obviously teneral. Two species, *fusca* and *kalabahensis*, were recognized on the basis of this type of variation. In the case of *fusca*, pale basal bands can be seen under the overlying terga on the co-type

female in the BMNH. The female "type" of *kalabahensis* in the BMNH does not show evidence of pale scales beyond tergum II but there seems little doubt the specimen is teneral and the abdominal segments are contracted. I have seen a small number of specimens from various localities similar to both of these. Most of the specimens were with associated immature stages confirming the identification. There is considerable variation in the number of setae on the midfemur. Specimens from Philippines, Sri Lanka and Lesser Sundas show considerable reduction in the number of setae and are usually without a distinct patch on the midanterior surface, but some specimens, especially males from Malaysia have a distinct "hairy" appearance at the middle. Scales on the posterior pronotum are also quite variable. There are usually 1-7 scales present. They are very infrequently absent on specimens from Thailand and Malaysia, commonly absent on specimens from Sri Lanka and rarely present on specimens from the Philippines. The general color of the thoracic integument varies slightly. Adults from the Philippines are generally lighter than specimens from other areas, but some specimens from Mindoro are as dark as typical Malaysian specimens.

The pupa is rather consistant in all areas. Abdominal seta 6-I-VI varies more noticeably. In most areas except the Philippines it is most commonly double on all segments but in most Philippine specimens it is usually single, however, it is more commonly double on specimens from the southwestern island of Palawan. The larva shows only minor variations in all areas in branching of various setae and other structures. Specimens collected from some tree holes and rock pools often have various setae noticeably heavier and longer than specimens from other habitats, but there are no differences in the number of individual branches of these setae or in other structures. This phenomenon occurs in all areas and seems to suggest an environmental influence rather than genetic. This species has a wider range of habitat utilization than all other known *Pseudoficalbia*, utilizing a wide variety of ground water habitats and natural and artifical container habitats throughout its range. Although such a wide range of habitat utilization by a single species is rather uncommon, I find no evidence to suggest more than one species involved. The larva resembles that of *abstrusa* and *gouldi* in several respects but is easily distinguished from both of these. The distinct sclerotized tracheal filament of the larva is known only in these 3 species of the *bicolor* series and in *maxima* and *unguiculata* of the *maxima* series. This peculiar structure was first demonstrated in *unguiculata* by Montschadsky (1930).

Delfinado (1966b, Figs. 81-3) illustrated the larva of what she presumed to be *lagunensis* (= *bicolor*) but it is in fact the larva of *abstrusa*. Her description of the larva of *lagunensis* included characters of both species (see also discussion under *abstrusa*). Baisas (1974, Fig. 79b) reproduced Delfinado's illustration of the larva of *lagunensis* (= *abstrusa*).

BIONOMICS. This is the most common and widely distributed species in Asia. The immature stages are found in a greater variety of habitats than any other species of *Pseudoficalbia* and it is probably this ability which has contributed to its successful dispersal and dominance in most of the Oriental region.

Two hundred and sixty-nine separate immature collections have been examined during this study. Collections have been examined from the following habitats. Those from the Philippines have been separated from the rest of the region in order to demonstrate the similarity of habitat utilization between 2 very distinct regions with sufficient collections from each to demonstrate this point. In the Philippines these are: rock pool (29), stream pool

(22), animal hoof prints (10), tree hole or hole in log (10), metal cans (paint or tin) (6), swamp or marsh pools (4), seepage pools (3), wooden bucket (2), coconut shell or cup (2), auto tire (1), ground pool (1), bamboo stump (1), well (1). In other areas these are: rock pool (59), stream pool or margin (27), tree hole or stump (26), elephant foot print (13), ground pool (8), marsh pool or depressions (11), metal cans, small or large (6), seepage pools (3), bamboo stump (4), crab hole (4), gem pits (4), split or fallen bamboo (3), swamp (2), auto tire (2), clay pot (1), ditch (1), animal hoof print (1), coconut spathe (1), coconut shell (1). The species occurs from sea level to 1,000 m, but of the 140 collections with recorded elevation, 95 percent are below 305 m.

Two females were collected on an exposed leg during a human biting collection between the hours of 1900-2200 in southeastern Thailand. It is not known if they actually took blood from the collector.

URANOTAENIA (PSEUDOFICALBIA) DEMEILLONI PEYTON and RATTANARITHIKUL (Figs. 11, 12)

Uranotaenia demeilloni Peyton and Rattanarithikul 1970: 404 (♀, ♂, L, P).
Uranotaenia, N^{o} 86, type *obscura?* of Borel 1930: 134 (A, L*).
Uranotaenia (Pseudoficalbia) demeilloni Peyton and Rattanarithikul, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about equal to forefemur (0.98-1.10); prementum dark brown scaled, with a few small setae at apex; 1 pair of labial basal setae; palpus about 0.11 of proboscis and about equal to antennal flagellomere 1; clypeus light brown; antennal pedicel light brown mesally, yellowish laterally, with a few minute setae dorsomesally; flagellum about 1.25 of proboscis, or exceeding proboscis from about base of flagellomere 12; flagellar whorls each of 6 setae; 1 long, strong and 1 weak interocular and 4 ocular setae; decumbent scales light grayish or creamy brown, slightly lighter with bluish green reflections at sides, without pale ocular line, though the tips of scales on ocular line may occasionally appear distinctly grayish in some lights; erect scales short, moderate in number, scattered over most of vertex, yellowish brown or dark brown. *Thorax.* Scutal integument light straw-brown; scales dense, narrow, curved, usually grayish brown anteriorly, slightly darker bronzy brown posteriorly or less frequently uniformly dark brown; prescutellar space largely scaled, bare only on small posterior area; scutellum light yellowish brown with dark brown scales; mesopostnotum dark brown, pale whitish on basolateral corners; paratergite light grayish brown; pleuron uniformly light grayish or whitish brown; *apn* with conspicuous light or dark brown scales with weak blue-green reflections; *ppn* with 1-3 setae and a distinct patch (10 or more scales) of overlapping, grayish or brownish translucent scales with blue-green reflections on upper posterior corner; *sp* with 1 seta; *ppl* with 1 long, strong, and 2,3 weaker setae; *stp* with 3,4 rather weak upper and 4-7 irregularly spaced posterior marginal setae and with a few scattered near colorless translucent scales on upper 0.3 with a few extending down posterior margin; *mep* with 3-5 upper setae, lower seta somewhat small and weak, about equal or slightly less in degree of development to upper *stp* and *mep* setae. *Wing.* Scales dark brown; cell R_2 about 0.43 of R_{2+3}. *Legs.* Coxae and trochanters same color as pleuron; C-I with several light brown translucent scales on anterior surface; C-II with a few transparent scales antero-

laterally; C-III with a very few transparent scales on anterior and posterolateral surfaces; femora dark brown scaled dorsally, light grayish brown ventrally, without conspicuous arrangement of setae; forefemur with 3, 4 setae on apical 0.33 of anteroventral margin, 6, 7 setae from basal 0.3 to near apex of posterodorsal margin; midfemur with 2-4 setae on basal 0.5 of dorsal margin, 6-12 somewhat weaker setae scattered along ventral margin; hindfemur with 1 strong subapical dorsal seta and several minute setae along ventral margin; tibiae and tarsi dark brown scaled with strong purple-green reflections; hindtarsomere about 1.3 of tibia, tarsomere 4 about 3.0 of tarsomere 5. *Abdomen.* Terga mostly dark brownish black scaled with narrow ochreous or creamy white basal bands on III-VII, usually complete to sides on IV-VI and not noticeably expanded laterally, very narrow and indistinct on III, IV, VII or occasionally absent on III, VII, narrow but almost always conspicuous and of uniform width on V, VI, scales on VIII a lighter brown than on preceeding terga; laterotergite with very few grayish scales; sterna pale whitish brown with shiny translucent scales.

MALE. Essentially as in female but pale scaling of abdominal terga much more extensive. *Head.* Proboscis usually slightly longer than forefemur (1.0-1.1); 1, 2 pairs of labial basal setae; antennal flagellum strongly plumose, whorls each of more than 20 setae, length about 1.1 of proboscis or exceeding proboscis by less than flagellomere 13; Flm 12 slightly longer than Flm 13. *Legs.* Hindtarsomere 1 about 1.30-1.45 of tibia. *Abdomen.* Pale basal bands on terga III-VII, each of near equal width to sides, very narrow and inconspicuous or often inapparent on III, IV, VII, broad and most conspicuous on V, VI with each near equal to 0.5 of tergal width, VIII occasionally mostly pale gray. *Terminalia* (Fig. 12). Terga IX, X with apical margin strongly produced into a long, moderately broad, median, apically truncated or rounded lobe; a small tubercle usually present on median tergolateral surface of tergum IX; tergomesal surface of basimere with numerous short, weak setae; 2, 3 long, strong, setae sternoapical to basal mesal lobe; basal mesal lobe of basimere with 2 long stout, tergoapical setae on distinct processes, 3-5 similar, slightly weaker setae in a row basal to these, near tergal margin, 6-8 short, weak, scattered basal setae; distimere rather stout, long, straight, near uniform in width to near blunt apex; spiniform small, stout, blunt or notched apically, arising from under a membranous hood; plates of aedeagus each with 1 stout slightly curved, apically directed, subapical, tergomesal tooth, 2, 3 strong, curved subequal teeth on apicosternal margin.

PUPA (Fig. 12). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown. All setae except 1-I and 9-VIII with simple branches. *Cephalothorax.* Seta 1-CT single, 2, 3-CT single or double, 4, 5-CT single to triple, 6-CT slightly shorter than 7-CT, 8-CT with 3-5 branches. *Respiratory Trumpet.* Light yellowish brown; index about 3.3, slightly expanded apically, indistinctly tracheoid on antero-basal 0.2. *Metanotum.* Seta 10-CT with 2-4 branches, 11-CT single to triple, 12-CT single or double, alveolus of 13-CT not apparent. *Abdomen.* Seta 6-I-VII single, rarely double, located dorsally on VII; 1-II usually lightly dendritic with 2-5 weak single bifid or trifid branches, 2-II strong, shorter than 5-II, 3-II double or triple; 1-III double or triple, 3-III double to 4 branched; 1-IV single or double, 5-IV single or double, about same length of 1-IV; 1-V-VII single or double, 5-V-VII single, stiff, rarely double, occasionally with a very few fine lateral barbs, each about equal in length and about 0.50-0.75 the length of each succeeding segment, 9-VIII with 2-7 strong branches, individual branches varied, simple or barbed, single, bifid or trifid. *Paddle.* Midrib

faintly pigmented on basal 0.5; outer margin serrate from basal 0.33-0.50 to apex; inner margin with small spicules on apical 0.15, with the more basal spicules minute; rounded apically, without apical emargination; seta 2-P absent.

LARVA (Fig. 11). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown, dark brown on collar; seta 4-C double or triple, 5, 6-C simple, 7-C with 3, 4 simple branches, 11-C double or triple, 14-C single, minute; mentum with 17-19 teeth. *Antenna.* Light brown with a few scattered, minute spicules dorsally; seta 1-A single, long, about 0.4 the length of antenna. *Thorax.* Seta 3-P with 4, 5 strongly barbed branches, 4-P with 2-4 strongly barbed branches, 7-P double, strongly barbed; 1-M, T with 4, 5 branches, 8-M double, 9-M single, 14-M with 5-9 branches; 7-T double or triple, 9-T single, 13-T with 5, 6 branches. *Abdomen.* Seta 1-I minute, single to 4 branches, 6-I, II double, strongly barbed, branches subequal; 1-II-IV with 3, 4 very weak branches; 13-II, III with 4, 5 branches; 6-III double, rarely triple, branches long, strong, barbed, pigmented, similar to 6-II, except slightly shorter; 6-IV-VI with 4 (3-5) stiff barbed branches, 13-IV with 3-5 branches; 1-V-VII double or triple, 13-V with 3, 4 branches; 1-VIII minute, double to 4 branched, not inserted on sclerotized plate with 2-VIII, 3-VIII with 4-6 strongly barbed branches; comb scales 6-8 on a small oval, weakly, sclerotized plate, each scale near equal in length, tapered to sharp spine-like,fringed with conspicuous fine lateral spicules from base to about distal 0.75-0.80. *Segment X.* Saddle complete, pale brown, without imbrications, very short, index less than 1.0, with a few very small spicules on posterolateral margin; seta 1-X double, stout, barbed, 2, 3-X single, 4a-X double, 4b-e-X single. *Siphon.* Light brown, very lightly imbricate; short, broad, index 2.00-2.52; pecten teeth 14-20, each broad, long, lightly fringed laterally and with 1-3 long slender spicules apically, usually 1 of these conspicuously longer and stronger than the others, pecten reaching to 0.48-0.60 of siphon; seta 1-S with 3-6 simple or finely barbed branches, usually inserted slightly beyond distal pecten tooth but occasionally within distal 1, 2 teeth at 0.58-0.64 of siphon.

TYPE-DATA. Holotype female with slide of associated pupal and larval skins in the USNM with the following collection date: THAILAND, *Ranong*, Klong Bang Man, 13 July 1967, S. Maneechai, collector, collection number 02127-4, SEAMP accession number 117, collected as a larva from a bamboo stump at an elevation of 60 m. Allotype male and several paratypes also in USNM; 2 males, 2 females with associated pupal and larval skins will be deposited in the BMNH.

DISTRIBUTION. Material examined: 55♂, 66♀, 33 L; 87 with associated skins (37 l, 87 p).

MALAYSIA. *Malaysia: Sabah* - Melalap, Tenom, 2♂, 3♀, 5 p. *Peninsular Malaysia: Perak* - Chior, 2♂, 4♀, 2 l, 2 p. *Perlis* - Wang Kelian, Kaki Bukit, 7♂, 99♀. *Selangor* - Ulu Gombak, 2♂, 1 l, 1 p.

PHILIPPINES. *Luzon: Mountain* - Baguio, 7♂, 4♀, 3 l.

THAILAND. *Chiang Mai:* Phrao; Chiang Dao, Ban Sop O Nok; 11♂, 21♀, 12 L, 12 l, 32 p. *Nan:* Pak Chom Po; Ban Wang Mo; Ban Pha Man; 2♂, 3♀, 3 L, 2 l, 5 p. *Kanchanaburi:* Huai Lin Thin, 4♂, 1♀, 3 l, 5 p. *Chanthaburi:* Ban Tha Mai, 1♂, 2♀, 3 p. *Prachin Buri:* Ban Bu Phram, 4♂, 5♀, 2 L, 2 l, 9 p. *Mae Hong Son:* Ban Mae Ho Nua, 1♂, 4 L. *Ranong:* Khlong Bang Man: Khao Chatri; 12♂, 14♀, 12 L, 12 l, 26 p. *Lampang:* Ngao, Ban Si Pan; 1♂.

Borel (1930: 134) described the female and illustrated the larva of a species he called *Uranotaenia* No. 86, type *obscura* from INDOCHINA. The adults were reared in the laboratory from larvae and although the description of the adult is

not clear on some points, I believe the larva illustrated is that of *demeilloni*.

DISCUSSION. This species appears to be related to *approximata*. In adult habitus features the 2 are very similar and differ primarily in the ornamentation of the pleuron. In *demeilloni* the pleuron is uniformly pale while in *approximata* the *apn*, *ppn*, *psp* and extreme upper edge of *stp* are distinctly darker than the remaining pale areas, though not as sharply defined as some species with dark and pale areas. In the females the reduced pale basal tergal bands are similar, with the bands on V, VI readily apparent and the others only faintly indicated or absent. Some of this may be due to teneral conditions of some of the reared specimens, but it seems unlikely that the entire series of both species should exhibit this characteristic. The male terminalia of these 2 are somewhat similar, especially in the apically produced terga IX, X, but differ in the number and distribution of teeth on the aedeagal plates and slightly in the number and arrangement of long stout setae on the basal mesal lobe. The pupa and larva of these 2 species are easily separated on a number of characters and each is easily separated from other species of the subgenus.

BIONOMICS. This species occurs principally in secondary forest with bamboo growth. It is found in a variety of bamboo habitats on or near the ground at elevations of 30-1,070 m. Specimens have been examined from the following habitats: split bamboo (8), bamboo stump (7), bamboo internode (with small entrance hole) (6), bamboo pot (3), auto tire (1). It is occasionally found in association with species of *Aedes*, and was collected once in association with *approximata*. All available adults were reared from immatures.

URANOTAENIA (PSEUDOFICALBIA) GOULDI PEYTON and KLEIN
(Figs. 13, 14)

Uranotaenia gouldi Peyton and Klein 1970: 248 (A, ♂, L, P).
Uranotaenia (Pseudoficalbia) gouldi Peyton and Klein, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.89 of forefemur; prementum dark brown scaled, with numerous small inconspicuous, curved, apically directed setae on dorsal and ventral margins and a few similar setae at apex; 1 pair of labial basal setae; palpus about 0.13 of proboscis and slightly less that antennal flagellomere 1; clypeus light brown; antennal pedicel dark brown mesally, light yellowish brown laterally, with a few minute setae and 2,3 transparent scales dorsomesally; flagellum about 1.55 of proboscis or exceeding proboscis from near base of flagellomere 10; Flm 1 about 1.33 of flagellomere 2 and with a few light brown scales basomesally; flagellar whorls each of 6 setae; 1 long, strong and 1 weak interocular and 4 ocular setae; decumbent scales light creamy or beige brown on vertex, narrowly pale grayish white on ocular line and entirely grayish white with blue-green reflections at sides, a paired row of short, broad, grayish translucent scales on interocular space reaching to frons; erect scales moderately long, numerous, covering most of vertex, dark brown. *Thorax.* Scutal integument uniformly light orange-brown; scales narrow, curved, mostly pale bronzy brown, a few on supra-alar area and on anterior promontory distinctly grayish; prescutellar space bare on posterior 0.5 or less; scutellum light brown, scales light grayish brown; mesopostnotum and paratergite light brown; pleuron uniformly pale yellowish or grayish brown, except for dark *apn; apn* without scales; *ppn* with 1 weak seta and a conspicuous patch of pale grayish translucent scales on upper posterior corner; *sp* with 1 long, strong seta; *ppl* with 1 long, strong and 2,3 weaker

setae and 2,3 inapparent grayish scales; *stp* with 11,12 rather evenly spaced setae on upper and posterior margins, upper 3,4 much more prominent and darkly pigmented, devoid of scales; upper *mep* with 3,4 setae. *Wing.* Scales dark brown; cell R_2 about 0.48 of R_{2+3}. *Legs.* Coxae and trochanters same color as pleuron; C-I with numerous light brown scales on anterior surface; C-II with a few inapparent, shiny transparent scales; C-III without scales; femora mostly dark brown scaled dorsally, narrowly pale grayish basally, distinctly grayish white with strong bluish or pearly white reflections ventrally depending on angle of light; forefemur with 5,6 conspicuous setae on anteroventral margin of distal 0.5, 11-13 similar setae on posterodorsal margin and with a varying number (few to many) of conspicuous but much weaker setae on ventral surface of apical 0.33, and usually a few scattered minute setae near base; midfemur with 3,4 setae on dorsal margin of basal 0.5, several minute, inapparent setae on ventral margin from near base to near middle, followed by 10-13 conspicuous setae on anterior and posterodorsal margin, usually with a few to many conspicuous but weak setae on anterior and ventral surfaces of apical 0.33; hindfemur with 1,2 conspicuous dorsal subapical setae and a few very inconspicuous, minute setae on ventral margin; tibiae dark dorsally, distinctly dull grayish ventrally; tarsi dark; hintarsomere 1 about 1.14 of tibia, tarsomere 4 about 3.0 of tarsomere 5. *Abdomen.* Terga uniformly very light brown (beige) scaled, with soft blue-green-gray reflections in some lights; laterotergite with a few transparent scales; sterna pale grayish brown with grayish translucent scales.

MALE. Essentially as in female except for sexual differences. *Head.* Antennal flagellum strongly plumose, whorls each of more than 20 setae, only slightly longer than proboscis; Flm 13 longer than Flm 12. *Wing.* Cell R_2 about 0.45 of R_{2+3}. *Terminalia* (Fig. 14). Tergum IX rather narrow, broadly produced in middle and rounded apically, with a small distinct tubercle on mid-tergolateral surface; tergum X a very narrow band tergomesally, with very small, short, rounded lobes tergolaterally which barely extend beyond apical margin of tergum IX; tergomesal surface of basimere with long, strong and short, weak setae intermingled, the strongest located apical to basal mesal lobe; basal mesal lobe of basimere with 5,6 long, stout, tergoapical setae and 5-8 weak basal setae, 1 long, stout and 1,2 weak setae on sternoapical margin; distimere rather strong, slightly curved, of near uniform width to distal 0.66 and tapered to pointed apex, with several rather long, stiff setae on apical 0.33; spiniform stout, acute, not arising from under a membranous hood; plates of aedeagus each with 2 short, stout, straight superimposed, apically directed, subapical tergomesal teeth, with the sternal-most smallest and almost totally obscured by the stronger tergal tooth, apicosternal margin with 3 curved laterally directed teeth, the sternal-most tooth longest.

PUPA (Fig. 14). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown, slightly darker on metanotum laterally. All setae except 12-CT, 1-I and 5-VII with simple branches. *Respiratory Trumpet.* Light brown, slightly darker apically, tracheoid on anterobasal 0.2; very short, broad, bell-shaped, pinna with lateral margin produced into an angular leaflet which extends beyond an otherwise truncate margin. *Cephalothorax.* Seta 1-3-CT double to 4 branched, 4-CT with 5-8 branches, 5-CT with 4-6 branches, 8-CT with 6-8 branches. *Metanotum.* Seta 10-CT double to 5 branched at various points from beyond base, 11-CT double, 12-CT with 3-5 sparsely barbed branches, alveolus of 13-CT present. *Abdomen.* Seta 6-I, II double; 1-II weakly dendritic with 2-4 strong primary branches, 3-II, III double to triple; 1-III with 5-9 branches, 6-III, IV double to

5 branches; 1-IV with 5-8 branches, 5-IV with 5-8 branches; 1-V with 3-5 branches, 5-V with 4-6 branches, 6-V, VI double or triple; 1-VI with 4, 5 branches, 5-VI double to 4 branched; 1-VII double to 4 branched, 5-VII double or triple, branches usually finely barbed distally, 6-VII located ventrally, small, double or triple; 9-VIII with 3, 4 branches. *Paddle*. Midrib pale yellowish on about basal 0.75, a very faint darker line across basal portion; very broad, almost round, slightly extended apically, without apical emargination; outer margin serrate from about basal 0.25 to apex; inner margin with a few small spicules at apex and a few scattered, minute, submarginal spicules towards base; outer part slightly produced beyond inner part apically; seta 2-P minute.

LARVA (Fig. 13). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head*. Pale yellowish brown, narrowly darker on collar; seta 4-C with 3-5 delicate branches, 5, 6-C strong, barbed, 6-C considerably lateral to 5-C and on diagonal line with 5 and 7-C, 7-C with 5-8 lightly barbed branches, 11-C very small with 3-5 branches, 14-C very stout darkly pigmented, spine-like; mentum with 23-25 teeth. *Antenna*. Pale brown with numerous, scattered stout spines on dorsal and ventral surfaces of basal 0.75, those on middorsal surface strongest and darkly pigmented; seta 1-A single, stiff, about 0.6 the length of antenna. *Thorax*. Seta 3-P with 5-7 barbed branches, 4-P triple, barbed, 7-P double, 14-P single; 1-M with 3-5 branches, 7-M double to 4 branched, 8-M with 6, 7 branches, 9-M with 4-6 branches, 14-M minute dendritic; 1-T with 3, 4 branches, 7-T with 5-9 branches, 9-T with 4-6 branches, 13-T with 4-6 branches. *Abdomen*. Seta 1-I minute, 3-I with 3-6 branches, 6-I, II double, barbed, ventral branch significantly shorter than dorsal branch; 1-II with 3, 4 branches, 13-II-IV with 3, 4 branches; 1-III with 4, 5 branches, 6-III-V with 4, 5 branches; 1-IV with 4-6 branches; 1-V with 6 branches; 13-V with 4, 5 branches; 1-VI with 6 branches, 6-VI with 5, 6 branches; 1-VII with 5, 6 simple branches, 3-VII with 7-10 simple branches; 1-VIII with 3, 4 branches, inserted on a small triangular sclerotized plate with 2-VIII, 5-VIII with 7-9 branches; comb scales 7-12, on large sclerotized plate, each tapered to sharp point apically, lightly fringed laterally to near apex, median scales slightly longer than those on each side. *Segment X*. Saddle complete, pale yellowish brown, distinctly imbricate, with the more apical imbrications with conspicuous setiform spicules; posterolateral margin with a few scattered small, strong, spicules; seta 1-X double, very stout, strongly barbed, 2, 3-X double, 4a, b-X double, 4c-eX single, 4d, e-X very short. *Siphon*. Pale yellowish brown, darker dorsally near base and on narrow basal ring, conspicuously imbricate on about basal 0.6, imbrications without spicules; index 4.8-5.6; pecten teeth 22-30, very inconspicuous, without pigmentation, each tooth very short, broad, rounded apically, about as wide as long, fringed with fine spicules apically, pecten reaching to about 0.5 or slightly more of siphon; seta 1-S with 6-8 stiff, finely barbed branches, inserted within distal 1-6 pecten teeth at basal 0.43-0.48 of siphon; trachea terminating in a distinct, long, sclerotized filament.

TYPE-DATA. Holotype female with slide of pupal skin in USNM with the following collection data: THAILAND, *Phangnga*, Khao Sung, 17 October 1966, E. L. Peyton, collector, collection number 01711-1, SEAMP accession number 84, collected as a pupa from a swamp at an elevation of about 15 m. Allotype male and a few paratypes also in USNM; 1 female paratype with slide of pupal and larval skin will be deposited in the BMNH.

DISTRIBUTION. Material examined: 2♂, 7♀, 1 L; 6 with associated skins (5 l, 6 p).

CAMBODIA. *Kompong Speu:* Kirirom, 1♀.

THAILAND. *Chiang Mai:* Ban Sop Mae Klang, 1♀. *Phangnga:* Khao Sung, 2♂, 3♀, 4 1, 5 p. *Trang:* Tung Ka Beau, 1 L. *Narathiwat:* Waeng, Khau Lau, 1♀, 1 l, 1 p. *Chon Buri:* Bang Lamung, 1♀.

DISCUSSION. This species is distinctively marked in all stages. The bare sternopleuron of the adult is very uncommon in the subgenus and is known elsewhere in *obscura* and the extralimital *diagonalis*, however, it differs from both of these in the much lighter color of thorax and abdomen, dark bare *apn*, absence of small patches of pale broad scales on anterior margin of scutum and the broad grayish scales on interocular space to frons. The latter character is unique to *gouldi*, but similar scales are present on some Southeast Asian species of the genus *Malaya* Leicester. The male terminalia are somewhat similar to those of *abstrusa* in the development of terga IX, X and distimere but differ in the number of stout setae on basal mesal lobe of basimere and number and size of apical teeth on the aedeagal plates. The immature stages also resemble those of *abstrusa* very closely but there are a number of significant differences. The pupa and larva of *gouldi* each have a unique character which readily distinguishes them from all currently known species. These are: the very distinctively shaped respiratory trumpet of the pupa and the position of head setae 5 and 6-C of the larva. The adult of *abstrusa* is very different from the adult of *gouldi*.

BIONOMICS. Immature stages have been collected from the following habitats: swamp (1), seepage pool or bog (2), stream pool (1). Two of these are recorded at elevations of 15 and 75 m. A single female is recorded as taken in a biting collection between the hours of 0500-0600, however, the specimen does not appear to be engorged.

URANOTAENIA (PSEUDOFICALBIA) LUTESCENS LEICESTER
(Figs. 15, 16)

Uranotaenia lutescens Leicester 1908: 222 (♂, ♀); Peyton and Rattanarithikul 1970: 404 (♂, ♀).
Uranotaenia lutescens, type N^{O} 2 of Borel 1930: 132 (♀, L*).
Uranotaenia (Pseudoficalbia) lutescens Leicester, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark brown scaled, with a few small setae at apex; 1 pair of labial basal setae; palpus about 0.11 of proboscis and about equal to antennal flagellomere 1; clypeus light brown; antennal pedicel dark brown mesally, light brown laterally, with a few minute setae dorsomesally; flagellum about 1.27 of proboscis or exceeding proboscis from base of flagellomere 12 or slightly more; Flm 1 slightly longer than Flm 2 and with a few brown scales basomesally; flagellar whorls each with 6 setae; 1 long, strong and 1 minute interocular and 4 ocular setae; decumbent scales uniformly light beige or creamy golden dorsally, without ocular line, a few scales at sides grayish with bluish green reflections; erect scales rather short, few, sparsely scattered over most of vertex, light brown or straw. *Thorax.* Scutal integument uniformly light or pale yellow; scales narrow, curved, light bronzy brown; prescutellar space largely bare; scutellum pale yellow, scales dark brown; mesopostnotum usually pale yellow, occasionally light brown; paratergite pale yellow; pleuron uniformly pale yellow; *apn* with a few sparsely arranged light grayish translucent scales; *ppn* with 1 seta, without scales; *sp* with 1 seta; *ppl* with 2, 3 setae of about equal devel-

opment; *stp* with 2, 3 small upper setae and 3, 4 similar, irregularly spaced setae on posterior margin, and with a few scattered, inapparent, grayish translucent or transparent scales on upper 0.33; *mep* with 2, 3 upper setae, lower seta very weak, lightly pigmented, inapparent, not quite as well developed as larger setae of upper *stp* and upper *mep*. *Wing*. Scales dark brown; cell R_2 about 0.43 of R_{2+3}. *Legs*. Coxae and trochanters pale yellow; C-I with several light brown translucent scales on anterior surface; C-II with a few transparent scales anterolaterally; C-III with a few light brown translucent scales posterolaterally; femora dark brown scaled dorsally, light grayish brown with strong purple-green reflections ventrally; forefemur with 2, 3 short setae on distal 0.66 of anteroventral margin, 7, 8 setae from near base to near apex on posterodorsal margin; midfemur with at most 2, 3 very inconspicuous setae on basal 0.5 of dorsal margin, 3, 4 slightly longer setae scattered beyond middle on ventral surface; hindfemur without conspicuous setae except for the usual apical ones, a few minute setae on ventral margin; tibiae and tarsi dark brown scaled, becoming somewhat lighter toward distal tarsomeres; hindtarsomere 1 about 1.35-1.43 of tibia, tarsomere 4 about 3.0-3.5 of tarsomere 5. *Abdomen*. Terga mostly dark brownish black scaled, with basal ochreous or creamy white bands on II-VII, tergum VIII completely creamy white, bands on II, VII very narrow, frequently incomplete dorsally and reduced to small sublateral patches, broadest and most conspicuous on IV-VI, each conspicuously broadened laterally and usually not reaching lateral margin; tergum I usually with a small patch of pale scales laterally; laterotergite with a very few light brown scales; sterna yellowish with similar colored translucent scales, occasionally light brownish scaled on sterna VI-VIII.

MALE. Essentially as in female, except pale scaling of abdomen which is much more extensive. *Head*. Proboscis about 1.0 of forefemur or barely less; 1, 2 pairs of labial basal setae; antennal flagellum strongly plumose, whorls each of more than 20 setae, about 1.0-1.1 of proboscis; Flm 12 longer than Flm 13. *Wing*. Cell R_2 about 0.4 of R_{2+3}. *Abdomen*. Tergum I usually with a patch of yellowish white scales laterally, occasionally completely yellowish white, terga II-VIII with very broad pale basal bands, each broadened laterally and reaching lateral margin, often completely yellowish white laterally and forming a continuous broad lateral line, with the dark scales reduced to small dorsoapical triangular patches on all terga, pale bands on III-VI broadest and usually occupying more than 0.5 the width of each. *Terminalia* (Fig. 16). Terga IX, X with apical margin produced into a broad, apically rounded, median lobe and with a small distinct tubercle on tergolateral surface; tergomesal and sternomesal surfaces of basimere with numerous short, weak setae only; basal mesal lobe of basimere short, narrow, without the usual tergoapical projection, 3, 4 long, stout, setae in a row on tergoapical margin, 5-7 short, weak basal setae, 1 long stout and 1 small seta on sternoapical margin; distimere rather stout, long, very slightly curved, of uniform width to near tapered blunt apex; spiniform small, stout, acute, arising from under a distinct membranous hood; plates of aedeagus each with 2 stout, straight apically directed, subapical tergomesal teeth, somewhat superimposed but the sternalmost tooth projecting apically beyond the stronger tergal tooth, 5-7 strong, curved teeth in an irregular double row on apicosternal margin, with tergalmost 2, 3 broadest, occasionally with a small short apicolateral tooth.

PUPA (Fig. 16). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly pale yellowish brown. All setae without lateral barbs. *Cephalothorax*. Seta 1-CT double to 4 branched, 2, 3-CT double or triple, 4-CT double to 4 branched from beyond

base, 5-CT with 4, 5 branches, 8-CT with 3-5 branches. *Respiratory Trumpet.* Pale yellowish brown, indistinctly tracheoid on anterobasal 0.2; index about 4.3-5.3 usually slightly expanded apically. *Metanotum.* Seta 10-CT single, very weak, 11-CT double to 4 branched, 12-CT double or triple, alveolus of 13-CT present. *Abdomen.* Seta 6-I single or double; 1-II single, delicate, inserted conspicuously anterior to posterior margin of segment, 3-II double or triple, 6-II single, 1-III single to 4 branched, 3-III double, 6-III single to triple; 1, 5-IV single or double, weak, each about equal in length, 6-IV single; 1-V single, stout, pigmented, long, about 1.5-2.0 the length of segment VI, 5-V similar, about 1.25-1.50 the length of segment VI, 6-V single, strong, stiff about 0.75-1.00 the length of segment VI; 1-VI single, strong, about 0.75-1.00 the length of segment VII, 5-VI single, strong about 1.00-1.25 the length of segment VII, 6-VI with 3-5 stiff branches; 1-VII single, rather weak, about 0.50-0.75 the length of segment VIII, 5-VII single, stronger than 1-VII, about 1.0 or more the length of segment VIII, 6-VII located ventrally; 9-VIII with 3-6 branches. *Paddle.* Light brown at base and on external buttress, with a dark line crossing near base; midrib very faintly pigmented; distinctly tapered and slightly produced apically; inner part 1.5 or more the width of outer part; outer margin with broad saw-like teeth which are blunt apically and extend from about basal 0.25 to apex; inner margin with very small scattered spicules from about 0.5 to apex; seta 2-P present.

LARVA (Fig. 15). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Several setae of thorax and abdomen exceptionally long. *Head.* Pale yellow, dark brown on collar; seta 4-C double to 4 branched, inserted posterolateral to 6-C, 5, 6-C simple, 7-C with 4-7 stiff, simple branches, 11-C minute double to 5 branched, 14-C single, long, slender; mentum with 17-19 teeth. *Antenna.* Light brown, without spicules; seta 1-A single. *Thorax.* Setae 1, 4-7-P single, exceptionally long, 1-P more than 2.0 the length of thorax, 5, 7-P about 3.0-3.8 the length of thorax, each lightly barbed; 3-P with 3-5 long, lightly barbed branches, 14-P single; 1, 2-M single, long slender, 5, 6-M single, exceptionally long, each about 3.0 or more the length of thorax, 8-M single, exceptionally long, about equal to 5, 6-M, 9-M with 3, 4 exceptionally long branches, but significantly shorter than single 10-M; 2, 6-T single, very long, slender, 7-T with 6-8 branches, 9-T double, about 1.5 the length of thorax. *Abdomen.* Seta 6-I, II single, stout, barbed, 6-II exceptionally long, about equal to length of abdomen; 1-II-V single, exceptionally long on IV, V, 3-II-VII single, very long; 13-II-V with 3, 4 branches; 6-III-VI single, simple; 1-VI double; 1-VIII minute, not inserted on sclerotized plate with 2-VIII, 3-VIII with 5-7 strongly barbed branches; comb scales 6-9 on a large, inapparent, weakly sclerotized plate, each rather long, slender, of near uniform length, tapered to narrow blunt apex, with very fine spiculate lateral fringe to near apex. *Segment X.* Saddle complete; pale yellowish; very lightly imbricate, with a few strong spicules on dorsal posterolateral margin followed ventrally by numerous very fine spicules; seta 1-X double, strong, lightly barbed; 2, 3-X single, 4a-c, e-X single, or double, 4d-X single. *Siphon.* Very pale yellowish brown; inconspicuously imbricate; index 4.0-4.7, noticeably tapered ventrally from about point of insertion of seta 1-S to apex; pecten teeth 20-31, each short, broad, rounded apically, fringed with lateral and apical spicules, with 1 median apical spicule conspicuously stronger and as long as or longer than tooth; pecten reaching to about 0.66-0.80 of siphon; seta 1-S single to triple, stiff, simple or occasionally very sparsely barbed, inserted at about 0.66-0.69 from base of siphon, usually within distal 1-4 pecten teeth, occasionally barely beyond distal tooth.

TYPE-DATA. There are 3 males and 7 females of the original series in the BMNH, each with a BM "Co-type" label. A male, with terminalia on plastic stage below adult on pin has the following information on underside of circular label: "cut bamboo, Ulu Klang jungle, 5 miles from Kuala Lumpur, Fly 9/3/03, ♂ of sc.-40, BM 1912-350," selected and labeled as Lectotype by E. L. Peyton, December 1968. The specimen is in good condition.

DISTRIBUTION. Material examined: 292♂, 316♀, 146 L; 208 with associated skins (136 l, 209 p, 1 incomplete).

CAMBODIA. Pichnil, 1♂, 1♀.

MALAYSIA. *Malaysia: Sabah* - Sipitang, Lingungan; Sook, Keningau; Keningau; 5♂, 8♀, 2 l, 2 p. *Sarawak* - 1♂. *Peninsular Malaysia: Selangor* - Ulu Langat; University Field Station Gombak; 13 miles from Gombak; 45th mile Gap Road; Kuala Kubu, Gap Road, Ponsoon, Ulu Klang; Ampang; Ulu Gombak; Ulu Lui; Bukit Kutu, Kuala Kutu Barhu; Genting Simpah; 2 miles from Gap; Pahang Rd.; 39♂, 42♀, 5 L, 9 l, 18 p. *Negri Sembilan* - Kompong Longkap, 2♂, 6♀, 2 l, 2 p. *Pahang* - 23 1/2 miles Pahang Rd.; Sungei Temay; Frasers Hill; 7♂, 12♀, 2 L, 7 l, 8 p. *Perak* - Chior Forest Reserve; 9th mile Cameron Highlands Rd.; 11♂, 21♀, 1 l, 5 p. *Kedah* - Sintok; Sintok 17 mile stone; 102♂, 92♀, 1 L, 22 l, 31 p.

THAILAND. *Ranong:* Khao Chatri; Kraburi; 4♂, 6♀, 1 L, 4 l, 6 p. *Phangnga:* Khao Pak Chaung; Nam Tai; 7♂, 8♀, 9 L, 8 l, 15 p. *Chumphon:* Ban Wang Phi, 1♂, 1♀, 2 L, 1 l, 1 p. *Kanchanaburi:* Huai Lin Thin; Huai Mae Nam Noi; Ban Sai Yok; 43♂, 47♀, 113 L, 74 l, 85 p. *Tak:* Doi Sam Sao; Khao Salak Phra; 3♂, 5♀, 1 L, 6 l, 8 p. *Nakhon Si Thammarat:* Ban Sai Koe; Chaung Khao; 6♂, 4♀, 5 L, 9 p. *Nan:* Doi Sam Sop; Ban Wang Mo; 3♀, 1 p. *Chiang Mai:* Phrao, Doi Sutep; Ban Huai Tat; *Chiang Dao* - Ban Pa Miang; Ban Sop O Nok; Ban Tham Kraeb; 36♂, 37♀, 14 L, 1 lp. *Lampang:* Doi Khun Tan, Doi Pha Huat, 17♂, 14♀, 7 L, 17 p. *Chiang Rai:* Fang 6♂, 9♀. *Mae Hong Son:* Ban Mae Ho Nua, 1♂, 1 p.

Borel (1930: 132) listed this species from the area of Giaray, INDOCHINA as *lutescens* Leic., type No. 2. His description appears to fit *lutescens*.

Stone et al. (1959) list this species from India and Andaman Islands. These records were derived from Barraud (1926: 344). Edwards *in* Barraud (1934: 80) reevaluated the earlier 1926 determination of *lutescens* and named Barraud's (1926) *lutescens* from India and the Andamans as *luteola* n. sp. Upon reexamination of Barraud's specimens in the BMNH in 1968, the 2 females listed by Barraud (1926 and 1934) from Andaman Islands proved to be *bicolor* (see also under *bicolor*).

DISCUSSION. This is an easily recognized species in all stages. Superficially the adult is closest to *approximata* and *demeilloni* but differs from these 2 in several respects. The most striking adult features include: the very light creamy decumbent head scales; entire thorax uniformly light yellow, without contrast between any areas except occasionally a very slight contrast with mesopostnotum; the greatly reduced number of pleural setae and the reduced development of the lower *mep* seta; very broad basal ochreous bands of terga, which are conspicuously expanded laterally and the completely white tergum VIII of female. All of these features differ from *approximata* and *demeilloni* except the pleural setae, and especially the small weak lower *mep* seta which is unique to these 3 species. The development of the basal mesal lobe of basimere of the male terminalia is unique. All other known species have the basal mesal lobe somewhat triangular, slightly to strongly produced tergoapically, and with at least one very stout seta distinctly more apical than other similar stout setae.

In the pupa there are several significant characters for recognition of the species, but the very distinctive broad, blunt, serrations on outer margin of paddle readily separates the pupa from all known species. The larva is easily recognized by the arrangement of head setae 4-7-C and the exceptionally long setae of thorax and abdomen.

BIONOMICS. In Malaysia and Thailand, this is one of the most common species encountered in secondary forest or scrub where bamboo habitats are abundant. Although occasionally found in artificial containers or other natural container habitats, this species shows a clear preference for a variety of bamboo habitats located on or near the ground. Collections have been examined from the following habitats; split bamboo (48), bamboo internodes, with small or moderate entrance holes (39), bamboo stump (31), cut bamboo or pot (7), tree stump (2), rusty tin (1), 55 gallon drum (1), auto tire (1), hole in log (1), rock pool (1). Several of these collections are recorded as pooled samples indicating a greater number of habitats than those listed, especially for split bamboo and internodes. One hundred and seventeen collections have recorded elevation of 30-1,520 m with the majority below 600 m. Macdonald and Traub (1960), reporting on the ecology of forest mosquitoes in the lowland dipterocarp forest of Selangor, Malaysia listed the following collections for *lutescens:* fallen split bamboo (12), bamboo internodes with moderate holes (5), bamboo stump (2), artificial container (2), and tree hole (1). In the natural habitat the larva of this species spends most of the time feeding on the bottom. Due apparently to the extremely long setae of the thorax and abdomen it is very slow in its movements and seems almost to struggle in quick jerking motions to surface or submerge. The living larvae are pale whitish in color.

URANOTAENIA (PSEUDOFICALBIA) OBSCURA EDWARDS
(Figs. 2, 17, 18)

Uranotaenia obscura Edwards 1915: 285 (A); Edwards and Given 1928: 338 (L); Peyton and Hochman 1968: 380 (♂*).

Uranotaenia papua Brug 1924: 441 (♀); Haga 1925: 44 (A, taxonomy); Lee 1944: 33 (L*); Bonne-Wepster 1954: 26 (♀, L*); Peyton 1972: 37 (synonymy).

Uranotaenia novobscura Barraud 1934: 84 (in part, ♂, ♀, except type ♂ and lp skins, see also *novobscura*); Qutubuddin 1951: 107 (A, ♂*); Mattingly *in* Qutubuddin 1951: 108 (♂).

Uranotaenia (Pseudoficalbia) papua Brug, Penn 1949: 29 (P*); Bick 1951: 405 (ecology); Peyton 1972: 37 (synonymy).

Aedes species unknown of Knight and Hull 1953: 480 (L); Peyton 1973: 161 (assignment).

Uranotaenia philippinensis Delfinado 1966a: 36 (in part, ♀ L*, P*, except ♂, Fig. 1b and distribution data, see also *abstrusa* and *confusa);* Delfinado 1966b: 51 (in part, ♂*, ♀, L*, P*, except ♂ description and distribution data); Peyton 1972: 37 (synonymy).

Uranotaenia (Pseudoficalbia) obscura Edwards, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.8 of forefemur; prementum blackish brown scaled, with a few to several conspicuous setae on distal ventral surface and at apex, occasionally a few similar setae dorsally between middle and apex; 1 pair of labial basal setae; palpus about 0.1 of proboscis and slightly less than antennal flagellomere 1; clypeus light brown; antennal pedicel light brown, with a few very minute inapparent setae and 2,3 small transparent

scales dorsomesally; flagellum about 1.4 of proboscis or exceeding proboscis from about base of flagellomere 10; Flm 1 about 1.2 of Flm 2 and with a few pale brown scales basomesally; flagellar whorls each with 6 (6-8) setae; 1 long, strong and usually 1 weak interocular and 4 (4, 5) ocular setae; decumbent scales light grayish brown dorsally, distinctly grayish white with weak bluish green reflections laterally; erect scales large, moderate in number, covering most of dorsal surface, black. *Thorax*. Scutal integument dark chocolate or rust brown; dorsocentral and supra-alar bare lines present but rather ill-defined; scales rather dense, mostly narrow, curved, dark bronzy brown, often with purplish sheen, several small, flat, broad, pale grayish or bronzy translucent scales on anterior margin, forming small patches at dorsocentral and acrostichal lines with varying reflections of weak bluish green, bluish white or colorless depending on angle of light and condition of specimen; prescutellar space largely scaled, a small median posterior bare space; scutellum dark brown with dark bronzy or mauve-brown scales on both lobes; mesopostnotum light brown; paratergite dark brown; pleuron dark brown or a lighter dingy brown with distinct grayish sheen, especially on *mep* and metapleuron, usually faintly darker on *psp* and upper edge of *stp; apn* with a distinct line of grayish or bronzy brown scales; *ppn* with 1 (1, 2) strong seta and a conspicuous patch of light brown translucent scales on upper posterior corner, varying in reflections from bronzy, gray, bluish green, bluish white to colorless and inapparent depending on angle of light; *sp* with 1 seta; *pra* usually with 1 seta, rarely 2; *ppl* with 1 long strong and 1, 2 weak setae; *stp* with 6-9 moderately strong, irregularly-spaced setae on upper and posterior margins, and devoid of scales or rarely 1-3 small scales near upper setae; upper *mep* with 4, 5 setae. *Wing*. Scales dark brown; cell R_2 about 0.38 of R_{2+3}. *Legs* (Fig. 2). Coxae and trochanters light grayish brown, lighter than pleuron; C-I with a few scattered inconspicuous, shiny grayish translucent scales on anterior surface; C-II, III with similar but fewer scales; femora dark brown scaled dorsally, light grayish brown with weak bluish or purple-green reflections ventrally; forefemur with 5, 6 setae on anteroventral margin beyond middle, 8-11 similar setae on posterodorsal margin from near base to near apex; midfemur with 1-4 weak inconspicuous setae on dorsal margin, rarely a few scattered setae on ventral margin; hindfemur without conspicuous setae, except for the usual apical setae; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.2 of tibia; hindtarsomere 4 about 3.0 of tarsomere 5. *Abdomen*. Terga uniformly dark bronzy or blackish brown scaled with strong purple-green reflections in some lights; laterotergite with a small patch of light brown scales; sterna light grayish brown, with pale grayish translucent scales, occasionally slightly darker on VII, VIII.

MALE. Essentially as in female except for sexual difference. *Head*. Antennal flagellum strongly plumose, whorls each of more than 20 setae, about 1.1 of proboscis; Flm 13 longer than Flm 12. *Wing*. Cell R_2 about 0.32 of R_{2+3}. *Legs*. Midfemur with 3-5 conspicuous setae on dorsal margin of basal 0.5 and 2-4 similar setae near middle on ventral margin; hindtarsomere 1 about 1.36 of tibia, tarsomere 4 about 3.2 of tarsomere 5. *Terminalia* (Fig. 18). Terga IX, X distinctly produced into a short, very broad, apically rounded lobe; tergomesal surface of basimere with numerous short, weak setae, and with 3, 4 conspicuously long, stout setae, 2, 3 long, stout setae sternoapical to basal mesal lobe; basal mesal lobe of basimere almost entirely covered with 10-14 long, stout setae and 5-8 short weak basal setae; distimere rather strong, more or less straight, gradually tapered to blunt apex; spiniform small, stout, bluntly pointed, arising from under a distinct

membranous hood; plates of aedeagus each with 2 short, stout rather straight apical, tergomesal teeth followed by a double row of 6-9 curved, subequal teeth on apicosternal margin.

PUPA (Fig. 18). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown, finely spiculate on dorsal and lateral surfaces of segment II-VIII. Abdominal setae quite variable in relative lengths and in the presence or absence of lateral barbs on some of the stronger setae. Position of some dorsal setae on segments II, III also variable. *Cephalothorax.* Seta 1-3-CT single or double, 4-CT single to 4 branched, 5-CT double to 6 branched, 6-CT single, very long, 8-CT double to 4 branched. *Respiratory Trumpet.* Dark orange-brown; short, broad, index about 2.5. *Metanotum.* Seta 10-CT single or bifid, 11-CT single, long, stout, 12-CT single to triple, weak, a well developed single or double 13-CT often present. *Abdomen.* Seta 6-I, II single or double; 1-3, 5-II single, stout, darkly pigmented; 1-III single or double, weak, 2-III single, strong, noticeably larger and stronger than 2 on succeeding segments; 3-III single to triple, stout, 5-III single, 6-III-VII single to triple, located dorsally on VII, 9-III-VIII long, stout, darkly pigmented, with or without a few lateral barbs, each progressively longer from III-VIII, about 0.25 the length of segment on III, 0.6-1.0 length of segment on VII, 1.5-2.0 length of segment on VIII, single or bifid on III-V, single or double on VI, single to triple on VII, VIII and inserted at or very near posterolateral corner; 1-IV-VII single to triple, weak, 5-IV-VI single, moderately stout, darkly pigmented, each about 1.0 or slightly more the length of each succeeding segment, rarely slightly less. *Paddle.* Midrib very faintly pigmented from base to apex; a narrow dark line across basal portion; very broad, rounded or slightly protrudent apically; outer margin with closely set serrations from about basal 0.2-0.3 to apex and with a few to numerous scattered, minute, submarginal spicules; inner margin with numerous short, strong, spicules from about basal 0.4-0.5 to apex and with a few much smaller submarginal spicules; seta 1-P stout, hooked apically, darkly pigmented, 2-P long, weak.

LARVA (Fig. 17). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Dark brown or yellowish brown; seta 4-C single, inserted very near clypeolabral suture, 5-C single, stiff, simple, 6-C double or triple or rarely single, stiff, inserted near clypeolabral suture and lateral to 4-C, 7-C single, weak, inserted anteromesal to antennal base and posterior to 6-C, 11-C minute, double or triple, 14-C single, weak; mentum with 17-19 teeth; mouth brushes often pectinate. *Antenna.* Yellowish brown, without spicules; distinctly curved outwardly; seta 1-A single, inserted near apex. *Thorax.* Seta 3-P short, with 3, 4 barbed branches, 4-P stellate, with 5-7 stiff, finely barbed branches, 7-P single, stout, strongly barbed, 8-P stellate, with 7-12 stiff, lightly barbed branches; 1-M, T minute, with 2-4 branches, 8-M stellate, with 3-5 stout, lightly barbed branches, 9-M single, 14-M with 8-13 branches; 7-T stellate, with 3-5 stout, lightly barbed branches, 9-T single, 13-T with 8-13 branches. *Abdomen.* Seta 1-I double or triple 6-I double or triple, 7-I double to 5 branched, 6-II double to 4 branched, 7-II double to 5 branched; 13-II-VI with 4-6 branches; 1-III-VI with 3-5 branches, branches usually stiff, pigmented on IV-VI, 6-III with 3-6 stout, lightly barbed, darkly pigmented branches; 6-IV stellate, with 4-6 stout, barbed branches; 6-V, VI stellate, with 5-9 stout, barbed branches; 1-VIII small, double or triple, inserted on small posterior extention of comb plate, 3-VIII with 4-7 lightly barbed branches; comb scales 4-9 on large sclerotized plates which are connected dorsally by a narrow saddle, each scale broad at base and tapered to

pointed apex, with a varying number of slender basolateral spicules. *Segment X.* Saddle complete, very short, index about 0.5, light brown, very lightly imbricate, usually without spicules on posterolateral margin, but often with numerous small, stout, scattered, submarginal spicules; seta 1-X with 2-6 stout, barbed, darkly pigmented branches, 2, 3-X single, with sparse, strong lateral barbs, 4-X with a paired divergent row of 5 setae, 4e-X much wider apart than 4a-X, without apparent barred area or grid, each seta strongly barbed, darkly pigmented, branched as follows: 4a, b-X single, 4c, d-X single or double, 4e-X with 2-5 branches, much shorter than the others, 4a-c-X often anomalously bent, twisted, or swollen near base, with heavy lateral barbs or with occasional abortive twisted branches. *Siphon.* Light brown, very lightly imbricate on basal 0.5; sides almost straight, index 2.5-3.0; pecten teeth usually 5-7 (1-9) often very widely and irregularly spaced, reaching to basal 0.20-0.73 of siphon, highly variable from side to side, each tooth broad at base with long, sharp median spine, very fine or rather long slender basolateral spines on one or both sides; seta 1-S with 4-11 stiff, lightly barbed branches, inserted at about 0.57-0.64 from base of siphon, beyond or within distal pecten teeth with equal degree of frequency.

TYPE-DATA. Six females and 3 males of the 14 original syntypes are in the BMNH with the following label data; Sarawak, Kuching, Pres. by J. C. Moulton, 1914-409. One male bears a BM "Type" label, which was apparently affixed by Edwards. The specimen is in good condition.

The 2 original syntype females of *U. papua* Brug, from Pionierbivak, Mamberano River, North Coast of New Guinea [Western N. G.] are in the BMNH and are in good condition. I hereby select one of these specimens as lectotype.

The holotype male, with terminalia on slide, of *philippinensis* Delfinado is in the USNM with the following data: PHILIPPINES, *Mindoro,* San Jose, 15 January 1945, E. S. Ross, collector, terminalia preparation number U-5, 25 November 1963. The specimen is in excellent condition.

DISTRIBUTION. Material examined: 225♂, 260♀, 101 L; 182 with associated skins (124 l, 200 p).

CAMBODIA. Pichnil, Stung Chral 2♀.

INDIA. *N. Bengal:* Sukna 5♂, 3♀.

INDONESIA. *Sulawesi:* Lambarese; Pedamaran; 1♂, 1♀. *West Irian:* Pionierbivak, Mamberano River, 2♀.

MALAYSIA: *Malaysia: Sabah* - Sapulut, Pensiangan; Labuk Sugut, Telupid Rd.; Sandakan Tepulid Rd.; Bukit Blachan, Lahad Datu; Papar; Keningau; Tawau; 12♂, 13♀, 6 l, 11 p. *Sarawak* - Kuching, 3♂, 6♀. *Peninsular Malaysia: Selangor* - Ampang Forest Reserve; Bukit Kutu, Kuala Kubu Baharu; Klang Telok; Ulu Gombak; Ulu Langat; Tanjong Robak; Telok, Banting Rd.; 42♂, 45♀, 2 L, 13 l, 23 p. *Perak* - Tanjong Tualong; Ipoh, Menglembu; Lasah; 5♂, 1♀, 3 l, 3 p. *Pahang* - Kuantan, 6♂, 7♀, 5 l, 7 p.

NEW GUINEA. Lake Sentani; Cyclops Mountain and various unrecorded localities 15♂, 14♀, 10 L, 9 l, 12 p.

PHILIPPINES. *Mindoro: Occidental* - San Jose, 13♂, 9♀, 8 L, 1 l, 1 p. *Luzon:* Mt. Mayon, 1♂; *Laguna* - Pangil; Mt. Makiling; 26♂, 23♀, 40 l, 39 p. *Negros:* Cuernos de Negros, 3♀. *Leyte:* Mahaptag; Tacloban; 50♂, 50♀, 19 L, 8 l, 6 p. *Palawan:* Panitan; Irahuan River; Iwahig; 9♂, 21♀, 18 L, 1 l, 14 p. *Samar:* Osmena, 1♀.

SINGAPORE. 2♀.

SRI LANKA. *Western:* Kalatuwawa, 10♂, 11♀, 20 L, 21 p.

THAILAND. *Surat Thani: Ko Samui* - Khlong Ta Kwian; Khao Khwang;

Ban Suan Phrao; Khao Phu Noi; Leam Yai; Ban La Mai; Leam Chong Kham; Ban Suan Ma Phrao; Wat Chaeng; 17♂, 26♀, 10 L, 13 l, 32 p. *Chiang Mai:* Doi Sutep, 1♀. *Lampang:* Doi Khun Tan, 1♀, 3 L. *Ranong:* Vat Pra Chum Pharam, 1♂, 1♀. *Chumphon:* Ban Wang Phi, 2♂, 1♀. *Trat:* Ko Chang, 1♂, 2♀, 2 L, 3 l, 3 p. *Phangnga:* Tak Khet, 1♀. *Kanchanaburi:* Huai Bong Ti; Khao Saeng; 2♀. *Chanthaburi:* Ban Bo Phu, 6♂, 5♀, 1 L, 11 l, 11 p.

The species is also reported from Sumatra, Bengkulu, Air Prioeken by Brug and Edwards (1931: 256), Hainan Island by Chu (1957: 147), Milne Bay, NEW GUINEA by Lee (1944, as *papua*), Isle of Haroekoe, near Amboina [Haruku Island, near Ambon, Moluccas INDONESIA] by Haga (1925: 44 as *papua*) and Padaido Island (Geelvink Bay), Hollandia, Mainak (Mandobo), Tanahmerah and Kimann, NEW GUINEA by Assem and Bonne-Wepster (1964: 75, as *papua*).

DISCUSSION. This species shows much variation in all stages. In the adult it is most notable in the coloration of the thorax. The chaetotaxy of the immature stages is more variable than in any other *Pseudoficalbia* from Southeast Asia, and includes the number of setal branches, degree of development and position of individual setae. In the pupa there is noticeable shifting of some setae, occasional duplication of setae, occasional anomalous development of a seta or increased thickness, length and presence of lateral barbs of setae 5-IV-VII and 9-III-VIII. In the larva there is considerable variation in the branching and degree of development of setae 6-I-VI, 7-I, II and to a lesser extent 1-IV-VI. The number and length of comb scales and pecten teeth are particularly unstable. The general length of comb scales and pecten teeth suggest a clinal variation between western and eastern populations, with those from the Philippines and New Guinea generally noticeably longer than those from other areas to the west. Although the usual number of pecten teeth is 5-7, it is not uncommon to find a specimen with only 1 or 2 near the base or very widely separated.

Even with the variations noted, this species is rather easily distinguished from other Southeast Asian *Pseudoficalbia*. Its nearest apparent relatives are extralimital and include *atra*, *diagonalis* and *quadrimaculata*. These 3 species utilize very similar habitats and are also apparently quite variable, especially in the immature stages (see Belkin 1962 for an analysis of *quadrimaculata*). I have not made a detailed study of these species except to assure that each is distinct from *obscura*. The primary distinguishing characters of the adult are: the uniformly dark brown color, presence of small patches of broad scales on anterior margin of scutum, conspicuous scales on the anterior pronotal lobes and posterior pronotum and absence of a scale patch on the sternopleuron. The male terminalia are very distinctive and differ significantly from all Southeast Asian species in the shape of terga IX, X, the number of setae on the basal mesal lobe of basimere and number and arrangement of teeth on the aedeagal plates. The pupa and larva are quite distinctive.

The original description of *papua* states, "Anterior border [of scutum] with a row of gray flat scales, somewhat bluish in some lights . . . Pleurae greyish yellow without ornamentation. Prothoracic lobes unscaled . . . This species is especially characterized by the presence of pale flat scales on the anterior border of the mesonotum in the absence of such scales on any other part of the mesonotum or the pleurae." Haga (1925) pointed out a discrepancy in the original description and added the following: "The proepimeron shows a patch of small flat scales (in perfect specimens 18 scales) just in front of the single proepimeral bristle; these scales are greyish but in some lights bluish. Prothoracic lobes with three strong bristles and several small flat broad greyish scales." Examination of the 2 syntype females in the BMNH

confirms this addition to the original description.

In the paratype-series of *philippinensis* there are included a few specimens of *abtrusa* and *confusa* (see discussion under these 2 species). The original description and illustration of the male terminalia of *philippinensis* (1966a) does not conform to that of the holotype and was probably drawn from one of the paratypes which is here treated as *confusa*. In Delfinado (1966b) the original description of the male terminalia of *philippinensis* was reproduced but in Fig. 103 the terminalia of the holotype male were apparently illustrated. Since all of the original specimens of *philippinensis* were not available for examination it is not possible to determine for certain which of the localities listed apply to *philippinensis sensu strictu*, except for those from San Jose, Mindoro.

The specimens listed by Barraud (1934) from Sukna, VIII, 1928, (Sobha Ram), as part of the original series of *novobscura* are all *obscura* and are not the same as the holotype of *novobscura* (see discussion under *novobscura*). It appears that the original adult description of *novobscura* was based entirely upon the above specimens of *obscura*, but the description of the larval skin is that of the type of *novobscura*. The 2 species are not related and do not resemble each other in any stage. Barraud's confusion of the adults of this species with *novobscura* was due entirely to the very poor teneral condition of the reared holotype male of *novobscura*.

BIONOMICS. This species is found in a variety of habitats, usually containing small amounts of water and includes both natural and artificial containers. However, it has a clear preference for large fallen tree leaves on the forest floor or large fallen leaf bracts, spathes or fronds of various palms, abaca, banana etc. or occasionally large green leaves that grow on or near the ground and are capable of retaining small amounts of pooled water. It is often found in these habitats in association with species of *Aedes*, *Armigeres* Theobald, *Culex* and *Zeugnomyia* Leicester. Specimens have been examined from the following habitats: fallen leaves (various types) (32), live leaves on ground (2), cut bamboo sections or pots on or near ground (16), tin cans (6), coconut shells (5), latex cups (3), palm tree stumps (2), rock pool (1 in Thailand, 1 in Philippines) (2), cup fungus (1), bamboo stump (1), small wooden box (1), banana leaf axil (1), *Pandanus* leaf axil (1). These habitats often have very small amounts of water with barely enough for the larva to move around freely. A few of the collections examined have notations of one ounce or 50 cc of water present. The species has also been recorded by others from fallen leaves, tin cans and discarded helmets in the jungle. Bonne-Wepster (1954) records a collection from the inflorescence of *Curcuma* sp., Bick (1951) lists habitats from New Guinea for *papua* (= *obscura*) as: artificial containers (9), spathes or leaves (8), coconut shells (3), rock holes (2), tree holes (1), puddles (1).

Macdonald and Traub (1960) report *obscura* as quite common in the lowland dipterocarp forest of Selangor, Malaysia and collected the species 11 times from fallen leaves. They observed, "*Ur. obscura* like *Z. gracilis* is confined to wet, fallen leaves on the forest floor, and when the water of a leaf is poured off, the *obscura* larvae may be seen anchoring themselves by their mouth parts to resist the flow of water. The larvae are in fact quite difficult to dislodge." I have also observed this interesting habit a number of times in Thailand, Sri Lanka and the Philippines. This is an adaptive protective habit, since I have observed the larvae on exposed leaves with a very shallow stand of water do this during very heavy rains. In one instance I am sure the larvae would have been washed off the leaf by the very heavy splashing raindrops

had they not anchored themselves.

bimaculata series

DISCUSSION. Eighteen species are currently assigned to this series. The series is Indomalayan, Oriental and Palaearctic in distribution with the greatest concentration of species in the Indomalayan region. Most species have a rather restricted distribution, but *nivipleura* is very widely distributed and occurs in most countries of the Indomalayan and Oriental regions. *Uranotaenia novobscura* also has a rather wide distribution and extends into Palaearctic Japan as far as Tokyo. It is the only species known to occur north of Okinawa. Adults of this series range in size from minute (*modesta*) to quite large (*ascidiicola* and *gigantea*) with the majority being very small. In adult habitus features, members of the series do not differ significantly from the adults of the other series of Section A, for *ascidiicola* and *gigantea* Brug are somewhat atypical for the series. Although there are a few exceptions to the characters presented below, the presence of setae on tergum IX of the male and the development of larval seta 1-C in all species sets this series apart from all known Indomalayan and Oriental *Uranotaenia*. The Ethiopian species, (*shillitonis* series, Peyton 1972: 31), *henrardi* Edwards and *shillitonis* Edwards, in Edwards (1941), *pseudohenrardi* Peters (1955) and *devemyi* Hamon [1954 (1955)], are reported to have numerous setae on tergum IX of the males but too little else is known of these species to suggest a relationship with the Indomalayan and Oriental group. There is some evidence to suggest that species within the *bimaculata* series could be further divided into conventional "species groups" or "complexes," based on similarities in one or more stages. I have not chosen to do so because of the difficulty in defining the adults on general habitus features, and further I see no real advantages in doing so. The suggested groupings appear to be as follows: (1) *albipes*, *bimaculata*, Leicester, *lui*, *nivipleura*, *novobscura*, *quinquemaculata;* (2) *ascidiicola*, *gigantea*, *moultoni*, Edwards, *xanthomelaena* Edwards; (3) *modesta*, *patriciae*, *propinqua*, *quasimodesta;* (4) *pseudomaculipleura* Peyton and Rattanarithikul, *reinerti* and (5) *maculipleura* Leicester, *moufiedi*. Although the immature habitat is unknown for a few species, it appears that they utilize, almost exclusively, restricted natural container habitats such as bamboos, tree holes, pitcher plants and leaf axils. Rarely can a species also be found in an artificial container, especially if it contains decaying leaves. Egg-laying habits have been described for *ascidiicola* and *novobscura* (as *bimaculata*) and in each case eggs are reported to be laid singly on the water surface.

ADULT. Generally dark brown or black species with no pale scaling of legs or abdominal terga (except *albipes*, *ascidiicola*, *gigantea* and *xanthomelaena*). Female proboscis usually very short, 0.73-0.92 the length of forefemur; antennal flagellum of female usually exceptionally long, 1.21-1.80 the length of proboscis, usually exceeding proboscis from base of flagellomere 11 or more (only 1.1 in *ascidiicola* and *gigantea*); erect head scales numerous or sparse but generally no longer than 0.5 the length of antennal flagellomere 1; ocular setae 6-8; dorsocentral setae generally very long about equal to half the width ofscutum or more, rarely less; *apn* and *ppn* usually without scales, or rarely *apn* or *ppn* with a very few scales (both profusely scaled in *ascidiicola* and *gigantea*); *ppl* setae usually 1-3 (1-7); *stp* setae few, usually 6-11, (16-22 in *reinerti* and *maculipleura*); upper *mep* setae usually 1-4 (1-6); wing cell R_2 0.44-0.72 the length of R_{2+3}, rarely less than 0.5, distinctly shorter than

cell M_2 (except *lui*).

MALE TERMINALIA. Tergum IX broadly rounded apically, without lobes but with a subapical patch or row of 2-12 long setae on each side of midline; tergum X well developed, complete and strongly sclerotized tergomesally, usually produced into a broad median apical lobe with a shallow median apical emargination or with distinct short broad lateral lobes, usually extending well beyond apical margin of tergum IX (except *lui*) and apparently never fused or continuous with apical margin of tergum IX: distimere slender more or less straight or only slightly curved on inner margin; spiniform minute, inapparent or occasionally apparently absent (except *bimaculata*, *lui* and *novobscura*); plates of aedeagus each with a single large strongly curved tooth on apical tergomesal margin which usually projects apically or laterally beyond the 2,3 sternoapical teeth; proctiger with cercal setae (except *novobscura*).

PUPA. Seta 6-CT rather short, rarely much longer than 7-CT or trumpet, inserted much closer to 7-CT than to 5-CT; 5-II mesad of 2-II and usually closer to 3-II than to 4-II (except *ascidiicola*); 6-VII located dorsally; 1-IX absent (except *nivipleura*); paddle fringed on inner and outer margins with filamentous spicules (except *lui*, *nivipleura* and *pseudomaculipleura*); outer part of paddle usually as wide as, or wider than inner part, rarely less; seta 1-P absent (except *ascidiicola*, *lui*, *nivipleura*, *novobscura* and *xanthomelaena*); 2-P absent.

LARVA. *Seta 1-C minute, very weak, often inapparent,* inserted apically on a prominent, usually rounded, apical process of the median labral plate, with the process often directed somewhat mesad; 7-C usually weakly developed, the majority single to triple (1-15); mentum with 11-19 teeth; antenna usually darkly pigmented, and usually darker than the head capsule, rarely with a few inconspicuous spicules; seta 1-P single; 3-P usually with less than 4 branches (1-6); 4-P usually with less than 4 branches (1-7); 7-P rarely with more than 2 branches (1-5); 14-P with 1-12 branches; 1-M, T minute, with very weak branches; 6-M often greatly reduced; 1,2-VIII not inserted on common basal sclerotized plate, but 1-VIII often inserted on posterior margin or small posterior extension of comb plate when present; 6-I-II single (except *nivipleura*); 2-X single or double (triple on *nivipleura*); 4-X with 5 pairs of setae (9 pairs on *moultoni*) on a weak grid or strongly pigmented sclerotized boss, each seta single or branched from near base as follows: 4a-X 1-7, b 1-5, c 1-3, d 1-4, e 1,2 and in *moultoni* f 3,4, g,h 3, i 2,3, 4b-X usually with equal branches on each side; seta 1-S usually sublateral or lateral, often on line with or dorsal to row of pecten teeth.

URANOTAENIA (PSEUDOFICALBIA) ALBIPES NEW SPECIES

FEMALE. *Head.* Proboscis about 0.87 of forefemur; prementum uniformly dark brown scaled, a very few minute setae at apex only; palpus about 0.15 of proboscis and about 1.20 of antennal flagellomere 1; clypeus blackish brown; antennal pedicel dark brown, with a small inconspicuous dorsomesal patch of minute setae and colorless scales; flagellar whorls each of 6 setae; flagellomeres 11-13 missing, Flm 1 about 1.44 of Flm 2 and with a basal patch of light brown or bluish-white scales; 1 long, golden interocular and 5 ocular setae, the most mesal one very near interoculars and golden, the remainder black; decumbent scales bicolorous, forming a distinct, narrow creamy white ocular line which broadens laterally and extends posteromesally to nape, scales on vertex and postgena brown; erect scales large and moderately long, numer-

ous but not dense, scattered over entire dorsal surface to ocular line, pale yellowish white posteriorly and brownish black along ocular line. *Thorax.* Scutal integument mostly dark brown with very sharply defined lateral and anterior borders, extending over anterior margin as a broad dark V-shaped area to upper level of *apn*, pale white on lateral margin; a narrow lateral marginal line of long narrow, pale white scales reaching to anterior dorsocentral line, remaining scales narrow, curved, dark brownish black; prescutellar space bare only at extreme posterior edge; scutellum brown, median lobe with 5 and lateral lobe with 4 strong, black marginal setae; mesopostnotum dark brown dorsally, pale white laterally; paratergite bare, white; pleuron uniformly pale white; *apn* devoid of scales; *ppn* with a small patch of whitish translucent scales and a single seta on upper posterior corner; *sp* with 1 seta; *ppl* with 2 setae; *stp* with a few scattered shiny transparent scales on upper 0.3 and down posterior margin to base of coxa II, and with 2 pigmented upper setae, 1 pigmented and 3 whitish lower posterior setae; upper *mep* with 3 whitish setae. *Wing.* Scales on C, Sc, R and R_1 dark brown except for remigium which is pale creamy brown or blue-white depending on light angle, remaining scales pale gray translucent; cell R_2 about 0.61 of R_{2+3}. *Legs.* Coxae and trochanters pale white; C-I with a few whitish translucent scales on upper anterior surface; coxa II, III with a very few colorless scales basolaterally; femora, tibia and tarsi mostly brown scaled; femora light brown ventrally; tarsi with faint narrow whitish basal bands on tarsomeres 1-4, which are more obvious on posterior side, 5 completely white; hindtarsomere I about 0.9 of tibia. *Abdomen.* Terga mostly dark brown scaled with blue-green reflections, with distinct narrow creamy white apical bands on II-VI which do not quite reach lateral margin on II, VI, a small median apical white patch on VII; tergum I light creamy brown scaled; laterotergite pale whitish with a few colorless scales; sterna I-VI pale white with whitish translucent scales, VII light brown basally and narrowly whitish apically.

MALE, PUPA, LARVA. Unknown.

TYPE-DATA. Holotype female with the following collection data: THAILAND, *Nakhorn Nayok*, Khao Yai National Park, Ko-Ang waterfalls, 18 June 1964, Kol Mongkolpanya and Sumeth Chunchulcherm, collectors, collection number NY 249-41, SEAMP accession number 79. Except for missing fore- and midtarsomeres 4 and 5 on one side, the specimen is in excellent condition and it is deposited in the USNM.

DISTRIBUTION. Known only from the type-locality.

DISCUSSION. Ordinarily I would be very reluctant to establish a new taxon based on a single specimen. This species is, however, so well marked that I have no hestiation in naming it. The species is readily separated from all other *Pseudoficalbia*. The dark brown scutal disk and dark mesopostnotum, with the remainder of thorax, coxae and trochanters white, tarsomeres 5 white and white apical tergal bands make this species unique in the *Pseudoficalbia*. Only 2 Ethiopian species of the *annulata* series (Peyton 1972), Section B, are known to have apical tergal bands. Tergal bands or patches of pale scales in all other known species of *Pseudoficalbia* are basal. Only *nivipleura* has the thorax rather similarly marked. *Uranotaenia xanthomelaena* has banded legs with tarsomeres 5 white. Even though the male terminalia and immature stages are prime stages for series assigment, I feel confident that this species belongs to the *bimaculata* series and will prove to be most closely related to *nivipleura* when these stages are known.

BIONOMICS. The type-female was reared from a larva collected from a tree hole. The skins were apparently discarded.

URANOTAENIA (PSEUDOFICALBIA) ASCIDIICOLA DE MEIJERE
(Figs. 19, 20)

Uranotaenia ascidiicola de Meijere 1910: 925 (♂*, ♀, L*, P*, E*); Edwards 1922: 435 (♂, key); Brug 1931: 6 (A, L, taxonomy); Mattingly 1957: 11 (P, key).
Uranotaenia (Pseudoficalbia) ascidiicola de Meijere, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.78 of forefemur; prementum dark brown scaled, with a few inconspicuous delicate setae on ventral margin near middle and at apex; 3 pairs of labial basal setae; palpus about 0.18 of proboscis and about 2.0 of antennal flagellomere 1; clypeus dark brownish black; antennal pedicel dark brownish black mesally, lighter laterally with a small patch of minute setae and a few light brown scales dorsomesally; flagellum about 1.1 of proboscis or exceeding proboscis by less than length of flagellomere 13; Flm 1 about equal to Flm 2 and with a conspicuous basomesal patch of grayish brown scales with blue-white reflections; flagellar whorls each of 6 setae; 1 long, strong, bronze interocular and 5 black ocular setae; decumbent scales light grayish brown with blue-green reflections dorsally, gray-white laterally; erect scales exceptionally large, conspicuous, moderately long, rather dense, covering most of dorsal surface, dark brown in color. *Thorax.* Scutal integument uniformly dark orange-brown; scales mostly narrow, curved, rather dense, especially on scutal fossa, mostly light bronzy brown, a short anterolateral marginal line of gray-white scales from about middle of *ppn* to dorsocentral bare line where they are more concentrated and broadened, a small patch of slightly broader gray-white scales at anterior acrostichal line; prescutellar space mostly scaled, with a small posterior bare space; scutellum same color as scutum, scales dark brown with blue-green reflections, lateral and midlobes each with 4 strong marginal setae; mesopostnotum dark orange-brown; paratergite rust-brown; pleuron light brown with *apn*, *ppn*, *psp*, and upper edge of *stp* slightly darker rust-brown; *apn* with a conspicuous line of gray-white scales; *ppn* with a large conspicuous upper posterior patch of gray-white scales and 4 setae; *sp* with 1 seta; *ppl* with 4 strong golden setae and with a few gray-white scales on anterolateral margin, a distinct patch on anteromesal surface, continuing as a distinct narrow line across prosternum to near suture; *stp* with an upper patch of grayish scales which narrowly extends down posterior margin to below base of midcoxa and with about 3 upper and 9 posterior marginal setae; upper *mep* with 5, 6 setae; all pleural scales with strong blue-green reflections. *Wing.* Scales dark brown; cell R_2 about 0.46 of R_{2+3} and about 0.73 of cell M_2. *Legs.* Coxae and trochanters light brown; C-I with a distinct anterior patch of gray-white translucent scales; C-II, III each with an anterolateral patch of near colorless translucent scales, much less conspicuous than those on C-I; femora dark brown scaled with purple-green reflections dorsally, distinctly gray-white with strong blue-green reflections ventrally, without conspicuous arrangement of setae or spines, except on forefemur which has about 14 very short setae on posterodorsal margin and about 8 similar setae on anteroventral margin from basal 0.33 to near apex; tibiae and tarsi dark brown; hindtarsomere 1 about 1.2 of tibia; hindtarsomere 4 about 2.0 of tarsomere 5. *Abdomen.* Terga mostly dark brown scaled dorsally; terga II-VIII with broad basolateral patches of ochreous or gray-white scales, some of which extend dorsally as a thin faint basal line, but do not form complete distinct bands; laterotergite with a few grayish scales; sterna

with creamy white translucent scales, sterna VI, VII with narrow apical band of brown scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.85 of forefemur; 5 pairs of labial basal setae; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 0.82 of proboscis; Flm 12 longer than Flm 13. *Terminalia* (Fig. 20). Apical margin of tergum IX not apparent tergomesally where it may be fused with apical margin of tergum X, tergum IX with a subapical patch of 10-13 long stiff setae on each side of midline, surface strongly spiculate; tergum X complete tergomesally, produced into a pair of distinct short, broad, rounded, closely approximated lobes, apparently extending beyond apical margin of tergum IX; tergomesal surface of basimere with numerous strong and weak setae, 2 setae apical to basal mesal lobe conspicuously strong; basal mesal lobe of basimere with 1 long stout apical seta and a subapical row of 4 similar slightly shorter setae, 11-14 small weak setae basal to these, 1 long, strong and 2, 3 weak sternoapical setae; distimere strong, of near uniform width to near apex and then strongly curved and tapered to pointed apex; spiniform minute, inapparent; plates of aedeagus each with a strong curved laterally directed, subapical, tergomesal tooth, a similar larger more sternal apicomesal tooth, followed by 2 smaller curved teeth on sternoapical margin; proctiger with most of tergal surface strongly spiculate, with 5, 6 stiff cercal setae on each side.

PUPA (Fig. 20). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown. Most setae dark brown, very small, single or with a few fine terminal branches. *Cephalothorax.* Setae 1-9-CT short, weak, single or bifid. *Respiratory Trumpet.* Dark brown, without tracheoid area; expanded apically, index about 4.0, pinna diagonally truncate on apical 0.4. *Metanotum.* Seta 10-CT strong, single, alveolus of 13-CT not apparent. *Abdomen.* Seta 1-I with 7-10 very stout primary branches, dark brownish black; 1-II-VII short, strong, single or with 2-4 fine terminal branches, 6-II posteromesal to 7-II, 8-II-VI minute, located dorsally, 9-II short, stout, single; 9-III-V very stout, brownish black, with split ends, about 0.33 or more the length of segments, located near ventral posterolateral corner; 9-VI similar, with 3 strongly barbed branches and slightly longer; 9-VII with 7-9 very stout strongly barbed branches, located anteroventral to posterolateral corner, longer than segment VIII; 9-VIII with 11, 12 very stout, strongly barbed branches, located anteroventral to posterolateral corner, at least 2.0 the length of paddle. *Paddle.* Very small, not longer than segment VIII; light brown; midrib faintly indicated at base only; outer margin with closely set strong filamentous spicules, with those nearer to apex stronger and split into 2 or more fine points; inner margin straight from about basal 0.15 to apex, with small rather inconspicuous spicules; outer part wider than inner part, seta 1-P present.

LARVA (Fig. 19). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Several dorsal and ventral setae with very stout, acutely pointed, darkly pigmented branches, individual branches alternating in length with a few considerably longer than the others, branches simple or with inconspicuous lateral barbs, each seta with most branches radiating from base on a single plane, in a more or less fan or palmate form, or occasionally a few of the shorter branches arising on a different plane giving an indefinite stellate form, each stout seta arising from a distinct raised sclerotized basal tubercle. *Head.* Light brown; very small, long and narrow, 1.7-2.0 as long as wide; seta 4-C double or triple, 5, 6-C weak, 7-C single or bifid; mentum with 11 teeth. *Thorax.* Setae 5, 7-P single, stout, on

common sclerotized base which does not encompass the very weak single 6-P; 8-M stellate, with 6-8 very stout branches, 9-M single; 2, 3-T with 7-11 stout branches, 7-T stellate, with 6-8 very stout branches, 9-T single. *Abdomen.* Seta 1-VII with 7-10 stout branches, 2-II, V-VII with 6-9 stout branches, 3, 4-I-VII, with 5-8 stout branches, 6, 7-I-V long, stout, single, equal in development, inserted on a common sclerotized basal plate, 11-I with 7-9 stout branches, 13-I stellate, with 9-12 stout branches; 10-II-VII with 5-9 stout branches; 13-II-V, VII with 7-11 stout branches; 6-VI single, similar to 6-V, 7-VI with 6-8 stout branches, not on plate with 6-VI; 7-VII with 5-7 stout branches; 3-VIII minute, double or triple, 4, 5-VIII with 2-5 stout branches; segment VIII without a sclerotized plate; comb scales 3-5 in a patch between setae 1, 4-VIII, each scale a stout simple spine. *Segment X.* Saddle complete, yellowish brown, without imbrications and spicules on posterolateral margin; longer than siphon, index about 1.9; seta 1-X single, stout, 4a-e-X single, stout, lightly barbed, inserted on a strongly sclerotized boss. *Siphon.* Yellowish brown, without imbrications and acus; short, index about 2.0; pecten teeth 2-4, each a stout simple spine; 1-S minute, double, inserted beyond and dorsal to distal pecten tooth.

EGG. Described by de Meijere (1910) as follows, "Die Eier sind langgestreckt, ca. 0,85 mm. lang und 0,2 mm breit, von weisser Farbe, die Oberfläche ist glatt, ohne Sculptur. Sie schwimmen auf dem Wasser in den Bechern." His figure is reproduced in Mattingly (1970).

TYPE-DATA. Type-male with terminalia on slide in Rijksmuseum, Amsterdam, Netherlands. Type-locality: Tjibodas (1,500 m.) near Buitenzorg [Bogor], Java, INDONESIA, collected by Dr. Jensen 1909. I have not seen the type of this species, however, I have seen a female and male of the type-series, and there is also a male with slide mounted terminalia in the BMNH which is apparently from the original series. The specimen in the BMNH is labeled, Java, Tjibodas, from *Nepenthes*, Jensen 1909.

DISTRIBUTION. Material examined: 4♂, 2♀, 12 L; 2 with associated skins (1 l, 2 p).

INDONESIA. *Java:* Tjibodas (Bogor); Salak.

DISCUSSION. This species is large and very similar to *gigantea* in the adult stage but it cannot be confused with any known species in the pupal or larval stage. The differences in adult and immature stages of these 2 species are discussed under *gigantea.* The male terminalia are very similar to those of *gigantea* and apparently differ only in the following: tergum X bilobed tergomesally, broad truncate in *gigantea;* 2 strong curved, laterally directed mesal teeth of aedeagal plates distinctly separated, with the more sternal of the 2, apical to the more tergal, these 2 teeth with bases touching in *gigantea;* tergal surface of tergum IX and proctiger strongly spiculate, these finely spiculate in *gigantea.*

BIONOMICS. This species is apparently endemic to Java where it breeds in *Nephenthes* pitchers at elevations of 1,500-1,600 m. Eggs are reported to be laid singly on the water surface and not in rafts as described for a few other *Uranotaenia* species.

URANOTAENIA (PSEUDOFICALBIA) BIMACULATA LEICESTER
(Figs. 2, 21, 22)

Uranotaenia bi-maculata Leicester 1908: 226 (♂, ♀).
Uranotaenia bimaculata Leicester, Edwards 1921: 283 (A, ♂, in part, Malay Peninsula record); Edwards 1922: 436 (♂, taxonomy); Mattingly *in* Delfinado 1966b: 41 (♂*, lectotype selection).
Uranotaenia (Pseudoficalbia) bimaculata Leicester, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.89 of forefemur; prementum dark brown scaled dorsally, narrowly and indistinctly gray ventrally, no conspicuous setae except a few small scattered ones along ventral margin; one pair of labial basal setae; palpus about 0.15 of proboscis and about 1.23 of antennal flagellomere 1; clypeus reddish brown; antennal pedicel dark brown mesally, lighter laterally, with a small inconspicuous patch of minute setae and 3-5 colorless scales dorsomesally; flagellum about 1.21 of proboscis, exceeding proboscis from base of Flm 11 or slightly more; Flm 1 about 1.12 of Flm 2 and with a few grayish basomesal scales; flagellar whorls each of 7, 8 setae; 1 stout, black interocular and 5 ocular setae; decumbent scales pale grayish brown dorsally, distinctly whitish laterally; erect scales rather small but typical, sparse, more numerous on occiput with a few scattered on vertex, individual scales pale gray and inconspicuous. *Thorax* (Fig. 2). Scutal integument a moderate rust or yellowish brown, a large, bare, oval, velvety black supra-alar spot, which is usually set off from remainder of dark scutum by a broad pale yellow or orange line on anterior and mesal border; scales mostly narrow, curved, light brown or grayish brown, except for a few similar gray-white ones on mesal border of supra-alar dark spot and a few moderately broad gray-white ones on anterior promontory; prescutellar space largely bare; dorsocentral and supra-alar setae, long, stout, but not exceptionally so; scutellum light brown, scales light grayish brown; mesopostnotum dark rust-brown, lighter basolaterally; paratergite light or dark brown; pleuron mostly pale grayish brown, usually indistinctly darker on *apn*, *ppn*, *psp*, upper *stp*, *mep*, and metapleuron, occasionally uniformly pale; *apn* with a few inconspicuous pale gray scales near middle; *ppn* with 1 small seta; *sp* with 1, 2 setae; *ppl* with 1 strong and 1 weak seta; *stp* with 2 upper and 4, 5 weak, posterior marginal setae and with an inconspicuous broad patch of grayish translucent scales on upper 0.33, with a few scattered similar scales extending down posterior margin; upper *mep* with 3, 4 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 about 0.62 of R_{2+3} and 0.79 of M_2. *Legs.* Coxae and trochanters pale grayish brown, with a few inconspicuous translucent scales; femora dark brown scaled dorsally, gray ventrally; forefemur with 8, 9 short weak setae on posterodorsal margin, 3-5 similar setae on distal anteroventral margin; midfemur with a single small dorsal seta and a few minute setae on ventral margin; hindfemur with a single stiff seta on distal dorsal margin; tibiae and tarsi uniformly brown scaled; hindtarsomere 1 about 1.0 of tibia. *Abdomen.* Terga dark mauve-brown scaled; laterotergite with a few scattered grayish scales; sterna light grayish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.88 of forefemur; 3 pairs of labial basal setae; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.16 of proboscis or exceeding proboscis by no more than Flm 13; Flm 12 longer than Flm 13. *Terminalia* (Fig. 22). Tergum IX rather shallow, broadly rounded

on apical margin, with a subapical row of 2-6 weak setae on each side of midline; basal emargination very broad; tergum X well developed, produced tergolaterally into short broad, truncate lobes which extend slightly beyond apical margin of tergum IX; tergomesal surface of basimere with a mixture of strong and weak setae; basal mesal lobe of basimere with 1 very stout tergoapical seta, 4-6 stout subapical setae and 2-3 much smaller setae basal to these, 1 long, stout and 1-3 smaller setae on sternoapical margin; distimere more or less straight, of uniform width on basal 0.5, tapered to pointed apex on distal tergomesal margin; spiniform short, stout; plates of aedeagus widely separated, joined by a narrow tergal and sternal sclerotized bridge, not noticeably rounded on lateral margin below teeth, each plate with 1 stout outwardly curved, apical, tergomesal tooth and 2 curved teeth on sternoapical margin, the median tooth shortest, a small tooth on tergolateral margin; proctiger usually with 1 cercal seta on each side.

PUPA (Fig. 22). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly light yellowish brown. *Cephalothorax.* Seta 1-CT single, 2,3-CT single or double, 4,5-CT double or triple, 6-CT single, shorter than 7-CT, 8-CT with 3 (3-7) branches. *Respiratory Trumpet.* Light yellowish brown; index about 4.0, slightly expanded on apical half; tracheoid area inapparent. *Metanotum.* 10-CT single to triple, 11-CT with 3-6 branches, 12-CT single, lightly barbed, alveolus of 13-CT not evident. *Abdomen.* Seta 3-I with 3-7 branches from about 0.5; 1-II small with 12-20 very fine branches, 2-II single, longer than 0.5 the length of segment, 3-II with 6-12 branches from about basal 0.4 of stout basal stem; 1-III-VII weak, single to triple, 3-III long, stout on basal 0.5, with 4-12 branches beyond, with a distinct brush appearance, 6-III-V single or double; 5-IV-VII single, longer than succeeding segment on IV-VI; 6-VI single, significantly longer than 6 on preceeding segments; 6-VII with 2-5 branches, located dorsally; 9-VIII with 4-7 bifid or trifid branches. *Paddle.* Pale yellowish brown; midrib light brown from base to apex; outer margin with closely set, long, filamentous spicules from about basal 0.25 to apex, inner margin with similar shorter more widely spaced spicules; outer part slightly wider than inner part; apical emargination shallow; 1-P absent.

LARVA (Fig. 21). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Most setae of thorax and abdomen small and with few simple branches. *Head.* Yellowish brown, darker on collar; seta 4-C with 4-6 weak branches, 5-C single, longer than 6-C, 7-C with 8-15 weak branches, 11-C small, with 3-6 branches; mentum with 15 teeth. *Antenna.* Dark brown; seta 1-A with 4-6 branches. *Thorax.* Seta 1-3-P long, single, strongly barbed, 4-P with 3,4 strongly barbed branches; 7-P double or triple, strongly barbed, 14-P long, single; 8-M with 3-5 branches, 9-M double; 7-T with 4-6 branches, 9-T double. *Abdomen.* Seta 1-II minute, with 6-13 very weak branches; 1-III-V with 2-4 weak branches, 6-III-V double, strongly barbed; 6-VI single, strongly barbed; 1-VIII minute, multiple branched, inserted on posterior margin of comb plate, 3-VIII with 5-7 strongly barbed branches; comb scales 4-8 on large sclerotized plate, each tooth fringed laterally and apically, fringe stronger apically. *Segment X.* Saddle incomplete, pale brown, posterior margin without spicules, but a few very fine spicules on the more apical imbrications; 1-X double or triple, strongly barbed, 2,3-X single, 4a-X double or triple 4b-e-X usually single, rarely double. *Siphon.* Pale brown on basal 0.5-0.8, always distinctly dark brown distally; index 4.5-6.0, sides straight and gradually tapered from base to apex; pecten teeth 10-12, each tooth variable in shape, usually broad and not

noticeably tapered apically, finely fringed laterally and apically, reaching to about basal 0.27-0.38; 1-S with 3-5 barbed branches, inserted at basal 0.38-0.47 and on line with row of pecten teeth.

TYPE-DATA. Lectotype-male in the BMNH with the following data on the underside of a round circular label: "By edge of stream in jungle, The Gap, 16/4/04, Dr. G. F. Leicester, BM1912-350." Selected and labeled as "Lectotype" by P. F. Mattingly, 10 March 1964 and reported by Mattingly in Delfinado (1966b: 41). Three males and 1 specimen without head or abdomen in BMNH with the same data as the lectotype and labeled as paratypes.

The lectotype male is in good condition but with a fore- and hindleg missing on one side.

DISTRIBUTION. Material examined: 110♂, 139♀, 42 L; 89 with associated skins (75 l, 89 p).

MALAYSIA. *Peninsular Malaysia: Selangor* - Ulu Gombak; The Gap; 45th mile Gap Rd; Bukit Kutu; Ulu Langat; Ulu Bakau; 56♂, 82♀, 13 L 37 l, 43 p. *Pahang* - 16th mile Betong Rd.; Frasers Hill; 26♂, 19♀, 7 L, 10 l, 13 p. *Kedah* - Sintok, 1♀. *Perak* - 9th and 27th mile of Cameron Highlands Rd., 11♂, 21♀, 5 l, 6 p.

THAILAND. *Tak:* Doi Sam Sao; Khao Salak Phra; 3♂, 1♀, 2 L, 5 l, 4 p. *Phangnga*: Khao Pak Chaung; Pathum; Nam Tai; Tang Mai; 10♂, 12♀, 15 L, 15 l, 19 p. *Ranong*: Ban Chatri; Khlong Bang Man; Khao Chatri; 1♂, 2♀, 5 L, 1 p. *Chiang Mai*: Chiang Dao, Ban Tham Kreab, 2♂, 1 L, 1 p. *Lampang*: Doi Khun Tan, 1♂, 1 L, 1 p.

Listed in Stone et al. (1959) from Philippines. This is a very doubtful record, probably taken from Bohart and Ingram (1946b: 58). Most other published records of this species refer to *novobscura* (see discussion of *novobscura*).

DISCUSSION. This species resembles *novobscura* very closely in general adult habitus features and in the male terminalia. Because of this general resemblance, the 2 species have often been misidentified. Although the 2 species show a number of obvious similarities, both are quite distinct and exhibit significant morphological differences in all stages.

The adult is variable but is easily distinguished from all but *novobscura*. The color of the scutal integument varies from light yellowish brown to a darker rust-brown. The dark supra-alar spot is always velvety black and sharply contrasts with the remainder of the dark scutum. The pale area around the anterior and mesal border of the dark spot is almost always distinctly yellow or orange, but an occasional specimen has the posteromesal area brown and blending somewhat with the dark central portion of the scutum and the dark supra-alar spot. There are always a few scales on mesal margin of the dark spot and the more posterior ones are distinctly whitish. The supra-alar dark spot on *novobscura* is not as black, the scutum is generally darker especially in southern populations and usually there is only a pale area on anterior border of the dark spot, the posterior mesal border blends with the dark central portion of the scutum, the few scales, when present on the posteromesal margin of the dark spot are usually always more brownish.

Although the pale whitish scales on the anterior promontory have been used as a key character by Edwards (1922) they are not very distinct in many specimens. The color pattern of the pleural sclerites is variable but some of this may be directly attributable to the teneral condition of many of the reared specimens in the collection studied. The presence of broad pale gray scales on the *apn* is quite significant and this character alone will separate this species from *novobscura*, but the scales are often very inconspicuous, almost

colorless and represented by as few as 4 or 5.

The immature stages are only moderately variable in a few characters, but they are easily distinguished from all species including *novobscura*.

The length of larval siphon varies considerably but the general shape, position of seta 1-S and distribution of pecten teeth in relation to ratio of siphon are rather constant. The extent of the light colored basal portion of the siphon varies considerably but the siphon is always distinctly darker on at least apical 0.2 and this is usually readily detectable without a lens.

BIONOMICS. This species is commonly encountered in secondary rain forest where bamboo is more abundant. Like *novobscura* it prefers bamboo for egg laying, but in contrast to an indicated preference for bamboo stumps and artificial containers by *novobscura*, this species seems to have a distinct preference for bamboo internodes with small entrance holes or partially closed split bamboo, which are usually fallen on or near the ground and dried. The immature stages have been collected in Malaysia and Thailand from the following habitats: bamboo internode (27), split bamboo (11), bamboo stump (4), *Pandanus* leaf axil (1) and hole in log (1). Thirty-nine of these collections are with recorded elevations of 30-1,076 m.

In the natural habitat, larvae are very pale in color, hang down from the water surface in an almost vertical position; and have a slow undulating movement similar to that of many *Aedes* species.

The only recorded adult collections are those of Leicester (1908) from Malaysia in which he states, "The mosquito is fairly common in damp places in the jungle at "The Gap" though so far it is the only place I have taken it . . . It is always found in the neighbourhood of streams or settled on rocky boulders over which water drips."

URANOTAENIA (PSEUDOFICALBIA) GIGANTEA BRUG
(Figs. 23, 24)

Uranotaenia gigantea Brug 1931: 6 (A, L*).
Uranotaenia (Pseudoficalbia) gigantea Brug, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.81 of forefemur; prementum dark brown scaled, with a few short inconspicuous setae scattered along ventral margin and at apex; 3 pairs of labial basal setae; palpus about 0.17 of proboscis and at least 2.0 of antennal flagellomere 1; clypeus dark brownish black; antennal pedicel light rust-brown, only faintly darker mesally, and with a small patch of minute setae and colorless scales dorsomesally; flagellum about 1.1 of proboscis or exceeding proboscis by less than length of flagellomere 13; Flm 1 about 1.0 of Flm 2 and with a conspicuous basomesal patch of grayish brown scales; flagellar whorls each of 6 setae; 1 long, strong, bronze interocular and 5,6 ocular setae, mesal 3 bronze or golden, lateral 2,3 black; decumbent scales pale creamy brown in center, narrowly and indistinctly grayish white on ocular line, completely white at sides, all scales appearing whitish with blue-green reflections at some angles; erect scales exceptionally large and conspicuous, moderately long, dense, reaching to near ocular line, pale yellow in color. *Thorax.* Scutal integument uniformly dark orange or light rust-brown; an incomplete bare line on mesal border of supra-alar area, most noticeable posteriorly; scales mostly narrow, curved, rather dense especially on scutal fossa, light bronzy brown, a short anterolateral marginal line of gray-white scales from above middle of *ppn* to dorsocentral bare line,

a very distinct small patch of slightly broader gray-white scales at anterior acrostichal line; prescutellar space covered with scales except for very small posterior bare space; scutellum same color as scutum, scales grayish brown with blue-green reflections, midlobe with 6 and lateral lobe with 4, 5 strong marginal setae; mesopostnotum dark reddish brown; paratergite rust-brown; pleuron light orange or rust-brown, with *ppn*, *psp*, *pra* and upper edge of *stp* indistinctly darker rust-brown, *apn* with a distinct line of gray-white scales with blue-green reflections; *ppn* with a large conspicuous upper posterior patch of gray-white, moderately broad scales with bluish reflections and with 1-2 setae; *sp* with one seta; *psp* with a few semierect grayish translucent scales on posterior margin; *ppl* with several grayish scales and 3 stout golden setae; 2-3 grayish translucent scales on prosternum; *stp* with a broad upper patch of grayish translucent scales which narrowly extends down posterior margin to below base of midcoxa and with about 3 upper and 8 posterior marginal setae; upper *mep* with 6-7 golden setae. *Wing*. Scales dark brown; cell R_2 about 0.46 of R_{2+3} and about 0.81 of cell M_2. *Legs*. Coxae and trochanters same color as lighter areas of pleuron; C-I with anterior surface covered with pale grayish white scales, C-II, III each with an anterolateral patch of similar scales; femora dark brown scaled dorsally, distinctly gray-white or pearly white ventrally, without conspicuous setae except on forefemur which has 13-14 very short setae on posterodorsal margin from near base to near apex, a similar anteroventral row of 8 setae from about middle to near apex; hindtarsomere 1 about 1.26 of tibia; hindtarsomere 4 about 2.0 of tarsomere 5. *Abdomen*. Terga mostly dark brown scaled; terga II-VII with rather large basolateral somewhat triangular patches of creamy white scales, reaching at least 0.5 lateral width of each terga; laterotergite with a few grayish translucent scales; sterna uniformly covered with creamy white translucent scales.

MALE. Essentially as in female except for sexual differences. *Head*. Proboscis about 0.91 of forefemur; antennal flagellum strongly plumose, flagellar whorls each of more than 20 setae, length about 0.77 of proboscis; Flm 13 slightly longer than Flm 12. *Thorax*. Postspiracular area bare. *Terminalia* (Fig. 24). Very similar to *ascidiicola*. Apical margin of tergum IX not clearly apparent on single specimen available; a subapical patch of strong alveoli of 11, 12 setae present on each side of midline; tergum X complete tergomesally, produced into a short, broad, apically truncate median lobe; basal mesal lobe with 1 long, stout tergoapical seta on a distinctly produced apical finger-like process, 2 similar setae immediately basal to this one, 3 shorter, slightly weaker setae basosternal to these and 14-17 much weaker setae; 2 long strong, and 3 weaker sternoapical setae; distimere rather stout, of uniform width to near apex and then strongly curved and tapered to pointed apex; spiniform minute, inapparent; plates of aedeagus widely separated, each plate with 1 strong curved, laterally directed, apical, tergomesal tooth, a similar longer slightly stronger tooth immediately sternoapical to the tergal tooth, with bases of the 2 touching, sternoapical margin with 2, 3 teeth with the most basal strongest; proctiger with 4 cercal setae on each side, tergoapical surface finely spiculate.

PUPA. Not known.

LARVA (Fig. 23). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Most setae of thorax and abdomen exceptionally stout, very darkly pigmented, all stout setae with short strong lateral barbs. *Head*. Rather small, longer than wide, sides parallel, uniformly dark brown; seta 4-C double or triple, close to 6-C, 5-C single, weak, 6-C located very close to clypeolabral suture, 7-C small, weak, bifid or tri-

fid; mentum with 13 teeth. *Thorax.* Setae 1, 5-P very stout, single, 2-4, 6-P short, weak, single, 7-P very stout, single or double; 8-M short, stout, double, 9-M, T single; 2, 3-T stout, triple, 7-T short, stout, double or triple. *Abdomen.* Setae 1-I-VI, 4-I, VI, 11-I, 2-II, V, VI, 3-II-V, 10-II-VI, 13-II-V all very stout, acutely pointed, triple, rarely one of these with 4 branches on one side, each inserted on a raised sclerotized tubercle; 6-I-VI and 7-I-V single, stout, equally developed and inserted on a common, pigmented sclerotized basal plate and each on a raised tubercle; 7-VI short, stout, triple not on plate with 6-VI; 1, 3, 4, 6, 7, 10, 13-VII similar to the short stout setae on preceeding segments, double or triple; 3-VIII minute, multiple branched, 4, 5-VIII stout, double or triple; segment VIII without a sclerotized plate; comb scales 2-5 small, rounded with spiculate fringe apically, arranged in an irregular patch between setae 1-3-VIII. *Segment X.* Saddle complete, light brown, without sculpturing; index about 1.9, noticeably longer than siphon; 1-X single, long stout, barbed, 4a-e-X single, stout, barbed, inserted on a darkly pigmented sclerotized boss. *Siphon.* Light brown, without sculpturing and apparently without acus; index about 1.7 or less; pecten teeth 2, simple, spine-like or with 1-3 very fine lateral spicules on one side; 1-S minute, inserted laterally beyond middle of siphon.

TYPE-DATA. Type-larva on slide in BMNH with the following label data: right hand label in pencil, *Uran. gigantea,* Hoeta gindjang, *Nepenthes,* 16.492, T5c, with "Type" [written in pen across lower right hand corner and apparently marked by Brug]. Left hand label with BMNH printed label: N. Sumatra, Mt. Toba Lake, 1450 m., 29.iii.1929, Dr. A. Thienemann, B. M. 1930-511. There are 3 other slides of whole larvae in the BMNH labeled same as the type, except each is numbered 16.488, 16.487 and 16.493, none has a type-label. None of the 4 larvae appear to be fourth stage and 2 are definitely not fourth stage larvae. There are also 1♂ and 1♀ in the BMNH which are apparently from the same collection but with label data: N. Sumatra, Tobah, 29.iii.1929, Dr. A. Thienemann, B.M. 1930-511, larva in *Nepenthes,* numbers 16.485 and 16.486. These are also without type-labels.

Reference was not made to a type in the original description but it seems reasonable to accept the larva in the BMNH as the type of *gigantea* Brug. In the original description there were 2♂, 2♀, 2 pupal skins and 13 larvae from *Nepenthes,* Hoeta Gindjang, 29.III.1929 and 3.IV.1929; 3 larvae from *Nepenthes* between Balige and Siborong-borong, 17.IV.1929 and 1 larva from a *Nepenthes* from Samosir, 12.IV.1929. Stone et al. (1959) list the type-locality as: Balige, Siborong-borong, Samosir, [Tapanuli], Hoeta Gindjang, Sumatra. Since these were listed as 3 separate collection localities by Brug, the type-locality should be that which appears on the labels of the type-larva, namely: Hoeta Gindjang, Mt. Toba Lake, N. Sumatra.

Brug (1931) based the recognition of his species primarily upon significant differences in the larva of *gigantea* and *ascidiicola.* He stated that this mosquito differs from *ascidiicola* chiefly in the larval stage and noted further that there were a few minor differences in the adults of the 2, especially since he had observed discrepancies in de Meijere's description of the adult of *ascidiicola.* Brug did not have adults with associated larval skins but he stated, "We are obliged to accept that the larvae and adults belong to one another, not only because they come from the same breeding place but also no other *Uranotaenia* of this size is known from Sumatra. The larvae occur exclusively in Sumatra. In Java one only finds *ascidiicola*" (Translated from German). It is probably for these reasons that he wisely marked a larva as the type.

DISTRIBUTION. Material examined: 1♂, 2♀, 4 L.

INDONESIA. *Sumatra:* Balige, Siborong-borong; Hoeta Gindjang, Mt. Toba Lake; Samosir; Toba Lake. All of these localities are in northcentral Sumatra near Lake Toba.

DISCUSSION. This very large species is closely related to *ascidiicola* and the 2 are not easily separated in the adult stage. The larva is easily recognized and differs from all species including *ascidiicola* in numerous respects.

The number of available adult specimens of *gigantea* and *ascidiicola* is much too small to make generalizations about differences in the adults of the 2. What seem to be apparent differences in the few available specimens might well prove to be of little significance in a larger sample. Differences which appear to be of some value in separating the adults are essentially those presented in the adult key. In addition the decumbent scales of the vertex and on ocular line are slightly lighter in *gigantea*, the erect head scales are pale yellowish in *gigantea* and dark brown in *ascidiicola*. The setae present on the posterior pronotum and propleuron of *gigantea* are fewer, but this difference would very likely disappear in a larger sample. The most significant difference between the adults of the 2 species appears to be the basolateral pale scaled patches of the abdominal terga. The patches are much broader and somewhat triangular in *gigantea* and these apparently do not extend dorsally as do those of *ascidiicola*. In the original description of *ascidiicola*, de Meijere states that the abdomen is banded, but Brug (1931) indicated that he had reexamined de Meijere's material and some specimens had unbanded abdomens. Of the few specimens I have examined of *ascidiicola*, the basolateral patches are quite clear, but there is a very narrow basal dorsal extention, not reaching the dorsum or with one or 2 segments with a very faint indication of a complete basal band represented by about a single row of scales.

The larva of *gigantea* differs from the larva of *ascidiicola* in many characters, but the 2 share a number of rather unique characters for the genus *Uranotaenia*. These are: large stout setae of thorax and abdomen inserted on sclerotized basal plates; setae 6, 7-I-V of equal development and on a common sclerotized basal plate; seta 3-VIII minute; segment VIII without a sclerotized comb plate; comb scales in a patch between setae 1 and 4; segment X much longer than siphon; seta 4-X inserted on a strongly sclerotized boss; siphon without an acus and seta 1-S inserted laterally. A few of these characters are also present in *xanthomelaena* which is also a *Nepenthes* breeder. Specific differences are too numerous to list and can be easily seen in the illustrations. The most notable are as follows; stout branched setae of thorax and abdomen with fewer branches, in stellate form, those of *ascidiicola* with many branches and in fan or palmate form; abdominal segments I-VII with 2, 3, 2, 2, 3, 3, 3 pairs of very stout branched dorsal setae respectively, in *ascidiicola* these are 3, 4, 3, 3, 4, 4, 4 pairs respectively; comb scales fringed with apical spicules, comb scales simple and spine-like in *ascidiicola*. Although the available larvae of *gigantea* are not in the fourth stage of development these differences are valid since I have compared some early stages of *ascidiicola* also.

The larva of both *gigantea* and *ascidiicola* have a rather unusual arrangement of abdominal setae on most segments. The placement of some of the dorsal setae in relationship to adjacent setae is considerably different from that of most *Pseudoficalbia* species. The numbering of some of these are purely arbitrary on my part.

BIONOMICS. This species probably breeds exclusively in *Nepenthes* pitchers at high elevation. It is apparently endemic to the island of Sumatra.

URANOTAENIA (PSEUDOFICALBIA) LUI LIEN
(Figs. 25, 26)

Uranotaenia lui Lien 1968: 10 (♂*, ♀, L*, P*).
Uranotaenia (Pseudoficalbia) lui Lien, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.8 forefemur; prementum dark bronzy brown, a few inconspicuous setae along midventral margin and at apex; 2 pairs of labial basal setae; palpus about 0.14 of proboscis and about equal to antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, lighter laterally, with 1 minute seta and 1 scale visible dorsomesally; flagellum about 1.4 of proboscis or exceeding proboscis from near base of flagellomere 10; Flm 1 slightly longer than Flm 2 and with a few grayish brown scales basomesally; flagellar whorls each with 6 setae; 1 interocular and 5,6 ocular setae; decumbent scales light brown, appearing dull grayish white with faint greenish tinge in some lights, scales along ocular line and at sides slightly more grayish but forming no distinct line around eyes; erect scales, long, numerous, covering most of dorsal surface, light straw colored. *Thorax.* Integument light brown, slightly lighter grayish on scutal fossa, scales narrow, curved, light grayish brown with bronzy reflections; prescutellar space bare; dorsocentral and supra-alar setae exceptionally long, stout, dark bronzy brown; scutellum and scutum concolorous, scales light grayish brown; mesopostnotum same color as scutum, lighter basolaterally; paratergite light yellowish brown; pleuron uniformly light yellowish brown, slightly lighter than scutum; *apn* devoid of scales, *ppn* with 2,3 light grayish translucent scales and 1 seta on upper posterior corner; *sp* with 1 seta; *ppl* with 3,4 rather long setae and 1,2 shorter weak setae, scales absent; *stp* with an indistinct upper patch of light brown translucent scales which narrowly extends down posterior border to near level of midcoxa, and with 10-11 rather weak setae on upper and posterior margins; upper *mep* with 3,4 setae and no scales. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins, cell R_2 about 0.73 of R_{2+3} and near equal to cell M_2. *Legs.* Coxae and trochanters same color as pleuron; C-I with an indistinct anterior patch of light brown translucent scales, C-II, III with a few similar, scattered scales; femora dark brown scaled dorsally, weak grayish brown scaled ventrally, no conspicuous arrangement or grouping of setae or spines, forefemur with 8,9 setae on anteroventral margin extending from near base to near apex, approximately 7 similar setae from near basal 0.33 to near apex on posterodorsal margin; midfemur with 3 small setae on basal 0.5 of dorsal margin; hindfemur with a single long seta at distal 0.8; tibiae and tarsi dark brown scaled, with distal tarsomeres becoming somewhat lighter grayish; hindtarsomere 1 about 1.1 of hindtibia; hindtarsomere 4 about 2.8 or more of tarsomere 5. *Abdomen.* Terga light bronzy beige scaled, with bright purple-green reflections; laterotergite with a few light brown translucent scales; sterna light dingy grayish brown.

MALE. Essentially as in female. *Head.* Proboscis about 0.85 of forefemur; antennal flagellum strongly plumose, about 1.1 of proboscis or exceeding proboscis by slightly less than Flm 13; flagellomeres 12,13 nearly equal in length, each equal to Flm 10-11 combined. *Legs.* Hindtarsomere 1

very slightly shorter than tibia. *Wing.* Cell R_2 about 0.70 of R_{2+3} and about equal to cell M_2. *Terminalia* (Fig. 26). Tergum IX very long, broadly rounded apically, with a subapical row of 3, 4 setae on each side of midline, basal emargination very shallow and broad; tergum X well developed, weakly complete dorsally, produced laterally into short rounded lobes which are retracted within segment IX and do not extend beyond apical margin of tergum IX; tergomesal surface of basimere with a few small setae, 2 setae near tergolateral margin of basal mesal lobe noticeably stronger than the rest; basal mesal lobe with 1 very strong tergoapical seta, 3 similar though weaker subapical setae and 4, 5 short weaker setae basad of these, 1 long, stout and 3, 4 smaller setae on sternoapical margin; distimere more or less straight on basal 0.8 of sternolateral margin and curved inward apically, broad at base and gradually tapered on tergomesal margin to apex, with several small scattered setae from basal 0.4 to apex; spiniform stout, acute; plates of aedeagus widely separated, joined by a strong tergal and narrow sternal bridge, broadly rounded laterally below teeth, each plate with 1 rather short broad outwardly curved, apical, tergomesal tooth and with 2 short and 1 long curved sternoapical teeth, the most sternal one largest, strongly curved and directed basally; proctiger with 1 cercal seta on each side.

PUPA (Fig. 26). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly yellowish brown; branches of most setae arising well beyond base, generally more so than other species. *Cephalothorax.* Setae 1-3-CT bifid or trifid, 6-CT strong, simple, about 2.0 the length of 7-CT, 8-CT with 5, 6 branches arising near base. *Respiratory Trumpet.* Dark reddish brown; index about 3.5-4.2. *Metanotum.* Setae 10-12-CT simple, bifid or trifid, alveolus of 13-CT not evident. *Abdomen.* Seta 6-I, II long, strong, single; 1-II minute, with 4, 5 very weak branches, 2-II, strong, single, less than half the length of segment, 3-II, III stout, with 4-6 branches from about middle; 1-III, V-VII stiff, single or bifid, 6-III-V small, with 3-5 branches; 1-IV with 3 stiff, pigmented branches, 5-IV with 4, 5 stiff, pigmented branches; 5-V-VII stout, single, simple, darkly pigmented, each about as long as each succeeding segment; 6-VI stiff, single or double, about 0.5 the length of segment; 6-VII small, with 3, 4 branches, located dorsally; 9-VIII with 2, 3 stiff, pigmented, finely barbed branches, one usually forked. *Paddle.* Midrib light brown from base to apex; outer margin with closely set sharp serrations on apical 0.5 and crenulate towards base, inner margin with a few small scattered serrations on apical 0.3; inner part barely wider than outer part; 1-P single.

LARVA (Fig. 25). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown; seta 4-C with 11-14 branches, each branch split into 2-5 finer distal branches, 5-C simple, longer than 6-C, 6-C strong, single, bifid or trifid, 7-C with 10-12 weak branches, 11-C small, single; mentum with 15-17 teeth. *Antenna.* Dark reddish brown, with a few minute spicules on mesal surface; seta 1-A double or triple. *Thorax.* Setae 1-6-P single, 7-P single or double, 14-P small, single; 6-M long, stout, 8-M with 3 strong branches, 9-M with 3 branches; 1-T minute, 7-T with 5-7 branches, 9-T with 4 branches, 13-T minute, multiple branched. *Abdomen.* Seta 6-III-VI single, long, stout, barbed, darkly pigmented, 6-III about 0.75 the length of 6-II; 1, 2-VIII minute, bifid or trifid, neither inserted on basal sclerotized plate, 3-VIII with 4, 5 strongly barbed, brush-tipped branches; comb scales 8-10 on large sclerotized plate, each tooth lightly fringed on both sides from base to apex. *Segment X.* Saddle complete, light brown, without spicules on posterior margin but with a few very fine spicules

on the more apical imbrications; 1-X small, with 3 weak branches, 2-X double, 4a-d-X with 4-5, 2,2,2 branches respectively, 4e-X minute, single, less than 0.1 the length of 4a-d-X. *Siphon.* Dark brown; index 2.0-2.5; pecten teeth 12,13, reaching to slightly beyond 0.5 of siphon, each tooth short, broad, very lightly fringed on side toward base of siphon and apically; 1-S with 4,5 lightly barbed branches and inserted beyond distal pecten tooth.

TYPE-DATA. Holotype male with larval and pupal skins (62032.6), *ex* tree-hole, Chihtuan of Loswei village (1,200 m), Tatung, Ilan Hsien, September 9, 1961, C. L. Chung and L. C. Lu; allotype female and several paratype females and males with same data as holotype, deposited in the Taiwan Provincial Malaria Research Institute, Nanking, Taipei, Hsien, Taiwan. One female and one male paratype with associated pupal and larval skins, with same data as holotype deposited in USNM.

DISTRIBUTION. Material examined: 1♀, 1♂, with associated skins (2 l, 2 p). Known only from type-locality.

DISCUSSION. The adult is ornamented somewhat like *harrisoni, moultoni, pylei* and *sumethi* Peyton and Rattanarithikul but the 4 are not apparently very closely related. This species is rather easily distinguished from these and others by the very light colored thorax, light scutal scales, light decumbent head scales, numerous long erect head scales, light bronzy beige terga, dingy brown sterna, numerous *ppl* setae, 2,3 almost transparent scales on *ppn*, patch of shiny, near transparent scales on *stp* and wing cell R_2 equal to length of cell M_2. The long wing cell R_2 is probably the most significant character, for this feature rarely occurs in the subgenus. The description presented in this paper is based on one paratype female and paratype male with associated skins of pupa and larva. There are several notable discrepencies between these adults and the original description. The female was reported to have "4 propleural bristles" and antennal flagellomere 1 was "about one-half as long as the second." In the paratype, 6 propleural setae are on each side and antennal flagellomere 1 is about equal to Flm 2. The male was reported to have "narrow scales" on scutellum, "*ppn* apparently with no scales", "broad grayish translucent scales on sternopleuron and mesepimeron." Both paratypes have broad scales on the scutellum (my interpretation), and 2,3 pale scales on the *ppn*, both are without any evidence of scales on the mesepimeron. The male terminalia also differ from the original illustration in which no setae are shown on tergum IX, but the paratype has 4 long setae on one side and 3 on the other. This compares with other members of the *bimaculata* series and was probably overlooked on the type of *lui*. Prior to Peyton (1972) and this study, it was generally accepted that tergum IX of the male was bare in most Oriental *Uranotaenia*. The male terminalia of this species are quite similar to those of *novobscura* and *bimaculata*. The teeth on the aedeagal plates are rather similar but they are much shorter than those of *novobscura* and *bimaculata*. Plates of the aedeagus are widely separated and rounded on lateral margin basal to the teeth as in *novobscura*. The development of tergum X is also similar to that of *novobscura*. These 3 species are the only known members of the *bimaculata* series with a strong well developed spiniform on the distimere.

Illustrations of the male terminalia, pupa and larva were prepared from the paratype specimens in the USNM.

BIONOMICS. The immature stages of this species were encountered in tree holes at a rather high elevation (1,400 m) in association with *nivipleura*.

URANOTAENIA (PSEUDOFICALBIA) MACULIPLEURA LEICESTER
(Figs. 1, 27, 28)

Uranotaenia maculipleura Leicester 1908: 223 (♀).
Uranotaenia (Pseudoficalbia) maculipleura Leicester, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.84 of forefemur; prementum dark brown scaled, a few inconspicuous setae along ventral margin and at apex; one pair of labial basal setae; palpus about 0.11 of proboscis and 0.81 of antennal flagellomere 1; clypeus dark brown; antennal pedicel light yellow or orange-brown, with a few minute setae and no scales dorsomesally; flagellum about 1.5 of proboscis or exceeding proboscis from at least base of Flm 10; Flm 1 about 1.15 of Flm 2 and with 3-5 light brown scales basomesally; flagellar whorls each of 6 setae; 1 stout, golden interocular and 7 ocular setae; decumbent scales mostly light fawn or golden brown, scales on ocular line grayish but forming no distinct line, scales at sides gray-white with blue-green reflections; erect scales large, moderately long, numerous, distributed over entire vertex to near ocular line, light brown. *Thorax* (Fig. 1). Scutal integument dark orange or rust-brown, no distinct bare line on mesal border of supra-alar area though scales are sparse; scales narrow, curved, dark bronzy brown; dorsocentral and supra-alar setae very strong, long; prescutellar space bare; scutellum orange-brown, scales dark brown; mesopostnotum uniformly orange-brown; paratergite light brown; pleuron with whole of *apn*, *ppn*, *psp*, upper 0.33-0.50 of *stp* and most of *mep* dark brown, remainder pale orange or straw-brown; *apn* with a few light brown scales; *ppn* with 1 seta and usually no scales on upper posterior corner, rarely 2, 3 light brown scales present; *sp* with 1 seta; *ppl* with 4-6 prominent setae and 3, 4 light brown scales; *stp* with a continuous row of 20-22 strong, closely set setae on upper and posterior margins and a large patch of broad, light brown scales covering upper 0.33 or more and extends down lower posterior margin, scales often with shiny gray or golden reflections in certain lights; *pra* with 1 (rarely 2) seta; upper *mep* with 4-6 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 about 0.53 of R_{2+3}. *Legs.* Coxae and trochanters same color as pale areas of pleuron; C-I with a distinct anterior patch of brown scales, C-II, III with a very few inconspicuous grayish brown scales; femora dark brown scaled dorsally, not markedly lighter ventrally; forefemur densely and finely setose on basal posterior 0.25, a row of about 16 prominent setae on anteroventral margin, the distal 6, 7 distinctly shorter and spine-like, a row of 9 long prominent setae on posterodorsal margin from base to near 0.5, followed by 6, 7 much shorter spine-like setae extending to near apex; midfemur densely and finely setose on all aspects of basal 0.25-0.33, more obvious and concentrated on posterior aspect, each individual seta single; 4, 5 much longer setae on distal anterior aspect; hindfemur with a very few fine setae on dorsal surface near base; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 about 1.2 of tibia, hindtarsomere 4 about 2.9 of tarsomere 5. *Abdomen.* Terga dark brown scaled, with bronzy, golden or violet reflections; lateretergite with light brown scales; sterna with light shiny grayish brown scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis 0.82-0.90 of forefemur; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.22 of proboscis or exceeding proboscis from base of Flm 12 or slightly less; Flm 1 about 1.6 of Flm 2; Flm 13 longer than 12. *Terminalia* (Fig. 28). Tergum IX broadly rounded apically,

rather shallow, with an apical patch of 4, 5 (2-5) long slender setae on each side of midline, basal emargination moderately deep and broad; tergum X well developed, produced into a broad median apical plate-like lobe which is more or less truncate with a small median indentation apically and extending well beyond apical margin of tergum IX; tergomesal surface of basimere with a few scattered, small, weak setae, 1 seta slightly tergoapical to basal mesal lobe significantly longer and stronger than the rest; basal mesal lobe of basimere with 1 long, stout, tergoapical seta and 2 rather similar subapical setae and 3-5 much smaller setae basal to these, 1 long, strong and 2-4 smaller setae on sternoapical margin; distimere long, slender, slightly tapered and curved to apex, with a few minute setae on apical 0.5; spiniform not apparent; plates of aedeagus with lateral margins more or less straight, each plate with 1 very broad, stout, apicolaterally curved, apical, tergomesal tooth and 2 broad, strongly curved, subequal, sternoapical teeth; proctiger with 1 cercal seta on each side.

PUPA (Fig. 28). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly light yellowish brown, most setae small and with few branches. *Cephalothorax.* Seta 1-CT single, 2-4-CT bifid or trifid, 5-CT with 3, 4 branches; 6-CT short, strong, about equal to length of 7-CT, 8-CT with 5, 6 branches, 9-CT with 2, 3 branches. *Respiratory Trumpet.* Light brown; index 2.2-2.8, rather broad, abruptly reduced near base. *Metanotum.* Seta 10-CT minute with 3, 4 branches, 11, 12-CT bifid, alveolus of 13-CT not evident. *Abdomen.* Seta 6-I significantly shorter than 6-II, bifid, 1-II minute, with about 9 very weak branches, 2-II strong, single, less than 0.5 the length of segment, 6-II strong, single or bifid, longer than segment; 1-III-VII very small, with 3-5 weak branches, 6-III-V very small, with 3, 4 weak branches; 5-IV-VI, stout, single, lightly pigmented, as long as segment on IV and slightly shorter on V, VI; 6-VI weak, double, about equal in length to seta 6 on preceeding segments; 5-VII minute, double, 6-VII small, weak, with 3-4 branches, located dorsally; 9-VIII with 2, 3 stiff, simple, branches. *Paddle.* Light brown at base and on basal 0.3 of outer margin; midrib light brown from base to apex; outer margin with closely set filamentous spicules from basal 0.4-0.6 to apex and a few minute crenulations towards base, inner margin with slightly longer filamentous spicules from basal 0.3 to apex; outer part slightly wider than inner part; 1-P absent.

LARVA (Fig. 27). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Most setae of thorax and abdomen very small and weak. *Head.* Light brown, darker in region of collar; seta 4-C with 9-12 fine delicate branches, slightly longer than 6-C, 5-C single, longer than 6-C, 6-C located near clypeolabral suture, 7-C single, 11-C minute, double; mentum with 17 teeth. *Antenna.* Darker than cranium; seta 1-A with 4 branches. *Thorax.* Setae 1, 2-P single, finely barbed, 3-P stout, double, lightly barbed; 4, 7-P single or double, 14-P small, single; 5, 6-M small, weak, 8-M with 3, 4 stout, barbed branches, noticeably shorter than the similar 4 branched 9-M; 7-T with 5, 6 stout, barbed branches, noticeably shorter than the similar 4-5 branched 9-T. *Abdomen.* Seta 6-I, II single, short, stout, barbed, darkly pigmented; 6-III long, single or double, stout, barbed; 6-IV-VI long, single, stout, strongly barbed and darkly pigmented; 1-VIII minute, located on posterior edge of comb plate, 2-VIII single, weak, not inserted on basal sclerotized plate, 3-VIII with 3-5 stout, strongly barbed, darkly pigmented branches; comb scales 6, 7 on large sclerotized plate, each tooth tapered to a rather blunt point and finely fringed laterally to near apex. *Segment X.* Saddle complete, dark brown, with a very few short, stout spi-

cules on dorsal posterolateral margin; 1-X stout, barbed, bifid; 2-X single or double; 4a, b-X single or double, 4c-e-X single. *Siphon.* Dark brown; index about 3.0; pecten teeth 14-16, reaching to 0.65 of siphon, each tooth very finely fringed laterally and apically, apical spicules slightly longer and stronger; 1-S double, stiff, finely barbed, inserted at about 0.74 from base of siphon and on line with or slightly dorsal to row of pecten teeth.

TYPE-DATA. Type-female in BMNH with the following data: Beside jungle stream, 6 miles from Kuala Lumpur, Leicester. The original description was based entirely upon the type. The specimen is in fair condition, retaining only one mid- and hindleg, but most significant diagnostic features are intact. Wattal and Kalra (1965) described what they believed to be the "allotype-male" of this species from Dehra Dun, India. This determination is incorrect, see discussion section below.

DISTRIBUTION. Material examined: 16♂, 21♀; 2 with associated skins (2 l, 2 p).

MALAYSIA. *Peninsular Malaysia: Selangor* - Ulu Bahau, Kuala Kubu Bahru; Kuala Lumpur; 16♂, 18♀. *Pahang* - Gunong Benom, 3♀, 2 l, 2 p.

Reported also from India, by Barraud (1934: 82) and Wattal and Kalra (1965: 312) and from Taiwan by Chow (1950: 282) and Lien (1962: 621). I believe these records to be incorrect; see discussion section.

DISCUSSION. This is a rather well marked species in all stages and easily distinguished from most Oriental *Pseudoficalbia*. The species is known for certain only from Peninsular Malaysia. However, since the original description was based on the female stage, and the most distinguishing character was the dark marking of pleural sclerites, several species with dark pleural markings have been incorrectly determined as this species. The male terminalia, pupa and larva are treated for the first time in this revision.

Barraud (1934) described a female of what he presumed to be *maculipleura* from "DARJEELING DIST.: Marianbarrie Tea Estate*, near Sukna, c. 500', viii. 1928, caught in jungle (Sobha Ram)." This specimen, which I examined, is in the BMNH and in good condition and is marked very much like *maculipleura* but with a few significant differences. The most significant of which are the 2 dark areas on the sternopleuron mentioned in Barraud's description. The specimen in the BMNH has the extreme upper edge of *stp* dark and a small midanterior dark spot, somewhat similar to that which occurs in *stricklandi* and *koli*. The upper 0.33 or more of *stp* is dark in *maculipleura* and there is no small midanterior spot. The *apn* in the Indian specimen is pale and the scales are pale grayish white. In *maculipleura* the *apn* is dark and the few scales are light brown. The Indian specimen has numerous long wavy setae on all femora, somewhat similar to *maculipleura* but the number and general distribution is quite different. Although, the type of *maculipleura* and Barraud's Indian specimen resemble each other rather closely, I do not believe the 2 are conspecific.

Wattal and Kalra (1965) described and illustrated the terminalia of a male specimen from Ramgarh forest, Dehra Dun, India, which they erroneously designated as the allotype of *maculipleura* Leicester. In addition to this specimen they had in their possession one male from Zizag hills, Visakhapatnam, one female from Ramgarh forest and 2 females from Kalsi forest. The adult description comes rather close to that of *maculipleura* and Barraud's description of the Indian species. However, it is quite clear from the description and illustration of the male terminalia, that the *maculipleura* of Wattal and Kalra is not *maculipleura sensu strictu*. The specimen described by Wattal

and Kalra and that described by Barraud could well represent the same species. It is not possible at this time to suggest that the species is new and should be renamed. From the illustration of the male terminalia, it is difficult to determine definite affinities but it resembles members of the *recondita* series more closely than species of the other series. There are 2 Indian species described by Qutubuddin, *husaini* [1946 (1947)] and *mattinglyi* (1951), which are also inadequately known. I have not examined any of these, except for a female and male (without terminalia) of *mattinglyi*. These 2 also appear to belong to the *recondita* series and should be thoroughly re-examined along with the specimens identified as *maculipleura* from India, before a new name is applied to any of them. I am unable to contribute to this, because the specimens of Indian *maculipleura* and *husaini* were unavailable for examination.

Chow (1950) and Lien (1962) report *maculipleura* from Taiwan but it seems quite certain that the Taiwan specimens also represent a separate and distinct species. I also have not seen specimens of *maculipleura* from Taiwan. From Lien's account of the larva, it would appear that the species might possibly belong to the *recondita* series, and is probably a new species. Of the larva of Taiwan *maculipleura*, Lien states, "Larva breeds in very shaded small pools at edge of streams and in pools in tunnels in area below 500 m. Morphologically, the larva agrees fairly well with that of *stonei* [= *jacksoni* Edwards] except for anal segment which is completely ringed and also for some minor details." Since at least 3 species of the *recondita* series (*jacksoni*, *ohamai* Tanaka et al. and *yaeyamana* Tanaka et al.) are now known to occur in the Ryukyu Islands, it would not be unreasonable to expect to find representatives of this series in Taiwan also.

There are several species of *Pseudoficalbia* with dark and light pleural markings of the adult, some of which are quite similar to the pattern in *maculipleura*. In a few of these, the pleural pattern alone is not diagnostically conclusive. The dark and light pleural pattern in *pseudomaculipleura* is almost exactly the same as that in *maculipleura*, but there are several other significant points of difference, and in the male terminalia, pupa and larva there are very striking differences. The male terminalia of *moufiedi* are very similar to the terminalia of *maculipleura* but the adults differ significantly in general habitus features. The adult of both species have numerous setae encircling basal 0.33 of midfemur but in *moufiedi* each seta is bifid. This is an unusual character which I have not observed in any other species of *Uranotaenia*.

The most significant character in the larval stage is the greatly reduced thoracic setae, especially setae 5, 6-M. Several species of the *bimaculata* series have a greatly reduced 6-M, and the character is known only in this series and *confusa* of the *recondita* series, but a similarly reduced seta 5-M is known only in *maculipleura* and *xanthomelaena*. Although this observation is made from 2 larval skins which are oriented rather poorly, they are in sufficiently good condition to reasonably interpret this character.

BIONOMICS. The immature stages have been collected on only 2 occasions and therefore little is known of its breeding habits. It has been collected from a rusty tin can at an elevation of 533 m and a tree hole at an elevation of 853 m, both from Peninsular Malaysia.

URANOTAENIA (PSEUDOFICALBIA) MODESTA LEICESTER
(Figs. 29, 30)

Uranotaenia modesta Leicester 1908: 213 (♂, ♀).
Uranotaenia tubanguii Baisas 1935: 69 (♂*, ♀, L*); Delfinado 1966b: 55 (♂*, ♀, L*, P*); Peyton 1972: 37 (synonymy).
Uranotaenia (Pseudoficalbia) modesta Leicester, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.76 of forefemur; prementum dark brown scaled, with a few small inconspicuous setae at apex; one pair of labial basal setae; palpus about 0.12 of proboscis and 0.6-0.8 of antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, lighter laterally, a few minute setae and no scales dorsomesally; flagellum 1.65-1.82 of proboscis or exceeding proboscis from at least base of flagellomere 9; Flm 1 about 1.2 of Flm 2 and with 2,3 light brown scales basomesally; flagellar whorls each of 6 setae; decumbent scales light creamy or grayish brown, tips of ocular scales faintly lighter, but forming no distinct line, scales at sides grayish white; erect scales rather small, short, sparse, but conspicuous, pale yellow and scattered over vertex to ocular line. *Thorax.* Scutal integument uniformly dark chocolate brown or brownish black except along lateral and anterior margin which is narrowly pale grayish translucent; scales narrow, curved light bronzy brown or grayish brown dorsally, distinctly grayish white on narrow lateral marginal line, with those immediately above paratergite more concentrated, long, narrow, semierect; prescutellar space bare; scutellum light brown, scales grayish brown; mesopostnotum dark brown, lighter laterally; paratergite light brown; pleuron with a broad dark band across upper half; *apn, ppn, psp,* upper half of *stp,* whole of *mep* and metapleuron dark brown, remainder pale grayish or whitish brown, devoid of scales; *ppn,* and *sp* each with a single setae; *ppl* with 1 strong and 1 very weak seta; *stp* with 2,3 upper and 5,6 weak posterior setae; upper *mep* with 1-3 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 0.44-0.76 of R_{2+3} and about 0.82 of cell M_2. *Legs.* Coxae and trochanters pale grayish brown, C-I-III with very few scattered, inconspicuous, translucent scales; femora dark brown scaled dorsally, light brown ventrally, without conspicuous marginal setae; forefemur with a few small inconspicuous setae on anteroventral and posterodorsal margins; midfemur with 2-4 setae near base on dorsal margin and scattered minute setae on ventral margin; tibiae and tarsi brown scaled with gray, bronze or blue-green reflections; hindtarsomere 1 about 1.05 of tibia, hindtarsomere 4 about 3.0 of tarsomere 5. *Abdomen.* Terga dark brown or mauve scaled, with distinct gray sheen or bright purple reflections depending on light; laterotergite with a few pale translucent scales; sterna dark dingy brown, little contrast with terga.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.82 of forefemur; antennal flagellum strongly plumose, whorls each of more than 20 setae, length about 1.32 of proboscis or exceeding proboscis from base of Flm 12 or slightly more; Flm 13 slightly longer than Flm 12. *Wing.* Cell R_2 0.41-0.57 of R_{2+3}. *Terminalia* (Fig. 30). Tergum IX rather shallow, broadly rounded on apical margin, with an irregular subapical row or patch of 2-6 long setae on each side of midline, usually with at least 3 on one side; tergum X well developed, complete dorsally and produced into a large broad median apical lobe which has a very uneven and variable apical emargination, with broad unequal lateral corners (lobes) extending well

beyond apical margin of tergum IX; tergomesal surface of basimere with a very few weak setae and 1 conspicuously long, strong seta near tergolateral margin of basal mesal lobe; basal mesal lobe of basimere with a tergoapical group of 3, 4 long, stout setae, 2, 3 slightly shorter, strong setae basal to these and no small weak basal setae, 1, 2 long, very stout and 1 small seta on sternoapical margin; distimere slender, more or less straight to near curved apex; spiniform minute, inapparent; plates of aedeagus each with 1 very strong, broad, apicolaterally curved, apical, tergomesal tooth and 2 smaller curved sternoapical teeth with the most sternal largest; proctiger with 1 cercal seta on each side.

PUPA (Fig. 30). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument brown with posterior 0.5 of scutal plate, metanotal plate and segments I-IV noticeably darker than remaining areas; all setae with simple branches, without lateral barbs. *Cephalothorax.* Setae 1-3-CT single to triple, 5-CT lightly dendritic, 6-CT shorter than 7-CT and inserted about 2.0 the width of alveolus from 7-CT, 8-CT usually dendritic, with 4-10 branches. *Respiratory Trumpet.* Dark brown; index about 3.7-4.2, not noticeably flared apically, indistinctly tracheoid on anterobasal 0.2. *Metanotum.* Setae 10-12-CT rather weak, single to 5 branched beyond base, alveolus of 13-CT faintly indicated in some specimens, apparently absent in others. *Abdomen.* Seta 6-I single, weaker and shorter than 7-I; 1-II rather small, multiple branched, frequently dendritic, generally with 15-30 very delicate branches, 2-II single, stiff, less than length of segment, 3-II with 2-5 branches from near middle; 1-III-VII weak, with 2-5 branches, often lightly dendritic; 3-III single to 4 branched, 6-III-VI single to trifid; 5-IV, V single, strong, longer than succeeding segments and strongly curved or hooked apically, located near posterior margin of segment and near level of 1-IV, V; 5-VI single, weak, slightly more than 0.5 the length of segment VII; 5-VII minute, single or double, 6-VII dendritic, with 4-7 fine branches, located dorsally; 9-VIII with 4-6 rather strong branches, less than 0.5 the length of segment. *Paddle.* Darkly pigmented at base; midrib light brown to near apex; outer margin with closely set, long filamentous spicules from about basal 0.33 to apex; inner margin with similar, slightly longer spicules from about basal 0.4 to apex; outer part slightly wider than inner part; 1-P absent.

LARVA (Fig. 29). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown with collar region dark brown; seta 4-C dendritic, with 5-12 fine branches, located lateral to 6-C and closer to 5-C, 5-C simple and about 3.0 the length of 6-C, 7-C single, stiff, 11-C minute, with 2-4 branches; mentum with 19 teeth. *Antenna.* Dark brown; seta 1-A single, strong. *Thorax.* Seta 1-P single, 2.0 or more length of 2-P, 3-P double to 4 branched, 4-P single or double, as long as 5-P, 5-7-P single; 14-P single; 6-M minute, single, 8-M with 5-7 branches, 9-M with 4-7 branches; 7-T with 6-10 branches, 9-T with 4-7 branches. *Abdomen.* Seta 1-I, II minute, single to 4 branched, 6-III-VI single, simple; 1-III minute, double to 6 branched; 1-IV-VI small, double to 5 branched; 1-VIII minute, with 2-6 branches, inserted on comb plate near posterior margin, 2, 4-VIII long, strong, with 2-6 terminal branches, 3-VIII with 3-5 strongly barbed branches; comb scales 6-10, each scale tapered to point and very finely fringed laterally to near apex. *Segment X.* Saddle complete, dark brown, with few fine spicules on posterior margin but the more dorsoapical imbrications with a concentration of rather large and fine spicules which often give the appearance of being on posterior margin of saddle; 1-X single or double, 2-X single, 4a, b-X triple, 4c-X double or triple, 4d, e-X single. *Siphon.* Dark reddish

or rust-brown, tip light yellowish brown; index 4.1-6.5; pecten teeth 13-20, reaching to 0.50-0.62 of siphon, each tooth, short, broad, rounded and finely fringed apically; 1-S with 3-5 simple branches, inserted beyond distal pecten tooth at 0.61-0.72 and on line with row of pecten teeth.

TYPE-DATA. A syntype-male and female in the BMNH labeled as follows: Cotype, Kuala Lumpur, Fed. Malay States, Dr. G. F. Leicester, BM1912-350 and on underside of label, Hollow of tree, Ampang Jungle, 28/8/03. The male syntype with terminalia on slide, selected and labeled as lectotype by E. L. Peyton, December 1968. The female is labeled as paralectotype. Both specimens are in poor condition. The male has most of the legs missing and the thorax is somewhat collapsed, however, most diagnostic features are intact.

The type of *tubanguii* Baisas, was originally deposited in the Philippine Bureau of Health, Manila. The type and several paratypes of the species were subsequently destroyed during World War II. A male and female paratype are in the USNM with the following label data: *Uranotaenia tubanguii*, Kolambugan, Lanao, 1934, USNM paratype label No. 51399. Both specimens are in excellent condition.

DISTRIBUTION. Material examined: 211♂, 241♀, 78 L; 128 with associated skins (101 l, 138 p, 10 incomplete).

MALAYSIA. *Malaysia: Sabah* - Mt. Kinabalu; Sapulut; Pensiangan; Labuk, Telupid Rd.; Silam, Lahad, Datu; Mt. Pyramid, Tawau; 53♂, 64♀, 1 L, 6 l, 10 p. *Peninsular Malaysia: Selangor* - Kuala Lumpur; Ulu Gombak; Ampang; Ginting Simpah; Ulu Langat; Tanjong Robak; Bukit Kutu; 51♂, 76♀, 10 L, 31 l, 51 p. *Pahang* - 16th Mile Betong Rd.; Fraser Hill; Gunong Benom; Kuala Lipis; Kuantan, Chendar; 9♂, 7♀, 1 L, 4 l, 4 p. *Perak* - Chior, Forest Reserve; 21st mile Cameron Highlands Rd.; 82, 11♀, 5 L, 5 l, 7 p.

PHILIPPINES. *Luzon: Bataan* - Paysawan, 5♂, 6♀. *Mountain* - Baguio, 3♂. *Quezon* - Tayabas; Mt. Banahao; 2♂, 2♀, 2 L. *Laguna* - Pangil; Mt. Makiling; 11♂, 10♀, 18 L, 18 l, 21 p. *Nueva Ecija* - Calso, 4♂, 7♀, 4 L, 7 l, 9 p. *Nueva Viscaya* - Malete, 3♂, 1♀, 3 L, 3 l, 4 p. *Pampanga* - Angeles, 2♂, 2♀, 4 l, 5 p. *Camarine Sur.* - Isarog, 11♂, 5♀. *Leyte:* Tacloban; Lago Lago; 16♂, 14♀, 20 L, 7 l, 7 p. *Mindoro: Oriental* - Victoria, Minas; Victoria, Alcate; 4♂, 4♀, 4 L, 6 l, 8 p. *Occidental* - San Jose; 5♂, 2♀, 4 l, 2 p. *Palawan:* Mt. Molinao; Irahuan; Boloshan R. 2♀, 5 L, 1 l, 2 p. *Samar:* Osmena, 3♂, 3♀, 1 L, 5 l, 5 p. *Mindanao: Lanao Del. N.* - Kolambugan, 12♂, 18♀. *Davao* - Santa Cruz 1♂. *Angusan* - San Francisco, 3 L. *Zamboanga Del S.* - 2♂, 4♀. *Negros: Occidental* - Fabrica, 2♂, 4♀. *Calicoan*: 1♀.

THAILAND. *Phatthalung:* 42 km. Trang Rd., 3♂, 1♀, 1 p. *Nakhon Si Thammarat:* Ban Thuan Lek, 1♂, 1 p.

DISCUSSION. This minute dark species is apparently closely related to *patriciae, propinqua* and *quasimodesta* and could be confused with either of the 3 in the adult stage. The male terminalia are very similar and differ only in minor details. The immature stages show significant differences in all 4 species.

In the adult stage the very dark scutal integument and lateral marginal line of grayish white scales are very similar to *propinqua*. It differs from *propinqua* only in the absence of the large oval bare spots on the scutal fossae and the indistinctly darker spot on supra-alar area. The scutal integument of *patriciae* is much lighter in color with the median portion very pale brown and with an indefinite darker oblique sublateral line. The dark band across the pleuron of *patriciae* is narrower on *stp* and *mep*. In *modesta* the *mep* is entirely dark but in *patriciae* the lower 0.4 of more is pale. In this respect

patriciae differs from all of the others. The scutal integument and dark band across upper pleuron in *quasimodesta* is similar to *modesta* but it is without a lateral marginal line of gray-white scales on scutum.

The male terminalia of *modesta* differ from the aforementioned species in the greater number of strongly developed setae on the basal mesal lobe.

There are noticeable variations in the larval and pupal stages. In the pupa the most notable variation is in the development of seta 1-II. It varies from a very small delicate multiple branched seta, to a larger, basally stout, dendritic seta. This condition is observed in all areas but the stout dendritic seta is much more common in specimens from Peninsular Malaysia. The peculiar long, strong, curved or hooked seta 5-IV, V readily separates the pupa of this species from the other species. The most significant variations in the larva are the length of siphon and the spicules on the posterolateral area of anal saddle. The siphon varies from rather short and stout to long and slender, but the position of 1-S and the distance from base to distal pecten tooth in relationship to overall siphon length remain fairly constant. The spicules on the saddle vary from a few very fine ones to a concentrated patch of very stout and fine spicules near dorsal posterolateral margin. These variations are noted in specimens from all areas, but specimens from the Philippines more frequently have stronger spicules on the anal saddle.

BIONOMICS. This is a rather commonly encountered forest dwelling species in Malaysia and the Philippines. It is found in both secondary and primary rain forest at elevations ranging from sea level to 1,189 m for the 68 separate collections with recorded elevation.

The available collection data indicate a clear preference for tree holes for the immature habitat, with bamboo and leaf axils of lesser importance. Immature collections have been examined from the following habitats: tree hole (85), tree stump (2), bamboo stump (26), bamboo internode (on ground) (2), *Pandanus* leaf axils (5), *Nepenthes* pitcher (1), artificial container (1). In addition to those examined during this study, Macdonald and Traub (1960) record collections of *modesta* in lowland dipterocarp forest of Selangor, Malaysia from the following: tree holes (15), bamboo stumps (12) fallen split bamboo (4), bamboo with moderate holes (4). This observation also confirms the preference for tree holes. In Malaysia the immatures were collected on 4 different occasions in association with the immatures of *propinqua*.

In the natural habitat the larva feeds near the water surface and gives the superficial appearance of an anopheline larva. The larva is extremely small even for a *Uranotaenia*. The head, abdomen and terminal appendages are dark and the thorax is whitish. This is especially noticeable in the colored tree hole water where the larva is almost undetectable except for the light thorax appearing as a small oval white dot near the surface. The larva moves across the water surface in a quick jerking motion more similar to that of an anopheline than to most culicines.

URANOTAENIA (PSEUDOFICALBIA) MOUFIEDI NEW SPECIES
(Figs. 1, 24)

FEMALE. *Head.* Proboscis about 0.74 of forefemur; prementum dark brown scaled, with a few very inconspicuous setae at apex; one pair of labial basal setae; palpus about 0.1 of proboscis and about 0.66 of antennal flagellomere 1; clypeus light brown; antennal pedicel pale yellowish brown or bright yellow, with a few minute setae and no scales dorsomesally; flagellum about

1.66 of proboscis or exceeding proboscis from base of Flm 9 or more; Flm 1 about 1.2 of Flm 2 and with 2 or 3 light brown scales basomesally; flagellar whorls each of 6 setae; 1 stout, golden interocular and 5 black ocular setae; decumbent scales uniformly pale brown, but appearing in some lights as uniformly pale gray-white with blue-green reflections; erect scales rather small, light yellow in color, restricted to a few on occiput and an occasional 1-3 near ocular line. *Thorax* (Fig. 1). Scutal integument light yellow or orange brown on a broad median longitudinal line between dorsocentrals, darker brown sublaterally, narrowly pale yellowish on lateral marginal line, scutal fossa noticeably darker, supra-alar area and prescutellar space usually indistinctly darker; scales narrow, curved, mostly dark bronzy brown, black over darker integumental areas; prescutellar space bare; scutellum light brown, scales dark brown; mesopostnotum pale brown, usually with a darker, narrow, median longitudinal line; paratergite pale brown; pleuron with *psp*, upper 0.5 of *stp*, whole of *mep* and lower 0.5 of metapleuron dark reddish brown, remainder pale yellowish brown; pleural sclerites devoid of scales except for a very few light brown appressed scales on upper posterior 0.5 of *stp*, those nearest upper margin more concentrated, forming an ill defined patch; *ppn* and *sp* each with 1 seta; *ppl* with 1 strong and 1 weak seta; *stp* with about 4 upper and 9 posterior marginal setae, which become progressively weaker ventrally; upper *mep* with 2 setae. *Wing*. Scales dark brown, somewhat lighter on posterior veins; cell R_2 about 0.64 of R_{2+3} and about 0.81 of cell M_2. *Legs*. Coxae and trochanters same color as lighter areas of pleuron, C-I with several brown scales on anterior surface but forming no distinct patch, C-II, III with similar but fewer scales; femora dark brown scaled dorsally, lighter ventrally; forefemur with a row of about 9 setae on posterodorsal margin from base to near apex and 2, 3 setae at middle on anteroventral margin; midfemur densely covered with fine setae on all aspects of basal 0.33 or more, each individual seta bifid from about middle, 3 longer conspicuous dorsal setae; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 about 1.13 of tibia, hindtarsomere 4 about 2.8 of tarsomere 5. *Abdomen*. Terga uniformly dark brown scaled, with bronzy or violet reflections; laterotergite with a few scattered brown scales; sterna with light grayish brown scales.

MALE. Essentially as in female except for sexual differences. *Head*. Proboscis about 0.84 of forefemur; antennal flagellum sparsely plumose, resembling that of female except that the whorls are each of 8 or 9 setae, length of flagellum about 1.4 of proboscis or exceeding proboscis from base of flagellomere 11; flagellomeres 1-11 subequal, not exceptionally short, Flm 12 barely longer than Flm 11 and Flm 13 about 1.3 of Flm 12. *Terminalia* (Fig. 24). Tergum IX broadly rounded apically, with an irregular subapical row or patch of 3-5 long slender setae on each side of midline; tergum X complete, produced beyond apical margin of tergum IX into a broad median apical lobe with somewhat angular apicolateral corners and a shallow median U- or V-shaped notch; tergomesal surface of basimere with a few scattered stiff setae, 1 seta tergolateral to basal mesal lobe conspicuously longer and stronger than the others; basal mesal lobe of basimere with 3 stout tergoapical setae, the most apical on a distinct finger-like projection, usually 1 much smaller seta basal to these; 1 long, stout and 2-4 smaller setae on sternoapical margin; distimere expanded at base, gently curved and tapered to apex; spiniform minute and often inapparent; plates of aedeagus each with 1 prominent, more or less straight, laterally directed, subapical tergomesal tooth and 2 strongly recurved, subequal, sternoapical teeth, the most sternal occasionally duplicated on one side; proctiger with 1 cercal seta on each side.

PUPA and LARVA. Not known.

TYPE-DATA. Holotype male with terminalia on slide, MALAYSIA, *Sabah*, Mt. Kinabalu, 19 March 1970, Suliaman bin Omar, Chia Yiew Wang and Samuel Wilson James, collectors, collection No. S-110, terminalia preparation No. 71/14, SEAMP Accession No. 243, collected resting in a cave at 1,463 m. Four male and 2 female (1 on slide) paratypes with same collection data as holotype: 3 male paratypes with same collection data as holotype, except collection No. S-176, 22 March 1970, 1,585 m. The holotype and 8 paratypes are deposited in the USNM and 1 paratype male will be deposited in the BMNH.

The holotype is in good condition, missing a foreleg and several scutal setae, but retaining all significant diagnostic features. The paratypes are all slightly rubbed, a few legs missing on some and are at best, in fair condition.

DISTRIBUTION. Material examined: 8♂, 2♀.

MALAYSIA. Known only from type-locality.

DISCUSSION. The adult of this species resembles *maculipleura* in some respects but is easily recognized by the very distinctive thoracic ornamentation. The reduced number of setae of flagellar whorls of the male antenna, very pale *apn* and *ppn* of pleuron, absence of scales on *apn*, sparse scaling on *stp*, and number of *ppl* setae differ from that of *maculipleura*. The setae surrounding the midfemur appear very similar to *maculipleura* under low magnification but under high magnification each is forked, whereas in *maculipleura* they are simple. This unusual character has been observed only in this species.

The male terminalia of *moufiedi* and *maculipleura* are extremely similar and differ only in very minor detail, which can best be appreciated by a comparison of the illustrations of the 2. A few setae on the tergomesal surface of the basimere of *moufiedi* are stiff and longer, setae on *maculipleura* are uniformly short and weak. The large tergomesal tooth of the aedeagal plates is stronger in *maculipleura*. There is a slight difference in the general shape of the tergomesal lobe of tergum X.

This species is dedicated to Dr. Moufied A. Moussa in recognition of his many years of support of mosquito systematics.

BIONOMICS. Little is known of the habits of this species. The adults of the type-series were collected resting in 2 different caves at elevations of 1,463 and 1,585 m, in association with several adults of *reinerti*.

URANOTAENIA (PSEUDOFICALBIA) MOULTONI EDWARDS
(Figs. 31, 32)

Uranotaenia moultoni Edwards 1914: 128 (♂, ♀).
Uranotaenia brevirostris Edwards 1915: 284 (♂, ♀); Edwards 1926: 115 (L*); Peyton and Hochman 1968: 380 (♂*); Peyton 1972: 37 (synonymy).
Uranotaenia (Pseudoficalbia) moultoni Edwards, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.79 of forefemur; prementum dark brownish black, with a few inconspicuous setae at apex only; one pair of labial basal setae; palpus about 0.12 of proboscis or slightly less than antennal flagellomere 1; clypeus dark brown or black; antennal pedicel blackish, with a few minute setae dorsomesally; flagellum about 1.42 of proboscis or exceeding proboscis from apical 0.8 of flagellomere 9; Flm 1 barely longer than Flm 2 and with a very few blackish scales basomesally; flagellar whorls each of 7, 8 setae; 1 strong, black and 1 minute, golden interocular and 5 ocular setae; de-

cumbent scales uniformly black or slate gray, depending on light, always with violet-green reflections; erect scales broad, moderate in length, very few, restricted mostly to a single line on occiput, occasionally a few scattered to midvertex, light brown in color. *Thorax.* Scutal integument light yellow or pale orange-brown; scales, narrow, curved, pale and dark scaling variable in extent, usually mostly light grayish or grayish brown, rarely mostly black, but those on posterior dorsocentral line and mesal border of supra-alar area always distinctly dark, usually black; prescutellar space largely bare; scutellum same color as scutum, scales dark brown; mesopostnotum and scutum concolorous; paratergite light yellow; pleuron light yellow or pale grayish brown, occasionally with a faint narrow, darker brown line across *apn, psp,* upper *stp,* upper *mep* and metapleuron, often the darker areas completely absent or reduced to dark *apn* and spot on metapleuron; *ppn* and *sp* each with 1 seta; *ppl* usually with 2, 3 light translucent scales and 2, 3 setae; *stp* usually with 2-10 small, broad, inconspicuous, light brown or transparent scales on upper posterior surface, but frequently devoid of scales, and with 7-8 marginal setae; upper *mep* with 2, 3 setae. *Wing.* Scales dark brown; cell R_2 about 0.57 of R_{2+3} and about 0.7 of cell M_2. *Legs.* Coxae and trochanters same color as pleuron; C-I with a distinct anterior patch of light brown scales; C-II, III with a few inconspicuous pale translucent scales; femora dark brown scaled dorsally, faintly grayish brown ventrally, without conspicuous arrangement or grouping of setae or spines, forefemur with 10-13 short, stiff setae on posterodorsal margin from near base to near apex and 3-5 small, stronger setae on distal anterodorsal margin; midfemur with a single dorsal setae near base and 2, 3 short stiff setae on distal posterior margin; tibiae and tarsi dark brown; hindtarsomere 1 about 1.17 of tibia; hindtarsomere 4 about 2.88 of tarsomere 5. *Abdomen.* Terga uniformly dark brownish black scaled, with purple reflections; laterotergite with a few dark brown scales; sterna uniformly pale yellow.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.83 of forefemur; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.2 of proboscis or exceeding proboscis by slightly more than length of Flm 13; Flm 12 and 13 nearly equal in length. *Legs.* Hindtarsomere 4 about 3.33 of tarsomere 5. *Terminalia* (Fig. 32). Tergum IX broadly rounded apically, rather deep, with an apical patch of 4-7 long, stiff setae on each side of midline; tergum X well developed, produced tergally into a very large, broad, median, apically rounded, platelike lobe, with or without small median apical indentation, extending well beyond apical margin of tergum IX; tergomesal surface of basimere with a few scattered weak setae and 1 very long stout seta near tergoapical margin of basal mesal lobe; basal mesal lobe of basimere with 1 long stout tergoapical seta on a distinctly produced finger-like process, 1 similar seta just basotergal to this one, 4, 5 slightly shorter weaker setae basosternal to these, a row of 4, 5 weak setae on tergal margin and 1 long, stout seta and 1, 2 weak setae on sternal margin, no typical weak basomedian setae; distimere of near uniform width from base to near pointed apex; spiniform minute, inapparent; plates of aedeagus widely separated, sides more or less straight, each plate with 1 very strong, slightly curved, laterally directed, apical tergomesal tooth and 2 rather slender sternoapical teeth, with the most sternal longer, usually a very small raised spur basosternal to the large tergal tooth; proctiger with 3, 4 cercal setae on each side.

PUPA (Fig. 32). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly medium or dark

brown. All setae except 1-I and 9-VIII with simple branches. *Cephalothorax.* Seta 1-CT with 2-4 branches, 2-CT with 3-7 branches, 3-CT with 3-6 branches, 5-CT with 3, 4 branches, 8-CT with 3-7 branches, individual branches occasionally bifid, 9-CT single or double. *Respiratory Trumpet.* Medium brown; rather slender, not noticeably expanded apically; index 4.2-4.5. *Metanotum.* Seta 10-CT double to 4 branched, 11, 12-CT double or triple, alveolus of 13-CT present. *Abdomen.* Seta 6-I single to triple, with an occasional branch bifid or trifid, shorter than 7-I, 1-II small, with 4-6 delicate branches; 2-II less than length of segment III, 3-II double to 4 branched, 6-II double to 5 branched; 1-III small, with 3-4 weak branches, 3-III single to 4 branched, 6-III-V double to 4 branched; 1-IV weak, double to 4 branched, 5-IV, V strong, single, about 1.5 or more of each succeeding segment, occasionally with a few fine lateral barbs; 1-V weak, double to 4 branched; 1-VI, VII very small, weak, double to 4 branched, 5-VI strong, single, occasionally with frayed ends, 0.75 or more the length of VII, 3-VII stiff, single or bifid, 5-VII single or double, 6-VII with 4-7 branches, located dorsally; 9-VIII with 4-7 dendritic branches, located distinctly anteroventral to posterolateral corner of segment; sides of segment VIII gently rounded and tapered to narrower apex. *Paddle.* Midrib pale brown on basal 0.75; outer margin with closely set, long filamentous spicules, shorter and stronger towards base; inner margin with similar slightly longer spicules from basal 0.33 to apex; outer part as wide as or slightly less than inner part; 1-P absent.

LARVA (Fig. 31). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Medium or dark brown; small, long and narrow, about 1.5 as long as wide; seta 4-C with 5-8 fine branches, located slightly posterolateral to 6-C, 7-C single, 11-C minute, multiple branched. *Antenna.* Dark brown; seta 1-A double or triple. *Thorax.* Seta 1-P long, stout, strongly barbed, 3.0 or more the length of 2, 3-P, 3-P strong, with 3-5 strongly barbed branches, often 1 branch noticeably longer and stronger than the rest, 4-P strong, single or double, strongly barbed, 5-7-P stout, single, strongly barbed, 5-P about 2.0 or more the length of 6, 7-P, 14-P with 8-12 stiff, lightly barbed branches; 6-M reduced, minute, double to 4 branched, 8-M with 8, 9 strong plumose branches, 9-M with 8-12 strong plumose branches; 7-T with 10-12 strong plumose branches, 9-T with 5, 6 strong plumose branches. *Abdomen.* Setae 6-I, II single, long, stout, heavily barbed or spiculate, 7-I, II similar but shorter; 1-III variable, single to 4 branched, usually long, stout, barbed, occasionally greatly reduced and weak, branches simple, 6-III-VI single, long, stout, strongly barbed; 1-IV-VI single, long, stout, strongly barbed, occasionally 1-VI reduced, weaker; 3-VII single, long, stout, strongly barbed; 1-VIII minute, inserted on posterior margin of comb plate, 3-VIII with 6-8 strongly barbed branches, 5-VIII inserted very close to 4-VIII; comb scales usually 14-16 (9-16) on a very large oval sclerotized plate, each scale rather long and slender, blunt apically, lightly spiculate laterally to near apex. *Segment X.* Saddle complete, dark brown, lightly imbricate, with a few scattered stout spicules and numerous fine spicules on dorsal posterolateral margin; seta 1-X single, strong, barbed, 2, 3-X single, 4-X with 9 pairs of setae, inserted on a weak grid. *Siphon.* Dark brown; of near uniform width from base to apex; index 3.7-4.3; pecten teeth 16-21, reaching to about 0.75 of siphon; each tooth long, slender, lightly spiculate from base to apex on side toward base of siphon; 1-S with 3-5 stiff, barbed branches, long, about 0.8 or more of siphon length, inserted at about 0.8 from base of siphon and on line with pecten teeth; 6-S single, stiff, barbed; 8-S with 3-5 stiff, barbed branches, long, about equal to length of siphon.

TYPE-DATA. Type-male with terminalia on slide in the BMNH and with the following label data: Sarawak, Kuching, 6. 111. 1914, J. C. Moulton, BM 1914-287. One female and 1 male with same data but without type labels also in BMNH. The type is in good condition.

Type-male of *brevirostris* with terminalia on plastic piece on pin shaft in BMNH with the following label data: Sarawak Kuching, Pres. by J. C. Moulton, BM. 1914-409. Three females and 7 males with same data but without type labels also in BMNH. The type of *brevirostris* is in good condition.

DISTRIBUTION. Material examined: 154♂, 158♀, 38 L; 53 with associated skins (43 1, 53 p).

MALAYSIA. *Malaysia:* Tarakan 6♀, 5 L, 1 l, 1 p. *Sabah* - Mt. Kinabalu; Sipitang Forest Reserve, 1♂, 3♀, 4 l, 3 p. *Sarawak* - Kuching, 10♂, 4♀, 3 L. *Peninsular Malaysia: Trengganu* - Kemaman, 6♂, 10♀. *Selangor* - Kuala Selangor; Betong Benjuntai; Ulu Lui; Tanjong Robak; 87♂, 96♀, 22 L, 23 l, 26 p. *Johore:* Sedili, 11♂, 15♀, 9 l, 9 p. *Pahang:* Kuantan, 9♂, 10♀, 2 l, 2 p.

SINGAPORE. 2♂, 3♀; Pearce Reservoir, 1♂, 1♀, 2 L, 1 l, 1 p; Ulu Pandan, 6♂, 12♀, 2 l, 4 p; War Dept. Area, Clementi Rd., 1♀; Macritche Reservoir, 1♂, 3♀, 1 L, 3 l, 3 p; Nee Soon Rifle Range, 4♂, 4♀, 5 L, 7 l, 7 p.

Brug (1934) also reports this species as *brevirostris* from INDONESIA, *Kalimantan,* Mandor, near Pontianak and Brug and Edwards (1931) record it from *Sumatra* as *moultoni* from Bengkulu and Air Prioekan, and as *brevirostris* from Djambi and Moeara Tebo.

DISCUSSION. Edwards (1914) described *moultoni* from a series of females and males collected by J. C. Moulton at Kuching, Sarawak, in 1914. These specimens were accessioned at the BMNH with accession number 1914-287. At a later date in 1914, additional females and males collected in 1907, by J. Hewitt at Kuching, bred from a pitcher plant, were received at the BMNH and accessioned 1914-409. Edwards (1915) described the latter as *brevirostris* and noted that it differed from *moultoni* "in the yellow instead of black scales on the mesonotum, and in the somewhat less striking contrast in colour between the thorax and abdomen." Interestingly, Moulton (1914) published both these names in a check list of mosquitoes in the Sarawak Museum before the descriptions appeared.

This is a well marked, easily recognized species in all stages, but there is considerable variation in adult ornamentation. There is a dark form and a slightly lighter form in the adult but intermediates are common. The darker form has the decumbent head scales black, the scutal integument slightly darker, scutal scales more uniformly dark and occasionally with a faint darker brown line across upper pleuron. The lighter form has the decumbent head scales more uniformly slate gray, scutal integument lighter, scutal scales distinctly lighter grayish on anterior 0.5, and the dark line across upper pleuron reduced or absent. These variables are noted in all samples from all areas and even in the same collection, which leads me to believe that much of this may be due more to age than any other factor. Almost all of the specimens used in this study were freshly reared and killed or died at varying intervals after emergence. This is also true of the type-series of *brevirostris* and the lighter forms could well be a manifestation of a teneral condition. The type-series of *brevirostris* exhibits the above variations to some extent, but the type male has lighter decumbent head scales, lighter thorax and lighter grayish anterior scutal scales, the posterior scales are distinctly black as they are in all specimens of both forms. These differences are rather subtle and not

very striking. The male terminalia of the 2 type-males are the same.

The pupa and larva are quite distinct and most characters are rather typical. The larva exhibits a few significant variations. The most significant are: the development of seta 1-III and 1-VI. Seta 1-III is frequently long, very strong and barbed, similar to 1-IV, V, less commonly 1-III is shorter, weak and with few simple branches, 1-VI is usually similar to 1-IV, V but it is often reduced, much weaker than 1-IV, V; 3-P varies significantly in length and in thickness of individual branches. The larva is similar to those of *ascidiicola*, *gigantea* and *xanthomelaena* in the small long narrow head but differs from all 3 species in numerous obvious characters. Unique characters in the larva of *moultoni* are as follows: 9 pairs of setae for 4-X; extremely long, well developed 8-S; strongly plumose setae 8, 9-M and 7, 9-T; long, stout, single strongly barbed 1-IV, V.

BIONOMICS. The immature stages occur almost exclusively in *Nepenthes* pitchers at a rather low elevation. From the available data it also appears the species has a distinct preference for pitchers of *N. ampullaria* Jack. Thirty-two immature collections were examined from the following: *Nepenthes* (30), bamboo stump (1) and *Pandanus* axil (1). Eleven of the collections with specific identification of the pitcher plant are all *N. ampullaria*. Barr and Chellapah (1963) report *brevirostris* (= *moultoni*) as a common inhabitant of *N. ampullaria* in Singapore and Brug (1934) reported *brevirostris* (= *moultoni*) from *N. ampullaria* in western Borneo (Kalimantan). Twenty-seven of the collections examined are with recorded elevations of sea level to 152 m with 18 of these at sea level.

URANOTAENIA (PSEUDOFICALBIA) NIVIPLEURA LEICESTER
(Figs. 33, 34)

Uranotaenia nivipleura Leicester 1908: 219 (♂, ♀); Barraud 1926: 343 (♀); Barraud 1934: 76 (♂, ♀); Bohart and Ingram 1946b: 57 (♂, ♀); Peyton and Hochman 1968: 380 (♂*).
Uranotaenia (Pseudoficalbia) nivipleura Leicester, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.92 of forefemur; prementum uniformly dark brown scaled, with a very few minute setae at apex; one pair of labial basal setae; palpus about 0.11 of proboscis and about 1.0 of antennal flagellomere 1; clypeus light or dark brown; antennal pedicel dark brown on mesal half, lighter laterally, with a small inconspicuous dorsomesal patch of minute setae and colorless scales; flagellum about 1.21 of proboscis or exceeding proboscis from base of Flm 11; Flm 1 about 1.12 of Flm 2, with a few grayish brown scales basomesally; flagellar whorls each of 6 setae; 1 strong, golden interocular and 5 ocular setae, the most mesal one very near interocular and golden, remainder black; decumbent scales usually indistinctly bicolorous, those in center and on postgena grayish brown or light creamy fawn, scales on ocular line narrowly and indistinctly grayish or creamy, usually becoming more whitish laterally and extending posteromesally to nape; erect scales moderately long, numerous but not dense, distributed over entire vertex to ocular line, a varying number of pale white ones posteriorly and black anteriorly. *Thorax.* Scutal integument reddish rust-brown, extending over anterior margin as a dark V-shaped area to upper level of *apn*, indistinctly darker on supra-alar area and scutal fossa, narrowly pale yellowish on lateral marginal line; scales narrow, curved, dark brown in center, a few posterior lateral prescutellar scales straight and moderately broad, a narrow

lateral marginal line of long narrow white or yellowish scales, interrupted at anterior dorsocentral setae, a small patch of similar scales at anterior acrostichal line; prescutellar space bare on posterior 0.5 or less; dorsocentral and supra-alar setae exceptionally long, stout, black; scutellum dark brownish black, scales similar in color, broad; mesopostnotum dark brown dorsally, yellowish laterally; paratergite yellowish; pleuron uniformly pale yellowish (light straw) and sharply contrasting with very dark scutum; *apn* devoid of scales; *ppn* with 1 stout seta and 2-6 inconspicuous light gray translucent scales on upper posterior corner; *sp* with 1 seta; *ppl* with 2 strong setae; *stp* with 7-10 setae on upper and posterior margins, and a broad upper patch of broad, near colorless, translucent scales, which narrowly extends down posterior margin to upper level of coxa II; upper *mep* with 3, 4 whitish setae. *Wing.* Scales on C, Sc, R and R_1 dark brown, remigium often exhibiting a varying degree of gray or creamy white scales, remaining scales light grayish brown; cell R_2 about 0.48 of R_{2+3} and 0.8 of M_2. *Legs.* Coxae and trochanters pale yellow, C-I with a patch of light grayish brown scales on anterior surface; C-II, III with a few similar though less conspicuous scales basolaterally; femora dark brown scaled dorsally, light brown ventrally; forefemur with 3, 4 short stiff setae on apical 0.5 of anteroventral margin and 5-7 short, weak setae on posterodorsal margin, no rows of setae on mid- or hindfemur; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.0 of tibia. *Abdomen.* Terga tawny brown scaled, reflecting various colors of dusty gray, violet-green or golden depending on angle of light and age of specimen, tergum I usually lighter; laterotergite pale yellow, with a few scattered pale gray scales; sterna light grayish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 1.0 of forefemur; 2 pairs of labial basal setae; antennal flagellum about 1.0 of proboscis, strongly plumose, whorls each of at least 20 setae; flagellomeres 12, 13 subequal, each as long as combined length of 9-11. *Terminalia* (Fig. 34). Tergum IX broadly rounded on apical margin, with a subapical patch of 3-6 conspicuous setae on each side of midline, basal emargination shallow; tergum X complete dorsally, produced tergolaterally into short, broad lobes which are produced into angular apicolateral corners and distinctly shorter on mesal corner, extending beyond apical margin of tergum IX; tergomesal surface of basimere with several setae of unequal lengths; basal mesal lobe of basimere with 1 long, stout tergoapical seta arising from a distinct finger-like process, 3, 4 similar though shorter subapical setae and 1, 2 smaller setae basal to these; 1 long, strong and 2, 3 weaker setae on sternoapical margin; distimere long, slender, rather straight, gradually tapered from base to apex, with 2, 4 small distal setae; spiniform minute, inapparent; plates of aedeagus widely separated, joined by a broad tergal bridge and a membranous sternal bridge, broadly rounded laterally basal to teeth, each plate with 1 large, broad leaf-like, apically curved, pointed, tergoapical tooth, a stout slightly curved apical, sternomesal tooth and a rather distinct median sternal arm which terminates in a small, strongly curved, basally directed tooth; proctiger with 4-6 prominent cercal setae on each side, tergal apicolateral surface strongly spiculate.

PUPA (Fig. 34). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly light yellowish brown, all setae small and short, with very few simple branches. *Cephalothorax.* Setae 1-5-CT single or double, 6-CT strong, longer than 7-CT, 8-CT single or double. *Respiratory Trumpet.* Light yellow; index about 3.5; tracheoid area inapparent. *Metanotum.* Setae 10-12-CT usually single, occa-

sionally bifid, near equal in length; alveolus of 13-CT not evident. *Abdomen.* Seta 1-II-V weak, single or double, 2-II short, stout, single, 3-II stiff, single; 3-III single or double, 5-III stout, spine-like, 6-III-VII short, weak, single; 5-IV-VII single, not more than 0.5 the length of each succeeding segment; 9-VIII with 2-5 stout, darkly pigmented, simple branches; 1-IX stout, single. *Paddle.* Midrib pale brown to near apex; outer margin with very fine, rather widely spaced serrations from basal 0.25 to apex, inner margin with minute, irregularly spaced spicules on apical 0.4; outer part significantly narrower than inner part; 1-P usually single occasionally bifid or trifid.

LARVA (Fig. 33). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Dark brown; seta 4-C single, 7-C double or triple, placed anterolateral to 4, 6-C, 11-C with 3-5 branches; mentum with 13 teeth. *Antenna.* Darker than cranium; seta 1-A single or double. *Thorax.* Seta 1-P single, 3-P double or triple, 4-P double, 7-P double or triple, 14-P single; 8-M triple, 9-M double; 7-T with 4, 5 branches, 9-T double. *Abdomen.* Seta 1-I small, single or double, 6-I, II usually double, rarely triple; 1-II-IV with 2-4 branches; 6-III-V double, lightly barbed; 1-V double or triple; 1-VI single or bifid, 6-VI single or double; 1-VIII double or triple, inserted on posterior margin of comb plate, 3-VIII with 2, 3 lightly barbed branches; comb scales 7-13, on a large oval sclerotized plate, each scale slightly expanded and rounded apically, finely spiculate laterally and apically. *Segment X.* Saddle incomplete, light brown, posterior margin without spicules, but the more apical imbrications very finely spiculate; seta 1-X double, stout, strongly barbed, darkly pigmented, 2, 3-X triple, barbed, 4a-d-X double or triple, barbed, 4e-X short, weak, single or double, barbed. *Siphon.* Dark brown; very broad at base and tapered to narrow apex, sclerotized portion broadly and deeply excavated on basoventral 0.3 or more, entire area between pecten teeth to base membranous; index about 2.0; pecten teeth 9-15, when above 10, usually in an irregular row and several teeth out of line, reaching to about basal 0.4; each tooth finely fringed laterally and apically, variable in shape; 1-S double or triple, inserted slightly beyond and ventral to distal pecten tooth.

TYPE-DATA. Type-male with terminalia on slide in BMNH with the following data on the underside of large circular label "In jungle, The Gap, 24/4/04," and with B.M. "Type" label. The species was originally described by Leicester from the above male and one female sent him "by Dr. Finlayson of Singapore which he bred from a larva found in a pitcher plant." I could not find the Singapore specimen in the BMNH. Leicester (1908) did not designate a holotype for any of his species, but since the above specimen is the only one in the BMNH with a type-label, presumably placed by Edwards, I accept it as such and see no need for a lectotype designation.

DISTRIBUTION. Material examined: 47♂, 57♀, 8 L; 31 with associated skins (27 l, 31 p).

CAMBODIA. *Kompong Speu:* Kirirom, O-Tachat, 1♀.

HONG KONG. Taipokau, 1♂, 2♀.

INDIA. Muktesar, Kumaon, 5♂, 3♀.

INDONESIA. *Java,* 1♀.

JAPAN. *Ryukyu Islands, Okinawa:* Chizuka, 2♂.

LAOS. Ban Van Heue, 1♂, 3♀.

MALAYSIA. *Malaysia: Sabah* - 19 km. N. of Kalabakan, 1♂. *Peninsular Malaysia: Johore* - Bekok, 2♂, 2 l, 2 p. *Penang* - Penang Hill, 3♂, 1♀. *Pahang* - Frasers Hill; Bentong; 8♂, 8♀, 2 L, 1 l, 1 p. *Selangor* - Kapar; The Gap; 5♂, 4♀, 4 l, 4 p.

SRI LANKA. *Central:* Kandy, Peradeniya, 16♂, 15♀, 17 l, 14 p. *Sabaragamuwa:* Ratnapura, Uggalkaltota, 1♀.

THAILAND. *Nakhon Si Thammarat:* Ban Tha Phra Nabon, 1♀. *Chiang Mai:* Doi Sutep; Suan Ma Yao; 5♀. *Chon Buri:* Khao Wai, Khao Mai Kaeo, 2♀. *Trang:* Khao Chong, 1♀. *Yala:* Baraket, 1♀. *Chanthaburi:* Khao Sai Dao, 3♂, 8♀, 6 L, 3 l, 10 p.

VIETNAM. *Binh Dinh:* An Khe, 1♀.

Reported also from SINGAPORE by Leicester (1908), and from TAIWAN by Lien (1962).

DISCUSSION. This is a well marked species in all stages and not likely to be confused with any other Oriental species of *Pseudoficalbia*. The adult exhibits considerable variation in pale scaling of head, thorax and wing. The decumbent head scales are usually indistinctly grayish or creamy on ocular line and grayish brown on the vertex, but some specimens have no apparent lighter scales on the ocular line and all scales are uniformly creamy brown. The number of black and white erect scales vary from mostly black to mostly white. The lateral marginal line of pale scales on scutum vary from white to yellow and pale scales on remigium of wing from 2, 3 pale creamy basal scales to entirely whitish. These variations not withstanding, the adult is easily recognized by the very distinctive ornamentation of the thorax. The male terminalia are unique for *Pseudoficalbia*, in having a membranous sternal connection of the aedeagal plates. The numerous prominent cercal setae of the proctiger are rather characteristic of this species. The only species with similar cercal setae are *ascidiicola* and *gigantea*.

A single gynandromorph of this species was encountered in the USNM collection from Malaya with the following label data: No. 1375, Frasers Hill, Pahang, Malaya, *Uranotaenia nivipleura*, Det. A. G. 1969, Mosquitoes of Malaysia, Dept. Parasit., U. Malaya. The specimen is an anterior-posterior gynander, with the anterior, including head and thorax female and the terminalia male. There are 5 normal females and 5 males from the same collection No. 1375 in the USNM. Gynandromorphism is a rather common naturally occuring phenomenon in the Culicidae and has been reported for a considerable number of species in several different genera. This specimen is of interest merely because it is the first confirmed record of its occurrence in the genus *Uranotaenia*.

The immature stages of this species are moderately variable in some characters. In the pupa there is noticeable shifting in position of setae 2-5-II, III and the general arrangement on III is somewhat atypical from other members of the series. The broad basoventral membranous area of the siphon readily distinguishes the larva from all other species.

BIONOMICS. The immature stages have been collected from the following: tree stump (4), tree hole (3) (all dead, fallen), auto tire (2) and rusty tin (1). Several adults were collected either in traps or resting in forest but 2 adult collections are of interest. One female is recorded as being collected in Thailand between the hours of 1900-2000, biting a pig. Another female is reported as resting in a house. Observations on biting behavior of *Uranotaenia* species are extremely rare. Both adult and immature collections have been made in forest and domestic environments at elevations ranging from 61-2,286 m.

URANOTAENIA (PSEUDOFICALBIA) NOVOBSCURA BARRAUD
(Figs. 2, 35, 36)

Uranotaenia novobscura Barraud 1934: 84 (in part, type ♂ and L only).
Uranotaenia bimaculata of Edwards 1921: 283 (in part, A, ♂, Japan record); Barraud 1926: 346 (♂*, ♀); Barraud 1934: 78 (♂*, ♀); Roth 1946: 67 (L*, P* taxonomy); Bohart and Ingram 1946b: 57 (♂, ♀*, L*, P*, E*); Asanuma and Nakagawa 1954: 372 (P*); Mattingly 1957: 11 (P); Hara 1957a: 49 (♀*) Hara 1957b: 284 (♀*); Sasa et al. 1971: 139 (♀*).
Uranotaenia (Uranotaenia) bimaculata of LaCasse and Yamaguti 1950: 42 (♂*, ♀*, L*, P*).
Uranotaenia (Pseudoficalbia) novobscura Barraud, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.8 of forefemur; prementum dark brown scaled dorsally, narrowly and indistinctly gray on ventral margin, no conspicuous setae except a few very small scattered ones along ventral margin and at apex; one pair of labial basal setae; palpus about 0.12 of proboscis and 1.1 of antennal flagellomere 1; clypeus reddish brown; antennal pedicel dark brown mesally, faintly lighter laterally, with a few small inconspicuous setae and 3, 4 colorless scales dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from about base of Flm 11; Flm 1 equal to or slightly less than length of Flm 2 and with a small basomesal patch of light brown scales; flagellar whorls each with 6, 7 setae; 1 stout interocular and 5 ocular setae; decumbent scales dark grayish brown or creamy brown, often with faint blue-white reflections, scales at sides distinctly gray-white; erect scales conspicuous, moderately long, numerous but not dense, distributed over entire vertex to near ocular line, pale yellowish brown or whitish. *Thorax* (Fig. 2). Scutal integument dark brown or brownish black, often with grayish sheen, with a large bare, oval, dark brown or velvety black, supra-alar spot which is usually set off from remainder of dark scutum by at least a narrow pale area on anteromesal margin; scales mostly narrow, curved, dark bronzy brown or grayish brown, a few moderately broad white scales on anterior promontory and occasionally a few narrow grayish white scales on anterior margin of supra-alar dark spot; prescutellar space largely bare; dorsocentral and supra-alar setae long, stout, but less than half the width of scutum; scutellum dark brown, with broad brown scales; mesopostnotum a deep dark brown, lighter basolaterally; paratergite dark brown; pleuron mostly light grayish or yellowish brown with *ppn*, *psp*, upper *stp*, and *mep* usually darker brown; *apn* devoid of scales; *ppn* with 1 strong seta and no scales; *sp* with 1 seta; *ppl* with 1 strong and 2 weak setae and a few conspicuous translucent scales; *stp* with a distinct patch of broad flat grayish translucent scales on upper 0.3 which narrowly extends down posterior margin to below base of midcoxa, setae few, small, weak, 2 upper and 6-7 posterior; upper *mep* with 4 setae. *Wing.* Scales dark brown, those on posterior veins lighter; remigium usually entirely grayish white or ochreous, occasionally reduced to 3, 4 pale ochreous scales basally or rarely all dark; cell R_2 about 0.5 of R_{2+3} and about 0.77 of cell M_2. *Legs.* Coxae and trochanters pale grayish brown with a few inconspicuous translucent scales; femora brown scaled dorsally, gray ventrally, tibiae and tarsi uniformly brown; forefemur with 8-12 short stiff setae on posterodorsal margin, 4-7 similar setae on apical 0.5 of anteroventral margin; midfemur with 3-6 setae on basal 0.5 of dorsal margin, 2-4 short stiff setae on apical posterior margin and several small weak setae on ventral mar-

gin; hindfemur with 1-4 stiff setae on dorsal margin and 2-4 short, stiff setae on apical 0.5 of posterior margin; hindtarsomere 1 about equal to length of tibia. *Abdomen.* Terga dark brown scaled, with purple reflections; laterotergite with a few grayish scales; sterna light grayish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.85 of forefemur; 3 pairs of labial basal setae; antennal flagellum strongly plumose, about 1.1 of proboscis in length or exceeding proboscis by slightly less than length of Flm 13; Flm 12 longer than 13 and about equal to combined length of 9-11; flagellar whorls each of 20 or more long setae. *Terminalia* (Fig. 36). Tergum IX broadly rounded apically, with an irregular subapical row of 2-4 setae on each side of midline, usually with at least 3 on one side, basal emargination very shallow and broad; tergum X well developed, complete dorsally, produced laterally into short angular lobes which usually project a little beyond apical margin of tergum IX but occasionally are retracted well within segment IX; tergomesal surface of basimere with several long setae, a few of which are quite stout; basal mesal lobe of basimere with 1 long, very strong, tergoapical seta, 4, 5 similar but shorter subapical setae and 1-3 small setae basal to these, 1 long, stout and 1-3 smaller setae on sternoapical margin; distimere more or less straight, of uniform width on basal 0.6 and tapered from apical 0.4 on tergomesal side to apex, apical 0.4 with several small setae, spiniform stout, acute; plates of aedeagus widely separated, joined by narrow tergal and sternal bridges, broadly rounded laterally below teeth, each plate with 1 very stout outwardly curved, apical, tergomesal tooth and 2 rather long strong apicosternal teeth, with the more tergal of the 2 long, straight and directed laterally, a small short subapical tooth near tergolateral margin; proctiger without cercal setae but with numerous fine spicules apically.

PUPA (Fig. 36). Chaetotaxy as figured. Diagnostic characters in series description and the following. Integument uniformly brown. *Cephalothorax.* Seta 1-CT single or double, 2-CT double or triple, 3-CT with 1-4 branches, 5-CT small, with 2-6 delicate branches, 6-CT single, strong, darkly pigmented, about equal to or slightly longer than 7-CT; 8-CT with 3-6 branches; 9-CT single to triple. *Respiratory Trumpet.* Dark reddish brown, faintly tracheoid on anterobasal 0.2; index about 3.8-4.5, of near uniform width from basal 0.25 to apex. *Metanotum.* Seta 10-CT very small, with 2-5 weak branches, 12-CT single or double, a well-developed single or double 13-CT rarely present. *Abdomen.* Seta 3-I single to triple; 1-II small, usually with 7-16 very weak branches from a strong basal stem, occasionally basal stem bifid and each division with 5-12 branches, 2-II single, less than length of segment III; 3-II strong, with 2-4 weak branches at or beyond middle, rarely single; 1-III small, with 2-4 weak branches, 3-III strong, with 2-5 weak branches beyond middle, 6-III-V single or double; 1-IV-VII small, with 2-3 (2-5) weak branches, 5-IV-VI single, darkly pigmented, about as long as succeeding segment on IV, V, usually shorter on VI; 6-VI single, longer than 6 on preceeding segments; 6-VII small, with 2-5 branches, located dorsally; 9-VIII usually with a strong, pigmented basal stem, with 4-8 branches from various points on basal 0.5, often with dendritic branching. *Paddle.* Darkly pigmented at base and on basal 0.3-0.5 of outer margin; midrib darkly pigmented to apex; outer and inner parts equal in width; outer margin with closely set saw-toothed spicules, each of which has a long fine terminal filament, inner margin with a fringe of longer filamentous spicules; 1-P single or double.

LARVA (Fig. 35). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Dark reddish brown; seta 4-C

with 11-26 fine branches, 5-C strong, single, considerably longer than 6-C, 7-C usually with 5-7 (4-10) branches, 11-C small, with 7-12 very weak branches; mentum with 13-15 teeth. *Antenna.* Darker brown than cranium, seta 1-A double or triple, 2-6-A darkly pigmented. *Thorax.* Seta 3-P with 2-6 branches, 4-P with 3 (2-4) branches, 7-P usually double or triple (1-4), 14-P with 2-4 stiff, lightly barbed branches; 6-M long, stout. *Abdomen.* Seta 1-I-VI small, weak, with 2-9 branches; 6-III, IV with 3 (1-4) barbed branches, much shorter than 6-I-II, VI; 6-V with 3 (1-3) barbed branches and slightly longer than 6-III, IV; 6-VI single (1-4), strong, barbed, darkly pigmented, significantly longer than 6-III-V; 1-VIII minute, multiple branched, 2-VIII inserted on a small sclerotized plate, 3-VIII with 4 (3-8) strongly barbed branches; plate of segment VIII large; comb scales 8 (6-12), each with 1-3 short stout spicules on each side at base, very finely spiculate laterally to tapered apex, apical spicules only slightly stronger. *Segment X.* Saddle complete, dark reddish brown, strongly sculptured, posterolateral margin and the more apical imbrications with very fine sharp spicules; seta 1-X with 4-8 barbed branches, 2-X double, 4a-e-X with 4-7, 2-4, 2-3, 1-2, 1-2 branches respectively. *Siphon.* Dark reddish brown; index about 2.5-3.2; pecten teeth usually 17-20 (15-32), extending to 0.55-0.75 from base of siphon, each tooth short, broad, very finely spiculate laterally and apically, often a few teeth out of line and well above or below the others, especially in those specimens with more than 20 teeth; 1-S with 3-6 branches which are usually strongly barbed distally, usually inserted within the distal 1-3 pecten teeth but occasionally slightly beyond the most distal tooth.

EGG. Description taken from Bohart and Ingram (1946b). "Length about 0.6 mm.; black, dorsal surface dull granular and delimited by a low ridge, sides and bottom smooth and shining."

TYPE-DATA. Originally described by Barraud (1934) from: "Sukna, Darjeeling dist., c. 500', x .1922 (Barraud). TYPE: ♂, No. 1276/1861 [with slide of associated larval and pupal skins]; allotype ♀ and other specimens from same place, viii. 1928 (Sobha Ram)." The holotype male and 8 other specimens (5♂, 3♀) are in the BMNH. There are slight discrepancies between the above published type-data and those on the labels attached to the specimens. The labels on the holotype male bear the following information: on 2 small labels affixed on minuten pin below specimen, one is with "No. 1276," the other with "No. 1861," a BMNH circular "TYPE" label is on the shaft of a larger pin and a second label below this is with, "Suriel, E. Himalayas, Darjeeling dist., X-1922 (Barraud), larva from bamboo." The slide of the associated larval and pupal skins of the type-male is labeled as follows: "No. 1276, *Uranotaenia novobscura* Barr., Suriel, Darjeeling dist., C. 5000' from Bamboo, X-1922, P. J. Barraud, BM 1935-622., larval and pupal skin of type ♂." In the original text (1934: 85), Barraud indicated that the fourth stage larva was "described from one damaged skin, from which type ♀ resulted." This is an error as the pupal skin is clearly that of a male. The other specimens from Sukna, consisting of 5 males (2 with terminalia mounted on slides) and 3 females, all bear similar information. Although none bear type-labels, it is clear these are the "allotype and other specimens from same place . . . ." referred to by Barraud and are labeled as follows: *U. novobscura*, P. J. Barraud, Sukna, N. Bengal, Cow Pen, Sobha Ram viii. 1928. All 8 specimens from the latter collection are *obscura* Edwards and only superficially resemble the holotype in adult habitus features.

The holotype male is in rather poor condition, being badly rubbed, scutum somewhat collapsed and torn, pinned through middle of pleuron and with fore-

and midleg missing on one side. It is obviously teneral and quite pale, which in part contributes to its resemblance to *obscura*. The terminalia were intact and only partially rotated when I clipped and slide-mounted them (December 1968). The mounted terminalia are quite different from those prepared by Barraud of one of the *obscura* specimens which he described.

It appears that the original description of the adult female and male of *novobscura* was based almost entirely upon specimens of *obscura* from Sukna and not upon the labeled holotype of *novobscura* from Suriel. Consequently, the original description of the species is represented by the very adequate description of the holotype larval skin, and the type-locality becomes Suriel, not Sukna.

DISTRIBUTION. Material examined: 93♂, 91♀, 85 L; 53 with associated skins (31 l, 53 p).

CAMBODIA. *Kompong Speu:* Kirirom, O-Tachat, 1♀.

CHINA. *Chekiang:* Hangchow, 2♂, 2♀. *Hainan*, 1♀.

HONG KONG. *New Territories*: Kowloon, 9♂, 1♀.

INDIA. *Darjeeling:* Suriel; Kurseong; 2♂, 1♀, 1 l, 1 p.

JAPAN. *Kyoto:* 3♂, 4♀, 3 L. *Tokyo:* 2♂, 4♀, 2 L. *Sagiyama:* 1♂, 2♀. *Ryukyu Islands: Okinawa:* Ikebaru; Shido; Metaniku; Okuma; Aku; Moromi; Nakasoni; Chizuka; Taira; 30♂, 24♀, 73 L, 6 l, 25 p.

LAOS. Ban Van Heue, 1♀.

MALAYSIA. *Peninsular Malaysia: Pahang* - Frasers Hill; Robinson Falls, Cameron Highlands; Sungai Menson, Cameron Highlands; Gunong Beremban, Cameron Highlands; 14♂, 18♀, 4 L, 15 l, 17 p. *Perak* - Maxwells Hill, 1♀.

TAIWAN. Yo-chih Nan-Tou; Mei-Shan Chia-I; Ta-Keng-Poi Tan; Taipei; Chuchi Chuchi; 7♂, 6♀.

THAILAND. *Chiang Mai:* Doi Sutep; Kuan Kwinnin; 18♂, 20♀, 1 L, 5 l, 5 p. *Lampang:* Ngao, 1♂. *Nakhon Ratchasima:* Khao Yai, 1♂. *Kanchanaburi:* Huai Mae Nam Noi, 2♀, 2 l, 2 p. *Tak:* Doi Sam Sao, 2♂, 2♀, 2 l, 4 p. *Chanthaburi:* Khao Sai Dao, 2 L.

Reported by Tanaka, Saugstad and Mizusawa (1975) (as *bimaculata*) as common throughout the Ryukyu Archipelago. Reported also from Anhwei, Hwangshan, CHINA (as *bimaculata*) by Feng (1938).

DISCUSSION. The identity of this species has been thoroughly confused, since publication of the original description. As far as I can determine, it has not been correctly recognized since that date, and even Barraud confused it with *obscura* when he described it from a mixed series of the 2 species. His adult key will identify this species as *obscura*. I have seen several specimens of *obscura*, especially from Thailand, labeled as *novobscura*. Fortunately, except for Thurman (1959), these records were never published. Qutubuddin (1951) also treated *obscura* as *novobscura* but in this case he and Mattingly (in collaboration) selected one of the male terminalia slides of *obscura* from Barraud's original series (cited above under Type-data) for illustration and comparison with that of *mattinglyi*. This is confirmed by the fact that the terminalia of the holotype of *novobscura* were still intact in 1968. The species has been collected frequently in a number of countries but has been consistently misidentified and reported as *bimaculata*. Consequently, most of the published records of *bimaculata* pertain to *novobscura*. Prior to this study there were no confirmed records of *bimaculata* beyond Peninsular Malaysia.

In an effort to clarify the confusion surrounding this species, the following information is presented. The original description of *bimaculata* Leicester (1908) was based totally upon adult habitus features, without accompanying

illustrations. Except for a sketch of the basal mesal lobe of the terminalia of the lectotype male, by Mattingly in Delfinado (1966b) no other stage has been treated to date. The most distinguishing adult feature of *bimaculata*, prior to the description of *novobscura* was the very conspicuous dark supra-alar spots of the scutal integument.

In 1926, Barraud described the adult and illustrated the male terminalia of what he considered to be *bimaculata* (here confirmed as *novobscura*) from a series of adult specimens in the Central Malaria Bureau collection, "from Kurseong, Mungpoo and Suriel, Eastern Himalayas, bred from larvae found in water in tree holes September and October 1922." In 1934 he again treated this series as *bimaculata* with very slight modification in the adult description and reproduced the earlier illustration of the male terminalia. The localities were essentially the same but also with slight modification and one addition as follows: DARJEELING DIST.: Kurseong, Suriel and Mungpoo, 5-6,000', ix & x. 1922 (Barraud); Marian barrie Tea Estate, near Sukna, c. 500', viii. 1928 (Sobha Ram). There is one female, No. 2037 and one male, No. 2034 in the BMNH labeled, *bimaculata*, Kurseong, 22.6.22, M. O. T. Iyengar, Tree hole. These may be the specimens from Kurseong listed by Barraud. I did not locate any of the other specimens of Barraud's *bimaculata* in the BMNH. The descriptions and the illustration of male terminalia of *bimaculata* in Barraud (1926 and 1934) and the 2 specimens listed above from Kurseong compare very well with the holotype of *novobscura*. Barraud specifically pointed out the pale remigial scales of the adult wing in the Indian specimens of *bimaculata* and these are quite obvious on the type of *novobscura*. The only obvious difference is the much paler teneral condition of the holotype. Although Barraud did not note it, the dark supra-alar spot on the scutum of the holotype of *novobscura* is rather indistinct, but it is clearly present. Comparing the collection data on the labels of the holotype of *novobscura* and Barraud's *bimaculata* from Suriel, it would appear these specimens were collected at the same locality and elevation (5,000-6,000'), possibly at the same time in x. 1922, but from different habitats; bamboo and tree hole. It would also appear that somehow these collections were mixed and Barraud did not originally intend to include the male from Suriel in the type-series of *novobscura*, since he did not list Suriel as one of the localities and listed Sukna as the type-locality with data corresponding only to that on the labels of the *obscura* specimens collected by Sobha Ram in 1928. However, since it is the only specimen with a type-label, it must be treated as such.

This confused treatment consisting of a very inadequate description of *novobscura* from a mixed series and a more complete description of the adult and adequate illustration of the male terminalia of the same species under the name of *bimaculata* in the same publication, set the stage for future recognition of the species as *bimaculata*. Following this, Roth (1946) made a comprehensive study of the immature stages of Okinawan specimens and described and illustrated these for the first time as *bimaculata*. Later, in the same year Bohart and Ingram (1946b) added a description and illustration of the egg. LaCasse and Yamaguti (1950) provided the last complete treatment of the species, as *bimaculata*, from Palaearctic Japan, along with a well-illustrated male terminalia which compared very favorably with those of *bimaculata* in Barraud (1926 and 1934). The original description of *bimaculata* Leicester seems to have been lost somewhere in the above process.

The male terminalia, larva and pupa of *bimaculata* are described and illustrated for the first time elsewhere in this revision. While the 2 species are very similar in adult habitus features, they differ significantly in the male

terminalia, pupa and larva. It can also be noted under the description and illustrations of *obscura* that there is little resemblance to *novobscura*.

This species is quite variable in all stages. The adult shows a clinal variation in color, especially in the scutum, which varies from very dark, almost black, in specimens from the southern extreme of Malaysia to a lighter brown for the more northern populations. The pale scales of the remigium of the wing are usually more obvious in southern specimens, often the remigium being entirely pale grayish white, whereas some specimens from northern Japan show only a few pale ochreous scales. There is considerable variation in the pleural markings which occurs throughout the range of the species though they are generally darker in specimens from the south. A few specimens have almost uniformly pale pleura or, only faintly darker on some sclerites. Adults from the Ryukyus show a marked departure from both the southern regions and northern Japan. Specimens are much lighter in color and the supra-alar dark spot is smaller and brown, never blackish. In specimens from the islands of Amami Oshima and Okinawa, scales on the remigium are always dark. Specimens from Ishigake and Iriomote are also lighter but the remigium has pale scales usually on the basal half (information on specimens from Amami Oshima, Ishigake and Iriomote islands kindly provided by Dr. Kazuo Tanaka; personal communication). The variation in color of adults may also be correlated somewhat with elevation, but information on elevation of northern collections is insufficient to substantiate this. Collections from India, Malaysia and Thailand with recorded elevation, range between 213-1,829 m with the majority above 914 m. None of the northern specimens in the USNM have information on elevation, but LaCasse and Yamaguti (1950) reporting on 394 larval collections made over a 4 year period in Palaearctic Japan stated, "The species does not apparently occur at altitude, and undoubtedly winters over readily in the larval stage."

Roth (1946) recognized 2 larval forms from Okinawa which he designated Forms A and B. Differences in the 2 forms were mainly in the degree of ocular bulge of the head and branching of abdominal seta 6-III-VI. He also noted several other variable characters such as general size, branching of prothoracic setae, number of comb scales and pecten teeth, however, he found these to be similar in both forms and "not only variable between specimens but often differ on either side of the same larva." Form A was small in size "with a slight bulging of the sides of the head, and with the lateral abdominal hairs on segments III-V triple and on segment VI double or triple." Form B was larger, more robust, "with a more decided bulge in the eye region, greatly enlarged thorax and with the lateral abdominal hairs on segments III-VI usually simple." However, from a large series of larvae of both forms he found these differences to be variable and was unable to identify some specimens as either form A or B "because of overlapping of characters." He was also unable to find any differences in reared adults of the 2 forms.

Roth also noted a few minor differences in the size and color of pupal skins of Forms A and B but indicated the colors were found in both. He concluded that the Okinawan specimens represented a single highly variable species.

Bohart and Ingram (1946b) reported on 11 larvae from Okinawa and observed the same general variation reported by Roth but also reported a single specimen with seta 6-III-VI single on one side and triple on the other.

Based on a study of larval specimens from Okinawa in his collection, Dr. Kazuo Tanaka (personal communication) states, "There seems to be some seasonal difference in the branching of hairs. Specimens obtained during

November and December have fewer branches than those obtained during August and September. This should be verified by more extensive collecting throughout the year." His specimens from Palaearctic Japan and Okinawa also show considerable variation in the adult and larva. The adults from Palaearctic Japan are more like those from Malaysia and those from the Ryukyu Archipelago are as stated above. In larvae of his collections from the former, pecten teeth are 20-32 and abdominal seta 6-VI is always single. In those of the later, pecten teeth are 15-29 and abdominal seta 6-VI is 1-4 branched but in specimens from Ishigake and Iriomote islands 6-VI is most commonly single.

I have noted all of these variations in specimens from all localities but the samples from most localities, except for Okinawa, are too small to analyze for any significant trends. Of the larvae available for study it is clear that the most common branching of abdominal seta 6-III-VI is as illustrated in figure 35. However, just about any combination of branching can be found from side to side on any segment in a series of specimens. The number of pecten teeth and the distance from base of siphon to the most distal tooth varies considerably in all areas but the northern specimens tend to have a greater number of teeth and the position of seta 1-S is more commonly inserted within the row of teeth. In specimens from India, Malaysia and Thailand, pecten teeth are 15-23 and the position of 1-S is more often slightly beyond the distal pecten tooth.

The pupa exhibits much less variation in the branching of individual setae and all appear to be within the normal expected limits. There is slight variation in the shape of the pupal paddle but this is not associated with any one locality. Roth (1946) also noted some variation in shape of the paddle of Okinawan specimens, "sometimes slightly elongate, or wide and rounded." The apical margin of paddle is with or without a shallow emargination.

Until additional reared, associated series from several localities become available for a more comprehensive analysis, I must conclude, as did Roth (1946) for Okinawan specimens, that the various populations studied represent a single plastic species and that the adult population from Okinawa is a recognizable variant.

BIONOMICS. Immatures of this species are most commonly encountered in bamboo stumps, tree holes and tree stumps, but they have also been collected from various artificial containers and from a banana leaf axil. In Japan it appears to occur more frequently in bamboo stumps and artificial containers at lower elevations than in Malaysia and Thailand. Roth (1946) listed "Earthenware containers, tin cans, tree holes, cut bamboo, pottery (tea pots, saucers, etc.)." LaCasse and Yamaguti (1950) state that in Palaearctic Japan larvae occur primarily in the stumps of cut bamboo in heavily shaded portions of bamboo groves. Occasionally they are found in other artifical containers offering environmental conditions approximating those existing in bamboo stumps. Bohart and Ingram (1946b) also found them rarely in rock holes. I have examined collections from the following habitats: tree holes (14), tree stumps (9), bamboo stumps (10), cement tank or pit (2), earthenware, jar or urn (7) auto tire (1), tin can (1) and banana leaf axil (1). Of the 8 collections from Malaysia, 6 were from fern tree stumps and 2 from tree holes, all at elevations of 1,189-1,646 m. Six collections from Thailand have recorded elevations of 213-1,326 m. There are several adult collections recorded as taken resting in forest (14).

The larvae hang almost vertically from the water surface and have a movement similar to *Aedes (Stegomyia)* species. The immatures are often collected

in association with tree hole and bamboo breeding species of *Aedes*, *Tripteroides* Giles and *Culex*.

Bohart and Ingram (1946b) obtained a batch of 50 eggs from a female in the laboratory. The eggs were laid "flat on the water and single." Mattingly (1970) suggested that from the general appearance of the egg it would seem that this is most probably true also in nature.

Hsiao and Bohart (1946), in reporting on mosquitoes of Japan stated, "The adults do not feed on man but have been reported to attack toads." They did not cite the source of this report.

URANOTAENIA (PSEUDOFICALBIA) PATRICIAE NEW SPECIES
(Figs. 2, 37, 38)

FEMALE. *Head.* Proboscis about 0.83 of forefemur; prementum light brown scaled, with a few inconspicuous setae at apex; one pair of labial basal setae; palpus about 0.15 of proboscis and 1.0 of antennal flagellomere 1; clypeus pale brown; antennal pedicel pale brown, faintly darker mesally, with a few minute setae dorsomesally; flagellum about 1.53 of proboscis or exceeding proboscis from base of flagellomere 10; Flm 1 about 1.25 of Flm 2 and with a few light brown basomesal scales; flagellar whorls each of 5, 6 setae; 1 strong and 1 weak, golden interocular and 5 black ocular setae; decumbent scales mostly light creamy or grayish brown, scales at sides dull white; erect scales small, but typical, sparsely scattered over vertex, more conspicuous on occiput. *Thorax* (Fig. 2). Scutal integument pale yellowish brown in center, broadly pale grayish white on lateral margin, an indistinct narrow oblique darker brown line on mesal border of lateral pale area, extending from anterior dorsocentral line to supra-alar area or this line occasionally incomplete at middle and apparent on scutal fossa and supra-alar area; scales narrow, curved, pale grayish on light integumental areas, grayish brown on darker areas, distinctly grayish white on narrow lateral marginal line with those immediately above paratergite long, narrow, semierect; prescutellar space largely bare; scutellum light brown, scales grayish brown; mesopostnotum light brown, occasionally with a narrow dark median line; paratergite pale grayish brown; pleuron with a distinct dark brown line across upper 0.5 as follows: *apn*, *ppn*, *psp*, upper 0.25 of *stp*, upper 0.6 of *mep* and lower metapleuron dark brown, remaining areas pale grayish brown or whitish, all sclerites devoid of scales; *ppn* and *sp* each with 1 seta; *ppl* with 1 strong and 1 weak seta; *stp* with 1, 2 strong upper and 4, 5 weaker posteromarginal setae; upper *mep* with 2 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 about 0.63 of R_{2+3} and about 0.69 of cell M_2. *Legs.* Coxae and trochanters pale grayish brown; C-I-III each with very few inconspicuous light brown translucent scales; femora dark brown scaled dorsally, grayish brown ventrally, with only a few scattered small inconspicuous marginal setae; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.0 of tibia; hindtarsomere 4, 2.7-2.8 of tarsomere 5. *Abdomen.* Terga bronzy brown scaled, with blue-green reflections; laterotergite with a few brown scales; sterna light brown scaled.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.89 of forefemur; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.31 of proboscis or exceeding proboscis from near base of flagellomere 12; Flm 13 longer than Flm 12. *Terminalia* (Fig. 38). Very similar to *modesta* except for the following.

Tergum IX not as rounded on apical margin; setae on tergum IX 4-7 in a patch and usually at least 5 on one side; median apical lobe of tergum X produced laterally into more definite rounded lobes, with apical emargination variable but generally narrower, deeper; basal mesal lobe of basimere with 3 long stout tergoapical setae, with the most apical arising from a prominent finger-like process, 3-5 small weak setae basal to these, 1 long, stout and 1, 2 weak setae on sternoapical margin; apical tergomesal tooth of aedeagal plates smaller, upper sternoapical tooth broader and more acutely pointed, either of the 2 sternoapical teeth occasionally duplicated on one or both plates; paramere not as broad at base and rounded on mesal margin; proctiger with 1 cercal seta on each side.

PUPA (Fig. 38). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale yellowish brown with faintly darker median areas on segments I-VI or uniformly light brown; all setae with simple branches, without lateral barbs. *Cephalothorax.* Seta 1-CT 2-4 branched, 2-CT with 3-5 branches, 3-CT single to triple, 5-CT with 3-6 branches, 6-CT slightly longer than 7-CT, inserted about 3.0-4.0 the width of alveolus from 7-CT, 8-CT with 3-6 branches. *Respiratory Trumpet.* Light brown; index 3.8-4.5, of near uniform width to apex; indistinctly tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT small, 3-5 branched, 11-CT bifid to 7 branched, 12-CT with 2-4 branches from near middle, alveolus of 13-CT present. *Abdomen.* Seta 6-I single, shorter than 7-I; 1-II minute, with about 11-14 fine branches, 2-II single, stiff, less than length of segment, position variable; 1-III with 3-6 delicate branches, 3-III with 5-8 branches, 6-III-VI single to triple; 1-IV with 2-5 delicate branches, 5-IV-VI usually double or triple branched from varied points beyond base, rarely single on one side, each as long as or slightly longer than succeeding segment; 1-V, VI with 3, 4 delicate branches; 4-VI long, with 3-6 stiff branches; 5-VII small, weak, single to 4 branched; 6-VII small, weak, with 3-5 branches, located dorsally; 9-VIII with 5-8 rather weak branches, located dorsally and distinctly anteromesal to posterolateral corner of segment, length about 0.5 of segment. *Paddle.* Pale brown, with basal portion occasionally darker; midrib light brown to near apex; outer margin with closely set, long filamentous spicules from about basal 0.3 to apex; inner margin with similar very slightly longer spicules; inner and outer parts about equal in width; 1-P absent.

LARVA (Fig. 37). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown, with collar and occasionally posterolateral area dark brown; seta 4-C dendritic, multiple branched, occasionally with long basal stem and branching well beyond base; usually in line with and posterior to 6-C, 5-C simple, only slightly longer than 6-C, 7-C single, 11-C minute, with 4-6 branches; mentum with 17-19 teeth. *Antenna.* Dark brown; seta 1-A with 3-4 branches. *Thorax.* Seta 1-P single, exceptionally long, more than 2.0 the width of thorax, 3-P with 2-4 strongly barbed branches, 4-P with 5-7 strongly barbed branches, 7-P with 2, 3 strongly barbed branches, 8-P stellate, with 5-12 barbed branches, 9-P with 4-7 strongly barbed branches, 14-P usually with 5-10 strongly barbed branches, occasionally single or double, stout, barbed; 2-M, T long, single, 6-M small, with 3-5 branches. *Abdomen.* 6-I, II exceptionally long, with 6-II near equal to length of abdomen; 1-II-VI small, weakly developed; 6-III-VI weak, double to 4 branched; 13-III-V long, well developed, with 4-6 branches; 1-VIII minute, inserted on posterior edge of comb plate, 2, 4-VIII long, with 3-5 distal branches, 3-VIII very long, with 3-5 strongly barbed branches; comb scales 7-9 on a rather large sclerotized plate which is a very

pale yellowish brown and not readily apparent, especially on whole larvae, each scale tapered to point and with fine lateral spicules to near apex. *Segment X.* Saddle complete, pale brown or yellowish, without spicules on posterolateral margin, but the more dorsoapical imbrications with fine spicules, some of which extend to posterior margin giving the appearance of marginal spicules; 1-X branched from beyond base, double or triple, 4a-c-X double, 4d, e-X single. *Siphon.* Pale brown or yellowish; index 5.2-6.7; pecten teeth 18-28, reaching to 0.67-0.80 of siphon, each tooth rounded apically with fine lateral and apical spicules, teeth from base progressively longer and narrower, distal tooth 1.5-2.0 the length of basal teeth; 1-S longer than siphon double or triple, simple, inserted beyond distal pecten tooth at 0.76-0.90 of siphon and on line with or slightly dorsal to row of pecten teeth.

TYPE-DATA. Holotype female with associated larval and pupal skins on slide, MALAYSIA, *Selangor*, The Gap, 19 August 1967, Shivaji Ramalingam, collector, collection number 761-13, SEAMP Accession number 183; collected as a larva from a bamboo stump at an elevation of 762 m. Four male and 9 female (6 with skins) paratypes, 15 April 1967, collection number 479; 2 male paratypes, 15 April 1967, collection number 487; 5 female paratypes (1 with pupal skin), 26 September 1966, collection number 260; 1 male paratype with pupal skin; 26 September 1966, collection number 258-102, all from same locality as holotype.

The holotype and paratypes are deposited in the USNM and 1 male and 1 female paratype will be deposited in the BMNH.

The holotype is in excellent condition. The paratypes are all in good condition.

DISTRIBUTION. Material examined (including type-series): 29♂, 59♀, 5 L; 40 with associated skins (20 l, 41 p).

MALAYSIA. *Peninsular Malaysia: Selangor* - Ulu Langat; Univ. Fld. Station; Gombak; The Gap; Ulu Bahan, Kuala Kubu Bahan; Bukit Kutu; 2 miles from The Gap; 17♂, 43♀, 4 L, 11 l, 14 p. *Pahang* - 16th mile Betong Rd.; Frasers Hill; 1♂, 1♀, 1 l, 1 p.

SINGAPORE. Bukit Tinah Nature Reserve, 1♀.

THAILAND. *Ranong:* Ban Chatri, 4♂, 1♀, 5 p. *Phangnga:* Nam Tai, 6♂, 5♀, 1 L, 3 l, 11 p. *Kanchanaburi:* Huai Mae Nam Noi, 1♀, 1 l, 1 p. *Tak:* Doi Sam Sao; Khao Salak Phra; 1♂, 7♀, 5 l, 10 p.

DISCUSSION. This small light brown species is rather well marked in all stages and easily recognized from similar species, *modesta*, *propinqua* and *quasimodesta*. The very distinctively marked scutal and pleural integument readily separates the adult from the others. The male terminalia are very similar in all 4 species and differ in very minor detail (see descriptions).

The pupa and larva resemble those of *modesta*, *propinqua* and *quasimodesta* in several respects, however, this species is very easily separated from the others by several unique characters. In the pupa the most significant are the long, branched, seta 5-IV-VI and the position of seta 9-VIII. In the other 3 species, seta 5-IV-VI is single or much shorter except for 5-IV, V on *modesta* and seta 9-VIII arises from the posterolateral corner of segment VIII. In the larva the most significant are the greater number of branches of setae 4, 9, 14-P, the exceptional length of 1-P and 6-II, the very pale brown anal saddle and siphon, the exceptionally long seta 1-S and its position beyond 0.75 from base of siphon and the distance attained by the most distal pecten tooth from base. Setae 1-P and 6-II are also quite long in *propinqua*, but less than *patriciae*.

The adult is fairly constant in most characters, except for the faintly

darker oblique line on the scutum which is occasionally difficult to detect. The pale scales on lateral margin in front of the wing root are occasionally very few and inconspicuous, but are always prominent on the anterior margin.

There is some shifting of position of abdominal setae on the pupa, especially noticeable is the position of 2, 5-II. Often 2-II is anterior to 3-5-II and occasionally immediately above 5-II with 5-II being closer to 4-II than illustrated. The lengths of 5-IV-VI vary but are generally as long as each succeeding segment.

The larva exhibits the greatest degree of variation in some setae, especially prothoracic setae. There are 2 distinct forms similar to ones noted in several species of other genera as "hairy" and "non-hairy" forms. This is most pronounced in setae 3, 4, 7, 9, 14-P in which the "hairy" form usually has a greater number of individual branches and each branch is strongly barbed. In the "non-hairy" form the branches are fewer in number and most branches are simple or only very lightly barbed. The extreme of this form is in 14-P which is very stout, single or rarely double as opposed to 5-10 in the other form. The most common form is the one with the greater number of strongly barbed branches, represented in all specimens from Malaysia. The less common form is represented in most specimens from southern Thailand.

This species is dedicated to my daughter, Patricia Ann Peyton, who has always shown a great interest in my work on mosquitoes.

BIONOMICS. This species occurs most commonly in secondary rain forest where bamboo is more abundant. It appears the immatures occur almost exclusively in bamboo habitats with a decided preference for closed bamboo internodes. Although the collection records are not very specific as to the nature of habitats listed as bamboo internode, it would appear from the preponderance of collections recorded as from internodes by experienced collectors from Malaysia and Thailand, that most are closed internodes, either with small rot holes or insect holes. It is known that several species of *Aedes* and *Armigeres* favor this kind of habitat over the more open split bamboo or bamboo stumps and it is the case with this species. It is found in the same general areas with *modesta* but due to the marked differences in habitat preference the 2 have not been collected from the same habitat together.

Immature collections have been examined from the following habitats: bamboo internode (19), split bamboo (11) bamboo stump (5) tree hole (2). Of the bamboo internode and split bamboo collections all are indicated as fallen, on ground, except for one upright internode. For 28 collections the elevation is recorded from 91-823 m. All available specimens were collected in the immature stages and the adults were reared from these.

URANOTAENIA (PSEUDOFICALBIA) PROPINQUA NEW SPECIES
(Figs. 2, 39, 40)

FEMALE. *Head.* Proboscis about 0.79 of forefemur; prementum dark brown scaled, with a few small inconspicuous setae scattered on ventral margin and at apex; one pair of labial basal setae; palpus about 0.13 of proboscis and about 0.71 of antennal flagellomere 1; clypeus light brown; antennal pedicel dark brown mesally, lighter laterally, with 1-3 minute setae dorsomesally; flagellum about 1.68 of proboscis or exceeding proboscis from about base of flagellomere 9; Flm 1 about 1.4 of Flm 2, and with a few brown basomesal scales; flagellar whorls each of 6 setae; 1 long, stout and 1 weak golden inter-

ocular and 5 black ocular setae; decumbent scales light creamy or grayish brown, dull white with blue-green reflections at sides, tips of scales on ocular line lighter but forming no distinct line; erect scales rather small, sparsely scattered over vertex, more obvious on occiput, pale yellow in color. *Thorax* (Fig. 2). Scutal integument mostly dark brownish black, distinctly pale grayish brown on very narrow lateral marginal line, indistinctly darker on supra-alar area, with a distinct oval, dark brown or black shiny, bare spot on scutal fossa, completely surrounded by narrow, curved, gray-white scales; scales narrow, curved gray-white dorsally, distinctly whiter on narrow lateral marginal line, with those immediately above paratergite more concentrated, long, semierect and slightly broader than the rest; prescutellar space bare; scutellum light brown, scales grayish brown; mesopostnotum dark brown, lighter laterally; paratergite light brown; pleuron with a broad dark band across upper 0.5 as follows: whole of *apn, ppn, psp,* upper 0.5 of *stp,* most of *mep* and metapleuron dark brown, remaining areas pale grayish or whitish brown; all sclerites devoid of scales; *sp, ppn, ppl* and upper *mep* each with a single seta; *stp* with 2, 3 upper setae and 4-6 much weaker posteromarginal setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 about 0.61 of R_{2+3} and about 0.8 of cell M_2. *Legs.* Coxae and trochanters pale whitish; C-I-III with a very few scattered, inconspicuous light brown translucent scales; femora dark brown scaled dorsally, light brown ventrally, with a few scattered small inconspicuous marginal setae on fore- and midfemora; tibiae and tarsi dark brown; hindtarsomere 1 about 1.1 or less of tibia; hindtarsomere 4 about 3.2 of tarsomere 5. *Abdomen.* Terga dark bronzy brown scaled with blue-green reflections; laterotergite with a few light brown scales; sterna dark grayish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.84 of forefemur; antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.35 of proboscis or exceeding proboscis from near base of flagellomere 12; Flm 13 longer than Flm 12. *Terminalia* (Fig. 40). Very similar to *modesta* except for the following. Setae on each side of tergum IX 3-6; median apical lobe of tergum X broader, apical emargination also uneven and variable but narrower and more definite, with lateral corners produced into unequal broadly rounded lobes; basal mesal lobe of basimere with 2 very long stout tergoapical setae, 1 slightly shorter, strong, more basal seta and 2, 3 very weak setae usually basal to these, 1 long stout and 1, 2 weak setae on sternoapical margin.

PUPA (Fig. 40). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown with terminal abdominal segments slightly lighter; all setae except 1-I with simple branches, without lateral barbs. *Cephalothorax.* Setae 1, 3-CT double to 4 branched, 2-CT double to 6 branched, 5-CT with 4-6 branches, 6-CT shorter than 7-CT and inserted about 2.0 the width of alveolus from 7-CT, 8-CT with 4-6 branches. *Respiratory Trumpet.* Dark brown, index 3.3-4.2, not noticeably expanded apically, indistinctly tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT small, with 2-6 branches, 11-CT with 4-6 branches, 12-CT with 2-4 distal branches, alveolus of 13-CT faintly indicated. *Abdomen.* Seta 6-I single, longer than 7-I; 1-II very small, with 10-20 extremely fine branches; 2-II single, stiff, much less than length of segment, 3-II with 3-7 branches; 1-III weak, double to 4 branched, 3-III with 3-7 branches, 6-III single to 4 branched; 1-IV, V double to triple, 5-IV-VI single, stiff, about 0.75 or less the length of succeeding segments, inserted considerably anterior to level of seta 1 and to posterior margin of segment; 6-IV single to 4 branched; 6-V single or double;

1-VI usually double, rarely triple, 6-VI double or triple; 1-VII double, 5-VII minute, single, 6-VII with 3-5 branches, located dorsally; 9-VIII stout, double or triple. *Paddle.* Light brown on basal portion; midrib light brown on basal 0.9; outer margin with closely set filamentous spicules from basal 0.3-0.4 to apex; inner margin with similar spicules from about basal 0.3 to apex; outer part slightly wider than inner part and slightly produced on apical margin; 1-P absent.

LARVAE (Fig. 39). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown, with collar and posterolateral corners darker brown; seta 4-C with 12-16 extremely fine branches, occasionally lightly dendritic, located on line with or lateral to 6-C and closer to 5-C, 5-C single, at least 3.0 the length of 6-C, 7-C single, stiff, 11-C minute, 3-5 branched; mentum with 19 teeth. *Antenna.* Dark brown; seta 1-A double. *Thorax.* Seta 1-P single, at least 2.0 the length of 2-P and about 6.0 the length of 3-P, 3-P with 3-5 branches, 4-P with 3 (2-4) branches, 5-P single to triple, 7-P with 2 (1-5) branches, 9-P with 3-4 branches, 14-P usually double or triple (2-5); 8-M with 8 branches, 9-M with 6, 7 branches; 7-T with 8-10 branches, 9-T with 7-8 branches. *Abdomen.* Seta 1-I, II minute; 6-II single, 1.5 or more the length of 6-I; 1-III-IV small, with 2-6 delicate branches, 6-III-V single, simple; 6-VI single or double; 1-VIII minute, inserted on posterior edge of comb plate, 2, 4-VIII long, strong, with 4-7 terminal branches, 3-VIII with 3 strongly barbed branches; comb scales 7 (6-12) on large plate, each scale tapers to pointed apex, fringed laterally to near apex. *Segment X.* Saddle complete, dark brown, without spicules on posterolateral margin, the more dorsoapical imbrications with a few fine spicules; 1-X with strong basal stem and 3-7 branches beyond basal 0.33, 4a-c-X double, 4d, e-X single. *Siphon.* Dark brown, distinctly lighter toward base and apex; index 4.1-5.6; pecten teeth about 16 (12-20), reaching to 0.51-0.61 of siphon, each tooth, short, broad, rounded and finely spiculate apically, a few finer spicules on basal side; 1-S with 3, 4 long simple branches, inserted beyond distal pecten tooth at 0.60-0.69 and on line with or dorsal to row of pecten teeth.

TYPE-DATA. Holotype female with associated larval and pupal skins on slide, MALAYSIA, *Selangor*, Ulu Bakau, 30 December 1967, Chia Yiew Wang and K. Ramakrishnan, collectors, collection number 1086-14, SEAMP accession number 110; collected as a larva from a large tree stump at an elevation of 518 m. Four female paratypes, each with associated larval and pupal skins on slide, same data as holotype. Two female paratypes, MALAYSIA, *Selangor*, University Field Station, Gombok, 19 September 1966, collection number 228, and 1 female 20 September, collection number 237. Five male and 2 female paratypes, MALAYSIA, *Selangor*, Ampang Forest Reserve, 14 March 1967, collection number 463. Three male and 6 female paratypes, MALAYSIA, *Pahang*, Gunong Benom, 2 September 1968, collection number 1734, 2 male and 2 female paratypes same locality, collection number 1735.

The holotype and paratypes are deposited in the USNM and 1 male and 1 female paratype will be deposited in the BMNH.

The holotype is in excellent condition. The paratypes are all in good condition and 12 have associated larval and pupal skins and 2 have pupal skins.

DISTRIBUTION. Material examined (including type-series): 25♂, 32♀, 1 L; 19 with associated skins (17 l, 19 p).

MALAYSIA. *Malaysia: Sabah* - Labuk, Tepulid Rd.; Sepilok, Sandakan; 12♂, 12♀, 3 l, 3 p. *Peninsular Malaysia: Selangor* - Univ. Fld. Station Gombak; 2 mile from Gap; 15th mile Ulu Gombak; Ampang Forest Reserve; Ulu Bakau; Bukit Kutu; Tanjong Robak; 8♂, 12♀, 7 l, 9 p. *Pahang* - Gunong

Benom, 5♂, 8♀, 7 l, 7 p.

DISCUSSION. This is a well marked, easily recognized species, which exhibits a number of similarities with *modesta* in all stages. Although sharing many characters in common, the adult is readily separated from *modesta* by the distinctively marked scutum. The pupa differs most in the development of abdominal seta 5-IV-V, shape of the paddle and the shorter filamentous spicules on the inner and outer margins of the paddle. The larva differs most in seta 1-A, total number of branches of 3-7-P, 14-P, 1, 4-X and length of 1-S.

The adult of the species exhibits little variation in overall ornamentation. The larva varies considerably in some of the prothoracic setae, but other characters are rather typical.

BIONOMICS. This species, like *modesta*, appears to be an inhabitant of forests and has a preference for tree holes and bamboos for depositing eggs. The 2 species are sympatric, with most collections of *propinqua* coming from the same general areas where several collections of *modesta* were also made and on 4 occasions specimens of both species were in the same collection. These may have been mixed collections but it is rather doubtful since 3 of the collections were from Peninsular Malaysia and the other was from Sabah, Malaysia. The species appears to be much less common than *modesta*.

The immatures have been collected from the following habitats: tree hole (7), tree stump (1), bamboo stump (2), fallen split bamboo (1), fallen bamboo internode with small holes (2). Ten of these collections have recorded elevations of 30-701 m. All available specimens were collected as immatures.

URANOTAENIA (PSEUDOFICALBIA) PSEUDOMACULIPLEURA PEYTON AND RATTANARITHIKUL
(Figs. 1, 41, 42)

Uranotaenia pseudomaculipleura Peyton and Rattanarithikul 1970: 408 (A, ♂, L, P).

Uranotaenia (Pseudoficalbia) pseudomaculipleura Peyton and Rattanarithikul, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.84 of forefemur; prementum dark brown scaled, with a few minute inconspicuous setae on midventral line and at apex; one pair of labial basal setae; palpus about 0.12 of proboscis and about 0.84 of antennal flagellomere 1; clypeus dark brown; antennal pedicel light brown, with a few minute setae and no scales dorsomesally; flagellum about 1.6 of proboscis or exceeding proboscis from base of flagellomere 9; Flm 1 about 1.18 of Flm 2 and with 2, 3 pale brown basomesal scales; flagellar whorls each of 6 setae; 1 stout, black interocular and 5 ocular setae; decumbent scales light brown, tips of scales on ocular line and at sides faintly grayish, but not forming a distinct line; erect scales, moderately long, numerous, extending to near ocular line, dark brown in color. *Thorax* (Fig. 1). Scutal integument uniformly light yellowish brown; scales uniformly, narrow, curved, dark bronzy brown; dorsocentral and supra-alar setae exceptionally long, stout; prescutellar space mostly bare; scutellum light brown, scales darker; mesopostnoum light brown; pleuron with distinct contrasting dark and light areas; *apn*, *ppn*, *psp*, upper 0.5 of *stp* and whole of *mep* except for very narrow pale edges, dark brown, remainder pale grayish brown; sclerites devoid of scales, except for an inconspicuous patch of sparsely arranged, broad,

light brown translucent scales on upper 0.5 with narrow extention down posterior margin of *stp; ppn* and *sp* each with 1 seta; *ppl* with 1 strong and 2, 3 weaker setae; *stp* with 12-14 rather small marginal setae, those on lower posterior margin much less conspicuous; upper *mep* with 3, 4 setae. *Wing.* Scales dark brown on anterior veins, slightly lighter on posterior veins; cell R_2 about 0.53 of R_{2+3} and about 0.71 of cell M_2. *Legs.* Coxae and trochanters same color as pale areas of pleuron; C-I with an anterior patch of sparsely arranged, light brown scales; C-II, III with a very few inconspicuous, pale brown translucent scales; femora dark brown scaled dorsally, light grayish ventrally, without conspicuous arrangement of setae or spines; forefemur with a row of about 8 short stiff setae on posterodorsal margin from near base to near apex, 4 similar setae on distal anteroventral margin; midfemur with 2-4 long delicate setae on dorsal margin near base, 2, 3 short setae on distal posterior margin and 1-3 long stiff setae on distal anteroventral margin; tibiae and tarsi uniformly dark brownish black scaled; hindtarsomere 1 about 1.2 of tibia. *Abdomen.* Terga dark brown scaled, with light bronzy or violet-green reflections; laterotergite with at most 2, 3 light brown scales; sterna light grayish brown with pale grayish or brownish translucent scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.88 of forefemur; one pair of labial basal setae, rarely an extra seta present; antennal flagellum strongly plumose, whorls each of more than 20 setae, length about 1.22 of proboscis, or exceeding proboscis by slightly more than length of Flm 13; Flm 13 slightly longer than Flm 12. *Legs.* Hindtarsomere 1 about 1.25 of tibia. *Terminalia* (Fig. 42). Tergum IX long, broadly rounded apically, with an apical row of 5-7 (3-7) fine setae on each side of midline; tergum X well developed, complete and distinctly sclerotized tergomesally, produced tergolaterally into short, rounded apicolaterally directed lobes which project slightly beyond apical margin of tergum IX; tergomesal surface of basimere with a few scattered weak setae and 3, 4 long, very stout setae on tergal side of basal mesal lobe; basal mesal lobe of basimere with 3 long, very stout, tergoapical setae, 3, 4 weak setae basal to these and 1 long stout and 1-3 weak setae on sternal margin; distimere, long, slender, more or less straight to pointed apex; spiniform minute, inapparent; plates of aedeagus with lateral margins more or less straight but with distinct rounded apicolateral shoulders below teeth, each plate with 1 very stout, apical, tergomesal tooth which is acutely curved and directed laterally, a very small pointed spur basosternal to this tooth and 2 curved sternoapical teeth, with the most tergal of these 2 broadest; proctiger with 2, 3 minute cercal setae on each side.

PUPA (Fig. 42). Chaetotaxy as figured. Diagnostic characters as in series description and the following: integument uniformly pale brown and all setae except 1-I and 9-VIII with simple branches. *Cephalothorax.* Seta 1, 3-CT double to 4 branched, 2-CT with 4, 5 branches, 5-CT with 4-8 branches, 6-CT long, single, stout, 8-CT with 5-7 branches. *Respiratory Trumpet.* Light brown; indistinctly tracheoid on anterobasal 0.15; index 4.0-4.5, of near uniform width to apex. *Metanotum.* Seta 10-CT small, with 3-6 branches, 11-CT single or with 2-5 distal branches, 12-CT triple; alveolus of 13-CT faintly indicated. *Abdomen.* Seta 6-I, II single, longer than 7-I, II; 1-II with 10-22 fine branches, 2-II single, stout, longer than segment III; 3-II with 3-5 branches beyond middle; 1-III, IV 2-4 branched, 3-III with 3-5 weak branches beyond middle, 6-III-VI double or triple; 5-IV-VI single, stout, at least 1.75 the length of each succeeding segment, occasionally 2.0 or more; 1-V-VII double or triple; 5-VII minute, 3-7 branched, 3-VII long, strong, with

2-4 branches from near middle, 6-VII with 5-7 stiff branches, located dorsally; 9-VIII with 8-10 stiff, strongly barbed branches, the lateral branches shorter than the median branches, which are at least as long as the segment. *Paddle.* Light brown at base; midrib light brown from base to apex; outer part usually slightly wider than inner part, never less; outer margin serrate on apical 0.5 with a few crenulations basally; inner margin with similar serrations on apical 0.12-0.16; apex very deeply emarginate, with outer and inner part usually distinctly pointed apically; seta 1-P absent.

LARVA (Fig. 41). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown, darker on collar; seta 4-C dendritic, with very weak branches, 5-C considerably longer than 6-C, 7-C with 5-9 simple branches, 11-C small, weak, lightly dendritic. *Antenna.* Dark brown; 1-A double. *Thorax.* Seta 1-P single, long, barbed, 3-P with 3,4 barbed branches, 4-P with 3-5 finely barbed branches, 7-P with 2-4 finely barbed branches, 14-P with 4-12 stiff, lightly barbed branches; 6-M greatly reduced, with 6-10 weak branches, 8-M with 6-9 lightly plumose branches; 9-M with 5-7 similar branches; 7-T with 6-9 lightly plumose branches, 9-T with 5,6 similar branches. *Abdomen.* Setae 6, 7-I, II very stout, barbed, darkly pigmented, acutely pointed, 7 slightly longer than 6 on each segment; 1-II with 5-8 weak branches; 1-III with 3-6 branches, 6-III single to triple, occasionally finely barbed, much weaker and shorter than 6-IV-VI; 1-IV double or triple, 6-IV-VI single, long, strong, barbed; 1-V single or double; 6-VII small, with 5-9 weak branches; 1-VIII small, with 6-8 fine branches, inserted on small posterior extention of comb plate, 3-VIII with 6-9 strongly barbed branches; comb scales 8-10, of near uniform size, evenly spaced, each scale slightly expanded and rounded apically with 1-4 stout basolateral denticles becoming progressively reduced to fine spiculate fringe apically; sclerotized plates large, closely approximated dorsally. *Segment X.* Saddle complete, dark brown dorsally, lighter laterally and ventrally, with a few very fine spicules on posterolateral margin or a few fine spicules on the more apical imbrications only; seta 1-X with 3,4 barbed branches, 2,3-X single, 4a-e-X with 4-5, 3-5, 2-3, 2-3, 1-2 branches respectively. *Siphon.* Dark reddish rust-brown; not significantly tapered from base to apex; index 3.8-5.0; pecten teeth 16-22, reaching to about 0.50-0.56 of siphon, each tooth rather broad, rounded with very fine spiculate fringe apically; seta 1-S with 3-5 conspicuously barbed branches, inserted beyond distal pecten tooth at 0.57-0.62 of siphon and on line with or slightly ventral to row of pecten teeth.

TYPE-DATA. Holotype female with slide of pupal and larval skins in the USNM with the following information: THAILAND, Nam Tai, *Phangnga*, 22 October 1966, Kol Mongkolpanya, collector, collection number 01830-6, SEAMP accession number 84, collected as a larva from split bamboo at an elevation of about 150 m. The allotype male and several paratypes also in the USNM; 2 females and 2 males of the paratype series to be deposited in the BMNH.

DISTRIBUTION. Material examined: 43♂, 63♀, 39 L; 89 with associated skins (28 l, 89 p).

THAILAND. *Ranong:* Ban Chatri; Khlong Bang Man; Pra Chum Pharam; 15♂, 26♀, 17 L, 12 l, 28 p. *Phangnga:* Khao Pak Chaung; Thap Wen; Nam Tai; 26♂, 32♀, 15 L, 14 l, 54 p. *Trang:* Trang National Park, 1♂, 1 l, 1 p. *Tak:* Doi Sam Sao, 1♂, 5♀, 7 L, 1 l, 6 p.

I have seen a small collection of 6 males and 2 females from Tawau, Sabah, Malaysia, which are probably this species. The male terminalia of these specimens are very similar to *pseudomaculipleura*. The specimens

were taken by D. R. Colless in a sweeping collection, No. 22/60, from the jungle on 22 February 1960. Although appearing to be in good condition, the specimens appear also to have possibly been overexposed in a killing bottle, thereby altering the pleural pattern and color of the thorax. In view of this I think it best to wait until further material becomes available from Sabah before deciding the identity of these particular specimens. All of the specimens are in the BMNH.

DISCUSSION. In general adult habitus features this species resembles *maculipleura* rather closely. However, the male terminalia are very similar to that of *reinerti*. In the adult it resembles *maculipleura* more closely in the light and dark integumental pattern of the pleuron, as it is generally the same in both species. It differs from *maculipleura* in several respects but the most significant differences are as follows: *apn* devoid of scales; *stp* with a few small scattered scales and with 9-14 weak setae on upper and posterior margins; fore- and midfemora without dense setae on basal 0.33. *Uranotaenia maculipleura* has scales on the *apn*, *stp* has a large distinct patch of scales and 20-22 stronger marginal setae, fore- and midfemora with dense setae on basal 0.33. Differences in the male terminalia of *maculipleura* and *reinerti* are discussed under the treatment of the latter.

The pupa and larva are both very distinctively marked and show only moderate variation in a few characters.

BIONOMICS. The immature stages occur most commonly in bamboo habitats. Collections have been examined from the following: split bamboo (5), cut bamboo sections on ground (4), bamboo internodes with small entrance holes (4), bamboo stump (3), tree stump (2), tree hole (1) and banana leaf axil (1). All collections are with recorded elevations of 18-488 m. The species has not been collected in the adult stage. The known distribution is rather curious since several thousand bamboo collections have been made by personnel of the SEATO Medical Research Laboratory, Bangkok over the past 15 years with only 20 collections containing this species. The localities run along a direct north-south line of the western border of Thailand from the province of Tak to the province of Trang, a distance of approximately 1,000 km.

URANOTAENIA (PSEUDOFICALBIA) QUASIMODESTA NEW SPECIES
(Figs. 43, 44)

FEMALE. *Head.* Proboscis about 0.73 of forefemur; prementum dark brownish black scaled, with a few minute inconspicuous setae along median ventral margin and at apex; one pair of labial basal setae; palpus about 0.14 of proboscis and about 0.71 of antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, light brown laterally; flagellum about 1.4 of proboscis or exceeding proboscis from at least base of Flm 10; Flm 1 about 1.4 of Flm 2 and with a very few brownish black scales basomesally; flagellar whorls each of 6 setae; 1 long, golden interocular and 5 ocular setae, with mesal 3 golden, lateral 2 black; decumbent scales light bronzy brown with gray-green reflections, tips of ocular scales appearing indistinctly grayish in some lights but forming no line; erect scales, moderately long, conspicuous, light brown, sparsely scattered over most of vertex. *Thorax.* Scutal integument mostly dark brown, rather indefinitely lighter brown on acrostichal line, narrowly dingy brown on lateral margin which emphasizes the broad sublateral darker area; scales uniformly light grayish or bronzy

brown; dorsocentral and supra-alar setae long, not exceptionally stout; prescutellar space bare; scutellum dingy brown, scales light grayish brown; mesopostnotum light dingy brown; paratergite light grayish brown; pleuron with *apn, psp, ssp,* lower 0.6 of *ppn,* upper 0.5 of *stp,* whole of *mep,* and lower 0.5 of metapleuron very distinctly dark brown, contrasting sharply with remaining light grayish brown areas; sclerites devoid of scales except for a small patch of a few light grayish transparent scales on upper *stp; ppn* and *sp* each with 1 seta; *ppl* with 1 strong and 1 weak seta; *stp* with 4 upper setae and about 5 weaker lower posterior marginal setae; upper *mep* with 2 setae. *Wing.* Scales light brown; cell R_2 about 0.72 of R_{2+3} and about 0.8 of cell M_2. *Legs.* Coxae and trochanters same color as light areas of pleuron; C-I-III with a few light brown translucent scales, more obvious on C-I but no distinct patch; femora dark brown scaled dorsally, indistinctly lighter brown ventrally, without conspicuous arrangement of setae or spines; forefemur with about 10 very small setae on anteroventral margin from near base to near apex, 4 similar setae on distal posterodorsal margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.0 of tibia; hindtarsomere 4 about 3.1 of tarsomere 5. *Abdomen.* Terga dark bronzy brown scaled, with purple reflections; laterotergite with 2,3 colorless scales; sterna light gray or dingy brown with a few scattered light bronzy scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.87 of forefemur; antennal flagellum moderately plumose, whorls each of 10-12 setae; Flm 13 longer than Flm 12. *Thorax.* *Stp* with 2 transparent scales (appears rubbed on single specimen available). *Terminalia* (Fig. 44). Very similar to *modesta* except for the following. Setae on each side of tergum IX 3, 4; median apical lobe of tergum X broad with a narrow, shallow, median apical emargination, lateral corners not produced into distinct broad lobes, apicolateral margins more or less truncate; basal mesal lobe of basimere with 1 very stout tergoapical seta arising from a prominent finger-like process, 1 very long, stout and 2 shorter, strong subapical setae and 3 weak setae basosternal to these, 1 long, stout and 1,2 weak setae on sternoapical margin; apical tergomesal tooth of aedeagal plates stronger, upper sternoapical tooth much smaller.

PUPA (Fig. 44). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument medium brown, including paddle; all setae except 1-I and 9-VIII very small and weak. *Cephalothorax.* Setae 1-3-CT single to triple, 5-CT double or triple, 6-CT shorter than 7-CT and inserted about 3.0 the width of alveolus from 7-CT, 8-CT with 3-5 branches. *Respiratory Trumpet.* Dark brown; index about 3.2; indistinctly tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT very small, with 3-5 branches, 11-CT single, 12-CT single or bifid; alveolus of 13-CT present. *Abdomen.* Seta 6-I shorter than 7-I; 1-II minute, multiple branched, 2-II single, stiff, less than 0.5 the length of segment, 3-II triple; 1-III-V small, weak, double or triple, 3-III double or triple, 6-III-VI single; 5-IV bifid, weak, about 0.6 the length of segment V; 5-V single, weak, about 0.5 the length of segment VI; 1-VI small, weak, double or triple, inserted considerably anterior to posterior margin of segment, 5-VI single, weak, much less than 0.5 the length of segment; 5-VII short, weak, 6-VII double or triple, located dorsally; 9-VIII double, stout spine-like. *Paddle.* Uniformly medium or dark brown, with a dark horizontal line near base; midrib brown on basal 0.6; outer margin with closely set, very long, stong, filamentous spicules from about basal Q.25 to apex; inner margin with similar, more widely spaced spicules from about basal 0.33; outer part not as wide as inner part and distinctly produced apically

beyond inner part.

LARVA (Fig. 43). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown; seta 4-C longer than 6-C, strongly dendritic with many delicate branches, inserted slightly lateral to 6-C and closer to 5-C, 5-C single, weak, nearly 3.0 the length of 6-C, 7-C single, 11-C minute, double or triple; mentum with 17-19 teeth. *Antenna.* Dark brown; seta 1-A double. *Thorax.* Seta 3-P with 3, 4 lightly barbed branches, 4-P with 2-4 simple branches, 7-P single or double, lightly barbed, 14-P single; 6-M weak, single. *Abdomen.* Seta 1-I-VI minute, rather inapparent; 6-III single, equal to length of 7-II; 6-IV-VI single; 4-VII strong, exceptionally long, bifid or trifid; 1-VIII minute, inserted on posterior margin of comb plate, 2, 4-VIII strong, with 3-5 terminal branches, longer than 3-VIII, 3-VIII with 3 strongly barbed branches; comb scales 7-10, on large sclerotized plate, each scale tapered to point and finely spiculate laterally to near apex. *Segment X.* Saddle complete, dark brown, with a few fine spicules on dorsal posterolateral margin and few similar spicules on the more apical imbrications; seta 1-X triple, 4a, b-X triple, 4c-X double, 4d-X single or double, 4e-X single. *Siphon.* Dark brown in middle, lighter towards base and at apex; index 4.3-5.2, broad on basal 0.6 and tapered to narrow apex; pecten teeth 18-28, reaching to 0.54-0.58 of siphon, each tooth rather long, narrow, rounded apically and finely fringed laterally and apically; 1-S double, about 0.75 the length of siphon, inserted beyond distal pecten tooth at 0.70-0.72 of siphon and on line with or slightly dorsal to row of pecten teeth.

TYPE-DATA. Holotype male with associated slides of pupal skin and male terminalia, MALAYSIA, *Sabah,* Mt. Kinabalu, 21 March 1970, Suliaman bin Omar, Samuel Wilson James and Chia Yiew Wang, collectors, collection number S-156-101, SEAMP Accession number 243 and SEAMP terminalia preparation number 71/71, collected as a larva from a tree stump covered with moss, at an elevation of 1,630 m. Five fourth stage and one third stage larval paratypes mounted on slides, same date as holotype except all with collection number S-156; allotype female with slide of associated pupal skin, same data as holotype, except, 18 March 1970, and collection number 100-100; 2 fourth stage larval paratypes on slides, same data as allotype, except both with collection number 100.

The holotype, allotype and paratypes are deposited in the USNM and 2 paratype larval slides will be deposited in the BMNH.

The holotype and allotype are in good condition.

DISTRIBUTION. Material examined; 1♂, 1♀, 8 L; 2 with associated skins (2 p).

MALAYSIA. Known only from type-locality.

DISCUSSION. The recognition of this species as new rests very heavily upon the very distinctively marked immature stages. While the 2 adults appear to be in excellent condition, I am a bit dubious of the 2 strongest characters which appear to distinguish this species from *modesta.* In general features the adult resembles *modesta* very closely. The absence of a lateral marginal line of gray-white scales on scutum and the presence of a small patch of transparent scales on the sternopleuron readily separates this species from *modesta* if these are valid constant characters. However, the knowledge that the distinction is based upon 2 reared, possibly teneral specimens, suggests caution. The transparent scales on the sternopleuron of the female are quite clear at some angles but undetectable at others; the male has at most 2 transparent scales on the sternopleuron. These were probably rubbed but with only one specimen known, it would not be wise to assume that a larger

sample would confirm this. However, the moderately plumose antenna of the male, with flagellar whorls of 10-12 setae is much different from the very strongly plumose antenna of *modesta* and related species.

The 2 pupal skins and 8 whole larvae are very different from those of *modesta* and the other apparently related species of *propinqua* and *patriciae*. The differences are numerous and quite stable. Little variation occurs in the small sample from 2 different collections, and based on this I have no hesitation in recognizing this as a dinstinct taxon. Association of the larva with the adult and pupa is presumptive but seems reasonable. Larval specimens are available for both collections from which each of the 2 adults were reared and no other *Uranotaenia* larvae were in these 2 collections. The most significant characters in the pupa are as follows: the greatly reduced setae on all abdominal segments; setae 1, 5-VI, VIII well removed from posterior margin of segments; the stout, spine-like seta 9-VIII; the uniformly brown pigmented paddles; the long, strong, filamentous spicules on paddle margins; the narrow outer part of paddle and the apical extention of outer part. The most significant differences in the larva are as follows: the long, stout, seta 6-III; the exceptionally long, terminally branched setae 4-VII, 2, 4-VIII; the very distinctively shaped siphon (Fig. 43); long, narrow pecten teeth; exceptionally long, double branched seta 1-S and its relative position in relation to the distal pecten tooth and distance from base of siphon.

BIONOMICS. Little is known of the habits of this species. Of the 2 immature collections examined, one was from a moss covered tree stump in the forest at an elevation of 1,630 m and the other from a tree hole at an elevation of 1,920 m. In the same general area of these collections on the same dates in March 1970, but at elevations between 1,158-1,585 m, 4 collections of *modesta* were made. The 1,585 m collection represents the maximum elevation recorded for *modesta* in any area and it may suggest that the 2 species do no compete for what appears to be a similar habitat preference. The failure to collect this species at the lower elevations while collecting several *modesta* leads me to speculate that *modesta* is replaced by *quasimodesta* at the higher elevations and when more collecting is done at higher elevations, this species may prove to be the one more commonly found.

URANOTAENIA (PSEUDOFICALBIA) QUINQUEMACULATA BONNE-WEPSTER (Fig. 1)

Uranotaenia quinquemaculata Bonne-Wepster 1934: 276 (♀*); Bonne-Wepster 1954: 27 (♀*).
Uranotaenia (Pseudoficalbia) quinquemaculata Bonne-Wepster, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.86 of forefemur; prementum uniformly dark brown scaled, with a few scattered, small, inconspicuous setae along ventral margin and at apex; one pair of labial basal setae; palpus about 0.14 of proboscis and about 1.1 of antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brownish black, with a few minute setae dorsomesally; flagellum about 1.44 of proboscis or exceeding proboscis from about base of flagellomere 10; Flm 1 about 1.0 of Flm 2, with a small basomesal patch of bronzy brown scales; flagellar whorls each of 5, 6 setae; 1 stout, black interocular and 5 ocular setae; decumbent scales uniformly light brown, with gray or greenish tinge; erect scales moderately long, numerous, but not dense, scattered over entire vertex to near ocular line. *Thorax* (Fig. 1). Scutal integument

light orange-brown, with 5 distinct large brownish black spots as follows: one pair at supra-alar area, one pair on scutal fossae and a single spot occupying prescutellar space; scales all narrow, curved, dark brown; prescutellar space largely bare; dorsocentral and supra-alar setae exceptionally long, stout; scutellum light brown, scales dark; mesopostnotum dark brown, light basolaterally; paratergite yellow-orange; pleuron uniformly yellowish orange; *apn* devoid of scales, a few inconspicuous gray translucent scales on upper *stp*, but forming no patch; *ppn* and *sp* each with 1 seta, without scales; *ppl* with 1 strong and 1 weak seta; *stp* with 2 upper and 4 lower posterior marginal setae of about equal development; upper *mep* with 2 setae. *Wing.* Scales dark on anterior veins, lighter on posterior veins; cell R_2 about 0.5 of R_{2+3} and about 0.73 of M_2. *Legs.* Coxae and trochanters yellow-orange, with a few inconspicuous translucent scales; femora dark brown scaled dorsally, light brown ventrally, without conspicuous setae; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 slightly longer than tibia. *Abdomen.* Terga dark bronzy brown scaled and reflecting green or purple depending on angle; laterotergite with a few light brown scales; sterna light creamy brown.

MALE, PUPA and LARVA. Not known.

TYPE-DATA. Type-female, INDONESIA, Java, Tjisarua (nr. Buitenzorg) [Bogor], altitude 1,400 m. April 1932, in BMNH with accession number BM 1934-305. Specimen reared from a single pupa found in a rot hole of a fallen tree. The pupal skin was not found in the BMNH and it is quite unlikely that it was retained. The type is in perfect condition.

DISTRIBUTION. Material examined: 2♀.

INDONESIA. Java, Tjisarua, near Buitenzorg (Bogor), 1♀.

MALAYSIA. *Sabah:* 19 km north of Kalabakan, 1♀.

DISCUSSION. This is a well marked species in the adult stage and is easily recognized by the very distinct dark integumental spots on the light brown scutum and the uniformly pale pleuron, without patches of scales. Superficially it resembles *bimaculata* and *novobscura* more closely than any other Southeast Asian *Pseudoficalbia*.

Macdonald and Traub (1960: 93) briefly described a species collected at Ulu Gombak, MALAYSIA, which could, quite reasonably be ascribed to *quinquemaculata*. The description is as follows, "Species no. 4. - Rather like *bimaculata*, but in addition to the pair of prominent, dark-brown spots in front of the wings, there is another pair anteriorly, above the posterior pronotum. There is also a dark-brown spot in front of the mid-lobe of the scutellum. Ground colour of mesonotum light brown, pleurae pale, legs dark-brown, abdominal tergites dark-brown."

BIONOMICS. Little is known of the habits of this species, due to the paucity of collections. The type was collected at a rather high elevation of 1,400 m in Java and Macdonald and Traub's (1960) *(quinquemaculata ?)* collections at Ulu Gombak were made in lowland dipterocarp forest around 305 m. The single specimen from Sabah is without recorded elevation but was collected in a "forest camp" and the general topography of Kalabakan is mountainous.

URANOTAENIA (PSEUDOFICALBIA) REINERTI NEW SPECIES
(Figs. 1, 24)

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark blackish brown scaled, with a few inconspicuous setae on midventral margin and at apex; one pair of very long and one pair of short delicate labial basal

setae; palpus about 0.15 of proboscis, equal to or slightly less than antennal flagellomere 1; clypeus dark brownish black; antennal pedicel dark yellow-brown, with a conspicuous patch of fine setae dorsomesally; flagellum about 1.32 of proboscis or exceeding proboscis from base of flagellomere 10; Flm 1 barely longer than Flm 2 and with a small basomesal patch of black scales; flagellar whorls each of 6 setae; 1 long, stout, black interocular and 5 ocular setae; decumbent scales pale creamy white or gray-white depending on angle of light, distinctly and narrowly white on ocular line and at sides, but forming no well differentiated line, all scales reflecting blue-green at various angles; erect scales large, moderately long, numerous, reaching ocular line, pale yellow. *Thorax* (Fig. 1). Scutal integument a deep dark rust-brown, lateral and anterior margins sharply delimited; a narrow dorsocentral bare line, but surrounding scales overlap the bare line; scales uniformly narrow, curved, brownish black; dorsocentral and supra-alar setae very strong, long, black; prescutellar space largely bare; scutellum dark rust-brown, midlobe with 4, 5 strong setae, scales dark brownish black with blue-green reflections; mesopostnotum a little lighter than scutum, light brown laterally; paratergite pale brown; pleuron with *psp* indistinctly darker than pale areas; upper 0.5 of *stp*, whole of *mep* and a small spot at suture between *stp* and subspiracular area dark rust-brown, remainder of pleuron pale grayish or yellowish brown, devoid of scales except for a large dense patch of grayish translucent scales covering most of upper 0.5 of *stp* with a few on posterior edge extending a short distance below dark area; *ppn* and *sp* each with 1 seta; *ppl* with 1, 2 long, stout, and 4 short, weak setae; *stp* with a continuous row of 19 closely set setae on upper and posterior margins, upper 13, prominent, strongly pigmented, lower 6 more delicate, light yellow; upper *mep* with 4, 5 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 about 0.6 of R_{2+3} and about 0.77 of M_2. *Legs.* Coxae and trochanters same color as lighter areas of pleuron; C-I with an anterior patch of light brown scales; C-II, III with a very few inconspicuous grayish translucent scales; femora dark brownish black scaled dorsally, indistinctly lighter ventrally; forefemur with a posterodorsal row of about 13 stiff setae extending from near base to near apex, those on basal 0.5 much longer than those on distal 0.5, an anteroventral row of 7, 8 similar setae from about basal 0.4 to near apex; midfemur with 3, 4 long delicate setae near base on dorsal margin, 3 long, stiff setae on anteroventral margin and usually a patch of about 10-20 much smaller, conspicuous, semierect, setae on distal anterior 0.33, a row of 4, 5 weak setae on posterior margin of distal 0.5 and a few very weak, opaque setae near middle on ventral margin; hindfemur with a posterodorsal row of very short, fine setae on basal 0.5 and 3, 4 long, stout setae on distal posteroventral margin, and a row of very short, fine, inconspicuous, setae on anteroventral margin; tibiae and tarsi uniformly dark brownish black scaled; hindtarsomere 1 about 1.27 of hindtibia. *Abdomen.* Terga dark brownish black scaled, with bronzy or violet reflections; laterotergite with a few scattered light brown scales; sterna light grayish brown with pale gray or brown translucent scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.93 of forefemur; antennal flagellum moderately plumose, whorls each of about 20 setae, length about 1.12 of proboscis or exceeding proboscis by not more than Flm 13; Flm 13 longer than Flm 12. *Thorax. Stp* with 16-19 setae. *Legs.* Distal anterior patch of fine setae on midfemur less conspicuous than on female. *Terminalia* (Fig. 24). Very similar to *pseudomaculipleura* and differing only in minor detail as follows: tergum IX with a subapical row of 4-9 setae on each side of midline which barely reach

apical margin of tergum; tergum X broader between tergolateral lobes; tergomesal surface of basimere with 5-7 conspicuously long, strong setae tergolateral to basomesal lobe; basal mesal lobe of basimere with 5, 6 long, stout tergoapical setae and 2-4 much smaller setae basal to these, 1 long, strong and 3-5 smaller setae on sternoapical margin; small short aedeagal tooth sternobasal to the large apical tergomesal tooth distinctly rounded apically, large, apical, tergomesal tooth not as acutely curved apically.

PUPA and LARVA. Not known.

TYPE-DATA. Holotype female, MALAYSIA, *Sabah*, Mt. Kinabalu, 22 March 1970, Suliaman bin Omar, Chia Yiew Wang and Samuel Wilson James, collectors, collection No. S-176, SEAMP Accession No. 243, collected resting in cave at 1,585 m. Allotype male with terminalia on slide, preparation No. 71/8 and 17 male (2 on slides) paratypes with same data as holotype; 1 male paratype, collection No. S-109 and 2 male paratypes collection No. S-110, same data as holotype except, 19 March 1970, collected resting in cave at 1,463 m.

The holotype is in excellent condition except for missing hindtarsomeres 2-5. The allotype and paratypes are in good condition. The holotype, allotype and 17 paratypes are deposited in the USNM. Two paratype males will be deposited in the BMNH and 2 paratype males will be deposited in the Shivaji Ramalingam Collection at the University of Malaya.

DISTRIBUTION. Material examined: 22♂, 1♀.

MALAYSIA. Known only from type-locality.

DISCUSSION. This is another of several species of the *bimaculata* series with very distinct dark and light integumental color patterns of the adult scutum and pleuron. The pleural dark marks are very similar to those of *moufiedi* except for the completely pale metapleuron. The male terminalia are extremely similar to that of *pseudomaculipleura*, differing significantly only in the number of long stout tergoapical setae of the basal mesal lobe of the basimere. In general adult habitus features it is a distinct, rather striking species and is easily distinguished from the adult of *moufiedi* and *pseudomaculipleura*. The uniformly creamy white decumbent head scales, the uniformly deep dark rust-brown scutum and mesopostnotum sharply contrasting with the pale pleuron and the large dense patch of scales on upper *stp*, serve to separate this species from both *moufiedi* and *pseudomaculipleura*. In general size the adult of *reinerti* is nearly twice that of the other 2 species. Other differences in the 3 species are noted under the descriptions of each.

This species is dedicated to Dr. John F. Reinert in recognition of his work on mosquitoes in Southeast Asia.

BIONOMICS. Little is known of the habits of this species. The adults of the type-series were collected resting in caves on 3 different occasions at elevations of 1,463 and 1,585 m in association with several adults of *moufiedi* in 2 of the collections.

URANOTAENIA (PSEUDOFICALBIA) XANTHOMELAENA EDWARDS
(Figs. 2, 45, 46)

Uranotaenia xanthomelaena Edwards 1925: 259 (♂, L).
Uranotaenia (Pseudoficalbia) xanthomelaena Edwards, Peyton 1972: 37.

FEMALE. *Head*. Proboscis about 0.85 of forefemur; prementum brownish black scaled, with a few inconspicuous setae at apex only; one or 2 pairs of

labial basal setae; palpus about 0.1 of proboscis and about equal to antennal flagellomere 1 or slightly less; clypeus dark brownish black; antennal pedicel brownish black mesally, lighter laterally, with a few minute setae dorsomesally; flagellum about 1.32 of proboscis or exceeding proboscis from about base of flagellomere 11; Flm 1 about 1.15 of Flm 2 and with a few blackish scales basomesally; flagellar whorls each of 7 setae; 1 long, strong, black interocular and 5 ocular setae, mesal 3 very strong, black; decumbent scales uniformly black, with greenish reflections; erect scales broad, moderate in length, rather sparse, more numerous on occiput, pale yellow in color. *Thorax.* Scutal integument pale straw-brown, faintly lighter grayish anteriorly; scales narrow, curved, mostly light grayish brown, distinctly whitish on anterior margin; prescutellar space with scattered scales, a small bare area posteriorly; scutellum pale brown, scales grayish brown; mesopostnotum slightly darker than scutum; paratergite yellowish brown; pleuron uniformly pale straw-brown or light grayish brown; *apn* usually devoid of scales but occasionally with 1, 2 small brown scales; *ppn* with 1 seta, rarely with 1, 2 small, light brown scales; *sp* with 1, 2 setae; *ppl* with a few inconspicuous translucent scales and 1 strong and 1 weak seta; *stp* with a few scattered shiny translucent scales along posterior margin to below base of midcoxa, and with 6-7 marginal setae; upper *mep* with 4, 5 setae. *Wing.* Scales dark brownish black; cell R_2 about 0.5 of R_{2+3} and about 0.77 of M_2. *Legs.* Coxae and trochanters same color as pleuron; C-I with a distinct anterior patch of light brown scales; C-II, III with a few inconspicuous almost colorless translucent scales on anterolateral surface; femora black scaled dorsally, not noticeably lighter ventrally; tibiae black, narrowly tipped with white scales, more obvious on hindtibia; fore- and midtarsomeres 1-3 with narrow indistinct grayish white basal and apical bands, basal pale scales more obvious on posterior aspect, tarsomere 4 almost completely whitish, usually with a small incomplete band or anterior patch of black scales at middle, tarsomere 5 completely grayish white; hindtarsomeres 1-4 with basal and apical bands more obvious and white, with basal bands wider than apical bands except for narrow basal band on tarsomere 1, tarsomere 5 completely white; hindtarsomere 1 about 1.2 of tibia. *Abdomen.* Tergal scaling highly variable, with varying degrees of dark blackish brown and pale creamy white or light golden brown scales, generally as follows: terga II-VII mostly blackish brown with a large conspicuous basal sublateral triangular patch of pale scales which is narrowly connected dorsally, occasionally pale patches not connected dorsally and entire dorsal surface dark, or rarely black scales reduced to a large dorsoapical triangular patch and a wide lateral marginal band; tergum VIII pale ochreous dorsally, dark laterally; sterna whitish with creamy white translucent scales.

MALE. Essentially as in female but thoracic integument generally much lighter and the pale scaling of abdominal terga usually much more extensive. *Head.* Proboscis about 0.89 of forefemur; antennal flagellum strongly plumose, whorls each of more than 20 setae, length about 1.1 of proboscis or exceeding proboscis by less than length of flagellomere 13; Flm 13 longer than Flm 12. *Thorax.* Scutal integument occasionally pale grayish white and scales uniformly grayish white. *Legs* (Fig. 2). Posterior midclaw small but conspicuous. *Abdomen.* Tergal scaling variable but generally as follows: terga II-VII with a large dorsoapical triangular patch and a narrow lateral marginal line of blackish brown scales, remainder pale creamy or golden brown, giving the appearance of a continuous narrow lateral marginal line of dark scales and a continuous broad sublateral line of pale scales, occasionally dark scales reduced to a few scattered scales laterally and a faint speckling dorsally, tergum

VIII mostly dark, indistinctly pale laterally. *Terminalia* (Fig. 46). Tergum IX shallow, broadly rounded on apical margin, with 1-5 long slender subapical setae on each side of midline; tergum X complete, weakly sclerotized, produced into a broad median apical lobe which has a variable median apical emargination with broad rounded lobed corners and extends well beyond apical margin of tergum IX; tergomesal surface of basimere covered mostly with short slender setae but 4, 5 setae apical and tergolateral to basal mesal lobe significantly longer and stronger than the rest; basal mesal lobe of basimere with 6-8 long, stout, setae near apex and on sternal margin, all rather closely grouped, 6-12 shorter, strong setae basal to these, without the typical weak basal setae, 3-6 smaller, stiff setae on sternoapical margin; distimere gently curved and tapered on distal 0.5; spiniform minute, inapparent; plates of aedeagus not very widely separated, slightly flared basolaterally, each plate with 1 strong, laterally curved, apical, tergomesal tooth and 2 strong curved sternal teeth, with the sternal-most longest and subapical, occasionally with 1, 2 very small median sternoapical teeth; proctiger with 3-7 cercal setae on each side, apical tergolateral surface strongly spiculate.

PUPA (Fig. 46). Chaetotaxy as figured. Diagnostic characters as in series description and the following. All setae except 1-I and 9-VIII small, single or with few weak simple branches. Integument uniformly light yellowish brown. *Cephalothorax.* Setae 1-9-CT very small, weak, single to triple, 6-CT considerably shorter than 7-CT. *Respiratory Trumpet.* Bright yellowish, very broad bell-shaped; index about 1.9; indistinctly tracheoid basally; inner wall conspicuously separated from outer wall and strongly constricted just beyond middle. *Metanotum.* Seta 10-CT with 3, 4 branches, 11, 12-CT single to triple, 13-CT often present, single or double. *Abdomen.* Seta 1-I rather weakly developed, with 2-5 primary dendritic branches, 6-I, II small, weak; 1-II minute, with 4-6 branches and located considerably anterior to posterior margin of segment; 1-III-VI with 2-4 very weak branches, each located considerably anterior to posterior margin of segment; 5-IV, V single, strong, darkly pigmented, about 0.5 of segment length on IV and 0.33 on V, each located significantly anterior to posterior margin of segment; 5-VII similar but weaker; 1-VII single or double, 9-VII single, strong; 9-VIII long, stout, single, very dark, with a few strong lateral barbs near middle. *Paddle.* Elliptical in shape, much wider than long, outer part at least 2.0 the width of inner part, and broadly rounded and produced lateroapically beyond inner part; midrib inapparent except near base; outer margin with very fine filamentous spicules, inner margin with similar but fewer spicules; seta 1-P present.

LARVA (Fig. 45). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Most dorsal and ventral setae of thorax and abdomen minute, with few very weak branches, most lateral setae long, very stout, single, darkly pigmented, barbed. *Head.* Light brown; very small, long, narrow, about 1.5 as long as wide; seta 4-C double, 7-C single, 14-C 3, 4 branched. *Antenna.* Dark brown; 1-A double or triple. *Thorax.* Setae 1-3-P single, long, stout, 4-6-P single, long, stout, on a common darkly pigmented sclerotized basal plate, 7-P single, long, stout, on separate raised sclerotized plate; 5-7-M greatly reduced, weak, 8, 9-M single, long, stout; 7, 9-T single, long, stout, 13-T single, stout. *Abdomen.* Seta 6-I-VI single, long, stout, equal in development except for shorter 6-VI, each on a raised sclerotized plate; 7-I-III similarly developed and inserted on sclerotized basal plate with 6; 13-III-V single, very stout, barbed, darkly pigmented, each on a raised sclerotized plate; 3-VII similar to 13-III-V; 1, 5-VIII minute, both inserted on comb plate near posterior margin, 3-VIII single or double, stout, barbed, or

strongly frayed distally, darkly pigmented; comb scales 4-6 on a large oval sclerotized plate, each scale of near uniform width from base to rounded apex, fringed with uniform spicules laterally and apically. *Segment X.* Saddle complete, light brown, lightly imbricate, without posteromarginal spicules; longer than siphon, index 1.5 or more; seta 1-X single or double, stout, barbed, darkly pigmented, 2,3-X single, simple, 4a-e-X each double, simple, inserted on strongly sclerotized boss. *Siphon.* Dark brown; very short, index 0.90-1.25; pecten teeth 4-6, variable, usually distal 3,4 teeth strong, simple, spine-like or with a few small lateral spicules arising at varied points from base on one side, basal 2,3 teeth most often with strong lateral spicules, or occasionally rounded with apical spicules; seta 1-S single, strong, simple, inserted laterally and usually beyond distal pecten tooth.

TYPE-DATA. Holotype male with slides of terminalia and associated larval skin in the BMNH bearing the following label data: *U. xanthomelaena*, Type H. T. Fed., Malay States, Kuala Lumpur, I. 1923, Dr. H. P. Hacker, BM-1923-318. Larval skin on slide 942, Pitcher Plants, Ravine J9.

DISTRIBUTION. Material examined: 25♂, 27♀, 10 L; 24 with associated skins (24 l, 22 p).

MALAYSIA. *Malaysia: Sabah* - Sipitang Forest Reserve, 1♂, 1♀, 2 l, 2 p. *Peninsular Malaysia:* 3♂, 6♀. *Selangor* - The Gap; Kuala Lumpur; 1♂, 1♀, 1 l. *Pahang* - Cameron Highlands; Kuantan, Pekan Rd.; 1♂, 1♀, 1 L, 1 l, 1 p. *Perak:* 23rd and 28th mile, Cameron Highlands Rd., 16♂, 15♀, 9 L, 18 l, 18 p.

SINGAPORE. 2♂, 3♀, 1 l. Ulu Pandan, 1♂, 1 l, 1 p.

DISCUSSION. This species cannot be confused with any other known species of the subgenus. All life stages are very distinct, with each exhibiting one or more unique characters. The immature stages show a number of similarities with *ascidiicola* and *gigantea* but these do not necessarily suggest a close relationship. Rather, it appears that several characters result from adaptation to the highly acid environment of the *Nepenthes* pitcher habitat. These include the exceptionally stout, barbed, darkly pigmented setae, often with reduced branches, stout setae on raised sclerotized basal plates, sclerotization in general stronger, head reduced in size, siphon very short and segment X generally longer. This phenomenon is observed to a greater or lesser degree in *Nepenthes* breeding species of the genera *Aedes*, *Armigeres*, and *Tripteroides*.

The adult is rather strikingly ornamented with banded legs, banded golden and black scaled abdomen, very pale integument of thorax and black decumbent head scales. Although there is considerable variation in the adult, especially in the pale and dark scaling of the abdomen it remains a distinctively marked species. The abdomen varies from being predominently black with large sublateral patches of ochreous scales which narrowly connect dorsally, to most of terga pale ochreous or golden and only a speckling of black scales dorsoapically and laterally. The male more frequently has fewer black scales and most often the sublateral pale patches are complete to apical margin of each tergum and form a continuous sublateral pale line from terga I-VII and a continuous narrow lateral black line. One male specimen had only a speckling of black scales.

The pupal chaetotaxy is particularly variable with considerable shifting of most dorsal setae. This can be observed on a single specimen where the setal placement on one side of a given segment is totally dissimilar to that of the other side. A well developed 13-CT is present in about 50% of specimens. Several duplicate setae were also observed in the larva and on one specimen a perfectly developed duplicate of the large stout seta 1-X with separate alveo-

lus, was present.

BIONOMICS. The immature stages of *xanthomelaena* occur almost exclusively in *Nepenthes* pitchers. Of the collections examined, 8 were from *Nepenthes* and one was from ginger inflorescence, all from elevations between 30-1,372 m. The species apparently utilizes 3 common species of *Nepenthes* (*N. ampullaria* Jack, *N. gracilis* Knorth. and *N. rafflesiana* Jack.). In Malaysia and Singapore, but Barr and Chellapah (1963) report it as a rather rare inhabitant of *N. gracilis*.

recondita series

DISCUSSION. This series was first recognized by Peyton (1970) as a natural group. In the intervening years much additional information and material has become available. Currently 15 species are recognized from Southeast Asia and are treated here. Additionally, one probable species from Taiwan and 6 extralimital species are provisionally recognized. These 7 species are as follows: Taiwan, *maculipleura* of Lien (1962); India, *husaini* Qutubuddin (?), *luteola*, *maculipleura* of Wattal and Kalra (1965) (?), *mattinglyi* Qutubuddin (?), *recondita* and from Sri Lanka, *srilankensis* Peyton. Since the discussion of this group by Peyton (1970), 11 new species have been recognized as a direct or indirect result of this study. A few of these have been published and the remainder are treated here for the first time. Published species include: *koli* Peyton and Klein (1970), *spiculosa* and *sumethi* Peyton and Rattanarithikul (1970), *srilankensis* Peyton (1974) and *ohamai* and *yaeyamana* Tanaka, Mizusawa and Saugstad (1975). Although *recondita* is listed in Stone, et al. (1959) from Thailand and Hainan Island, there are no specimens available to confirm this and its occurrence in Southeast Asia is highly improbable. Sources for these records were probably Thurman (1959: 121) and Chu (1958: 111). The series is represented by one or more species in most Asian countries as follows: Cambodia (3), Hong Kong (1), India (6), Indonesia (1), Malaysia (1), Philippines (3), Japan (Ryukyu Islands) (3), Singapore (1), Sri Lanka (1), Taiwan (1?), Thailand (7) and Vietnam (3). One species, *hirsutifemora*, occurs also in Papua New Guinea and in northern Australia. The disproportionate number of species in some countries can in most cases be attributed to a lack of collections from the highly specialized habitat of the immature stages of most species. A majority of species utilize small fresh water crab holes along the margins of shallow, running, mountain or foothill streams or at the edges of springs or seepages generally under the cover of secondary or primary forest. Only Thailand has a reasonable number of collections from this habitat and this is directly reflected in the greater number of species from that country. The fresh water crab hole habitat has been very inadequately sampled in all countries including Thailand and I predict that many additional species will be discovered. In addition to the crab hole habitat, a few species appear to be specifically adapted to other natural habitats as follows: *hirsutifemora* - pools in forest swamp or marsh, *nocticola* - cave pools, *pylei* - tree holes, *recondita* - tree holes, and *sumethi* - cave pools. Others that appear to be primarily crab hole inhabitants are occasionally found in small deep rock holes, crevices, rock pools, cave springs or rarely tree holes. Adults of *husaini* and *mattinglyi* were collected resting in crab holes and the immature stages will probably be found in this habitat also. In the natural habitat the larva of all species of the series hang vertically from the water surface and resemble *Aedes* very closely in feeding attitude and movements.

In general morphology there is also a strong resemblance to many species of *Aedes*.

The immature stages of the Ethiopian *annulata* series (Peyton 1972) resemble those of the *recondita* series very closely in general morphology and in the habitats of fresh water crab holes and cave pools but the 2 groups are not closely related. The adults of the *annulata* series are quite different from those of the *recondita* series and belong to the rather extensively ornamented Section B to which the Southeast Asian *maxima* belongs.

The series is best characterized in the male terminalia and pupal and larval stages. Although several species are generally recognizable in gross adult habitus features they do not differ significantly from the adult of other series of Section A. Generally, the erect head scales are more prominent, usually exceptionally long, numerous or often quite dense; dorsocentral and supra-alar scutal setae usually exceptionally long and stout, and pleural setae generally more numerous, especially on *ppl*, *stp* and upper *mep;* femora often with numerous setae in addition to the usual anteroventral and posterodorsal rows; tarsi always dark scaled; abdominal terga with or without pale scaled basal bands.

The male terminalia are well defined in this series, especially in the development of terga IX and X, aedeagus, distimere and usually the presence of cercal setae, but the aedeagus resembles that of the *bicolor* series somewhat in the general arrangement of teeth on each plate.

The combination of the position of pupal setae 6-CT and 2, 5-II and absence of the seta 1-IX is typical of this series.

The very distinctively shaped larval seta 1-C and the distinct apicomesal projection of the apical process of the median labral plate readily distinguishes this series from all other known *Pseudoficalbia*.

ADULT. *Head.* Proboscis 0.83-1.00 of forefemur; antennal flagellum of female 1.10-1.62 of proboscis; ocular setae usually 6, 7 (4-7) and often with an extra weak seta on interocular space; erect scales usually exceptionally long, usually 0.5 or more the length of antennal flagellomere 1. *Thorax.* Scutal scales narrow; dorsocentral and supra-alar setae exceptionally well developed, usually as long or longer than 0.5 the width of scutum (except *hirsutifemora*); pleuron uniformly very pale or with distinct darker areas on some sclerites; *apn* with scales (except *nocticola*); *ppn* with some scales, usually a distinct patch (except *hirsutifemora*); *ppl* with 4-7 setae; *stp* with 10-26 setae on upper and posterior margins, never devoid of scales, usually with a very distinct patch on upper 0.5; upper *mep* with 3-13 setae but generally with 5 or more, with or without scales. *Wing.* Cell R_2 0.36-0.54 of R_{2+3} (0.61-0.77 in *hirsutifemora*) and distinctly shorter than cell M_2.

MALE TERMINALIA. Tergum IX moderately sclerotized, *broadly rounded on apical margin, neither produced at middle or lateral corners, without setae,* basal emargination variable, usually quite broad; tergum X weakly sclerotized, usually complete tergomesally, but median tergal area often narrowed and very weakly sclerotized or rarely membranous, usually with noticeable shallow median emargination but rarely with more or less truncate apical margin, *with very short lateral lobes* (except *hirsutifemora*), *lobes usually very broad, rounded,* rarely pointed (*srilankensis*), usually extending well beyond apical margin of tergum IX (except *hirsutifemora*) and apparently never fused with tergum IX; basal mesal lobe of basimere distinctly sclerotized and usually lightly pigmented with a varying number of long stout setae tergoapically and at least 1 stout seta separate from these on sternoapical margin, surface lightly spiculate; *distimere rather long, slender, slightly to strongly*

curved and tapered from about apical 0.66 to pointed apex; spiniform prominent, stout, acute, not arising from under membranous hood; plates of aedeagus each with 1,2 strong, subapical tergomesal teeth, which are usually slightly curved and directed apicolateral or lateral *(when the more common 2 teeth are present they are superimposed and the sternal tooth is almost totally obscured in tergal view)* and with 1-7 curved teeth of varied development on apicosternal margin, usually with 1 or more of these stout and distinctly grooved on posterior margin (except *hirsutifemora*); proctiger with 1-3 pairs of cercal setae (except *confusa*, *hirsutifemora* and *sumethi*).

PUPA. *Cephalothorax.* Seta 6-CT usually exceptionally long and strong, 2.0-3.0 the length of respiratory trumpet (except *hirsutifemora*), always well separated from 7-CT and usually closer to 5-CT; respiratory trumpet never darkly pigmented, usually with a small, rounded, lobed, expansion near base on anterior surface or strongly constricted on anterobasal side. *Abdomen.* Seta 5-II lateral to 2-II and closer to 4-II than to 3-II, 2-II closer to 3-II and usually very strong, as long as or longer than segment III; 6-VI usually more strongly developed than 6-V; *1-IX absent. Paddle.* Inner and outer margins with stout spiculate serrations; inner part wider than outer part; 1-P present, 2-P absent.

LARVA. *Head. Labral process prominent, with a distinct angular apicomesal projection on basomesal side of seta 1-C,* varied according to species, apically rounded or pointed, 0.25-0.50 or more of 1-C; *1-C narrow at base and distinctly expanded apically, never spine-like, usually more or less straight on mesal margin and rounded on lateral margin, varied, blade-like, club-like or leaf-like;* 5-C single or branched, rarely barbed, 6-C single, simple, 7-C with 4-13 branches; mentum with 11-19 teeth. *Antenna.* Usually slender, without conspicuous spicules, never darkly pigmented; seta 1-A single to triple. *Thorax.* Seta 1-P double to 17 branched, 3-P with 5-19 branches, 4-P with 5-18 branches, 7-P double to 8 branched, 14-P stellate, with 5-39 branches, branches strong to exceptionally stout, sharp or acutely pointed and at least lightly barbed; 1-M, T usually stellate, with stout, sharp or acutely pointed branches, 5-T stout, spine-like, occasionally with stout, acutely pointed branches. *Abdomen.* Usually with a few to many setae very stout, spine-like or stellate, with stout, acutely pointed branches at least on segment I (except *confusa*), seta 5-III-VI usually stout, single, spine-like or stellate, often single and very long; 6-I, II usually double, rarely single or triple; 6-III-VI usually as long as or longer than 6-II; 11-I often very stout, long; 9-II-V usually very stout, spine-like, frequently very long (branched on *pylei*); comb plate usually very small, comb scales varied, usually each of near equal length and width, long, evenly spaced; 1, 2-VIII inserted on a common, long, narrow sclerotized plate (except *pylei* and *rossi*); 5-VIII inserted considerably ventral to 4-VIII and comb plate. *Segment X.* Saddle always conspicuously imbricate, with numerous spicules on posterolateral margin; seta 1-X usually double to triple, rarely single on an occasional specimen; 4-X with 5 pairs of setae, branched as follows: 4a-X 3-13, b 2-13, c 3-12, d 3-11, e 2-11, individual branches usually arising at different points on a single plane presenting a fanned appearance (this feature not well presented in illustrations due to small scale at which each is drawn), 4b-X on one side often with significantly fewer branches and considerably longer than 4b-X on opposite side. *Siphon.* Seta 1-S subventral.

URANOTAENIA (PSEUDOFICALBIA) ABDITA NEW SPECIES
(Figs. 47, 48)

FEMALE. *Head.* Proboscis about 0.89 length of forefemur; prementum dark brown scaled, a few small setae scattered on dorsal and ventral margins and at apex; one pair of labial basal setae; palpus about 0.12 length of proboscis and about equal to or slightly greater than length of flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, light yellowish brown laterally, with a few minute setae and 1, 2 colorless scales dorsomesally; flagellum about 1.3 length of proboscis or exceeding proboscis from about base of flagellomere 11; Flm 1 about 1.15 length of Flm 2, with a few brown basomesal scales; flagellar whorls each with 6 setae; 1 long, strong, and 1 minute interocular and 5 ocular setae; decumbent scales mostly grayish brown with blue-green reflections, tips of ocular scales appearing more grayish at some angles but forming no distinct line, scales at sides distinctly grayish with bright blue-green reflections; erect scales with exceptionally long slender basal stems and broadly expanded apices, dense and covering most of dorsal surface, with the posterior scales lighter in color than the anterior ones. *Thorax.* Scutal integument medium or light orange-brown; scales narrow, curved, mostly light bronzy brown, narrowly grayish white around anterior margin; prescutellar space usually mostly bare but occasionally reduced to a small posterior bare space; scutum and scutellum concolorous, scales on each lobe dark brown; mesopostnotum dark brown, distinctly darker than scutum; paratergite light brown; pleuron pale grayish or whitish brown, *psp* often faintly darker; *apn* with a line of light brown scales; *ppn* with 1 (1-3) seta and a conspicuous upper posterior patch of light translucent scales which are mostly grayish white with blue-green reflections, a few anterior scales light brown; *sp* with 2 (2-3) setae; *ppl* with 1 long, strong and 4-6 delicate setae, and a few light grayish translucent scales; *psp* usually with 2-4 transparent scales on posterior edge; *stp* with 13-15 setae on upper and posterior margins, lower 5-6 weak without pigmentation, and a large patch of appressed, shiny, near colorless translucent scales covering most of upper 0.5; *mep* with 5-8 upper setae, and a few shiny transparent scales intermingled with upper setae and usually a small patch or a few scattered transparent scales near middle (undetectable at some angles). *Wing.* Scales dark brown; cell R_2 about 0.4 (0.37-0.45) of R_{2+3} distinctly shorter than cell M_2. *Legs.* Coxae, trochanters and pleuron concolorous; C-I with light brown scales on upper and grayish translucent scales on lower anterior surface; C-II-III with a few transparent scales anterolaterally; femora dark brown scaled dorsally, light grayish ventrally, without conspicuous groupings of setae or spines; forefemur with 11-14 short, stiff setae on posterodorsal margin; 7-8 short, stiff setae on distal anteroventral margin and usually a few minute, weak, semierect setae scattered on basal 0.5; midfemur with 4-7 long delicate setae on dorsal margin, 7-11 rigid setae on distal posteroventral margin, 3-5 more delicate setae on distal anteroventral margin and often with numerous fine, semierect setae on apicoventral margin; hindfemur with a few very small weak setae scattered along dorsal, anterior and posterior margins, a long stout dorsal seta at apical 0.75, 5-6 short conspicuous setae on distal posteroventral margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.0 length of hindtibia, hindtarsomere 4 about 2.2 length of tarsomere 5. *Abdomen.* Terga mostly dark brownish black scaled, with purple reflections, terga III-VII with complete narrow creamy white basal bands, band on III and occasionally IV indistinct, those on V-VII

usually occupying about 0.25 or less the length of each tergum; tergum VIII, when extended, showing faint gray-white basal scales and a few median apical light brown scales; sterna mostly creamy white scaled, sterna VII-VIII usually light brown scaled apically.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.92 of forefemur; 2 pairs of labial basal setae; antennal flagellum strongly plumose with at least 20 setae in each whorl, about equal in length to proboscis, flagellomeres 12, 13 long with 13 longest. *Legs.* Hindtarsomere 4 about 2.35 of tarsomere 5. *Abdomen.* Terga IV-VII with narrow basal pale bands which are usually more conspicuous than those in female but not exceeding 0.33 the length of each tergum; tergum III usually with a very faint indication of a pale band involving about a single row of grayish scales; tergum VIII rarely with a few basal pale scales dorsally but often with a few dull grayish or ochreous scales basolaterally; sterna VII mostly dark brown scaled. *Terminalia* (Fig. 48). Tergum IX very broadly rounded on apical margin; basal emargination shallow and broad; tergum X complete, weakly sclerotized, produced into short, broad tergolateral lobes which project beyond apical margin of tergum IX; tergomesal surface of basimere with long slender setae with none conspicuously stronger than others and with a few weak setae basally; basal mesal lobe of basimere with 2 very long stout apical setae, each on a raised process, 3, 4 similar setae just basal to these and 6-9 short, weak, more basal setae, 1 long, stout and 2-4 weak setae on sternal margin; distimere rather strongly curved and tapered to pointed apex; spiniform small, stout, acute; plates of aedeagus each with 2 strong subapical tergomesal teeth and a row of 3-5 teeth on apicosternal margin, the most tergal of these strongest, grooved, curved and directed apicolaterally, the most sternal, strong and grooved, the median 1-3 teeth much smaller, usually very short, peg-like, always with blunt or rounded apices; proctiger with 1 cercal seta on each side.

PUPA (Fig. 48). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light yellowish brown, darker at intersegmental areas of some segments, densely spiculate on dorsal, ventral and lateral surfaces of segments III-VIII, spicules becoming progressively stronger and prominent to segment VIII. *Cephalothorax.* Seta 1-CT bifid or trifid, 2-CT double to 4 branched from near middle, 3-CT double to 4 branched from near base; 4-CT with 4-5 branches, 5-CT with 4-7 lightly barbed branches, 8-CT with 4-7 lightly barbed branches. *Respiratory Trumpet.* Light yellowish brown except for small dark basoanterior spot; indistinctly tracheoid on anterobasal 0.2; short and broad slightly expanded apically, index about 3.0. *Metanotum.* Seta 10-CT stout on basal 0.5, single or with 2-4 branches beyond 0.5, 11-CT similar but considerably longer, 12-CT with 4-6 simple or finely barbed branches; alveolus of 13-CT present, occasionally with minute spur. *Abdomen.* Seta 4-I with 4, 5 strong, lightly barbed branches, 6, I double, each branch often bifid or trifid; 1-II with 5-9 barbed branches, some branches much stronger than others, 3-II strong, bifid or trifid, 6-II double, occasionally strongly barbed distally, 1-III with 3-6 barbed branches, 3-III with a few to several weak terminal branches, position variable, usually anterior to or slightly mesal to 1-III, 6-III double; 1-IV with 3-5 barbed branches, often ends strongly frayed, 5-IV-VI usually single, occasionally double on one side or less frequently double on all 3 segments, strong, pigmented, each longer than 2 succeeding segments, usually with sparse fine lateral barbs, 6-IV with 3-5 branches; 1-V with 2-4 barbed branches, 6-V double to 4 branched; 1-VI single to triple usually barbed distally, 6-VI single,

strong, longer than segment VII; 1-VII single or double, usually barbed distally, 5-VII single, less than length of segment VIII, 6-VII single to triple, located ventrally; 9-VIII with 4-6 stout barbed branches, with 1, 2 median branches 2.0 or more the length of lateral branches and as long or longer than paddle, shorter lateral branches always with strongly frayed or branched ends. *Paddle.* Midrib pale yellowish brown to near apex; outer margin with closely set serrations from about basal 0.3 to apex; inner margin with closely set, strong, straight, spicules on apical 0.36-0.41 with a few minute crenulations occasionally towards base; apex with a very shallow emargination.

LARVA (Fig. 47). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument of thorax and abdomen, sparsely spiculate, spicules usually extremely short giving a granular rather than spiculate appearance, very apparent on skins, less so on whole larvae. Several setae of thorax and abdomen stellate with very stout, lightly barbed, darkly pigmented, acutely pointed branches. *Head.* Bright orange-brown, darker posterolaterally and on collar; seta 4-C with 5-8 delicate branches, 5, 6-C single, simple, 7-C with 7-10 branches, 11-C with 3-5 branches; mentum with 17 teeth. *Antenna.* Seta 1-A double. *Thorax.* O-P with 3-6 stout, barbed acutely pointed branches; 3-P with 6-10 strongly barbed branches, 4-P with 6-11 strongly barbed branches, 7-P with 5-7 strongly barbed branches, 14-P with 12-16 strong, barbed, sharp pointed branches; 1-M, stellate, with 4-7 stout branches, 14-M stellate, with 4-9 stout branches; 3-T stellate, with 3-6 stout branches, 5-T single, very stout, acutely pointed, darkly pigmented. *Abdomen.* Seta 1-I stellate, with 4-7 stout branches, 2-I, II stellate, with 3-5 stout branches, 6-I, II double, very stout, barbed, acutely pointed, posterior branch shorter than anterior branch, 11-I stellate, with 3-6 stout branches; 1-II stellate, with 3-6 stout branches, 5-II with 2-5 stout branches, 9-II-VI single, long, very stout, darkly pigmented, acutely pointed, usually lightly barbed basally, 13-II-V stellate, with 3-6 stout branches; 1-III, IV usually stellate, with 2-4 stout branches, 5-III-VI similar to seta 1, with 3 (3, 4) branches, 6-III-VI with 3, rarely 4, strong, barbed unequal branches; 1-V stellate, with 3, 4 stout branches, 4-V double or triple, strong, barbed acutely pointed, 13-V stellate with 3, 4 stout branches; 1-VI double or triple stout, 13-VI stellate, short, with 4-11 stiff, acutely pointed branches; 1-VII triple, rarely double, stout, 3-VII with 3, long, stout, barbed, unequal branches, 13-VII stellate, with 3-4 stout branches; 1-VIII stout, double, inserted on long narrow sclerotized plate with 2-VIII, 3-VIII with 6-10 strongly barbed branches, 5-VIII double or triple, branches stout, acutely pointed; comb scales 13-19, on a small narrow weakly sclerotized plate, all of equal length and width, evenly spaced, each rather long, narrow, more or less rounded apically, with spiculate fringe on lateral and apical margins, apical fringe slightly stronger, occasionally a few scales with a stronger apical spicule. *Segment X.* Saddle complete, light yellowish brown, strongly imbricate, with numerous stout, sharp spicules on posterior margin; seta 1-X with a single strong branch and usually 1, 2 very short weak basolateral branches, 2, 3-X double, rarely one single or triple, 4a-e-X with 7-10, 6-8, 5-7, 6-9, 5-8 branches respectively. *Siphon.* Bright yellowish or orange-brown, strongly imbricate from base to apex; index 3.1-3.8; pecten teeth 17-23, reaching to about 0.5 of siphon, all long, narrow, evenly spaced, distal 1-5 teeth stronger and simple, spine-like, more basal teeth always with an apical fringe of strong spicules; seta 1-S with 5-9 strong, conspicuously barbed branches, inserted barely beyond distal pecten tooth.

TYPE-DATA. Holotype male with slides of terminalia and pupal and larval skins with the following collection data: THAILAND, *Lampang*, Ban Rong

Na, 10 April 1967, Kol Mongkolpanya, collector, collection number 1940-6, SEAMP accession number 104 and SEAMP terminalia preparation number 69/1535, collected as a larva from crab hole at margin of mountain stream at an elevation of 700 m. Paratypes: 10 females (1 on slide), 8 males with associated skins on slides, same data as holotype, numbers 1940 -1, -2, -3, -4, -5, -7, -8, -9, -10, -11, -12, -13, -14, -15, -100, -103, -104 and -105, and 3 fourth stage larvae on slides number 1940; 4 females, 1 male, 5 pupal skins, 3 larval skins and 2 fourth stage larvae, same data as holotype, except Kol Mongkolpanya and Somboon Maneechai, collectors, collection number 1942, association subnumbers -2, -3, -4, -5 and -102.

The holotype and paratypes are in good condition and are deposited in the USNM. Paratypes of 2 males and 2 females with associated skins will be deposited in the BMNH.

DISTRIBUTION. Material examined (including type-series): 49♂, 37♀, 76 L; 78 with associated skins (67 l, 78 p).

CAMBODIA. *Kompong Speu:* Kirirom, O-Tachat, 1♂.

THAILAND. *Ranong:* Ban Bang Hin, 1♀, 1 L, 1 l, 1 p. *Lampang:* Ban Pa Khoi; Bang Rong; Ban Rong Na; 10♂, 14♀, 32 L, 19 l, 24 p. *Nakhon Ratchasima:* Khai Phai, 2 L. *Krabi:* Ban Mai Kaen Tai, 1♂. *Kanchanaburi:* Ban Sai Yok; Khao Na Chang; 7♂, 4♀, 4 L, 9 l, 10 p. *Prachinburi:* Ban Bu Phram, 5♂, 3♀, 19 L, 1 l, 6 p. *Chiang Mai:* Chiang Dao, Ban Pa Miang; Ban Mae Nam Nauk; 22♂, 13♀, 22 L, 32 l, 32 p. *Chanthaburi:* Khao Sai Dao, 1♂, 5 L, 1 l, 1 p. *Nan:* Ban Wang Mo; Ban Pha Man; 2♂, 2♀, 1 L, 3 l, 5 p.

Chu (1958: 111) lists *luteola* as a new record from Hainan, China. There is evidence that *luteola* does not occur in Southeast Asia. Although I have not seen specimens from Hainan, it is quite possible that Chu's specimens were either *abdita* or *enigmatica* (see discussion below).

DISCUSSION. This species is very similar to *enigmatica* and *luteola* in the adult stage. In general adult habitus features the adults of *abdita* and *enigmatica* are indistinguishable and that of *luteola* differs only in minor detail. The male terminalia exhibit differences in all 3 species, however, this observation is based on the examination of one terminalia preparation of *enigmatica*, 2 of *luteola* and 28 of *abdita*. The immature stages of *abdita* and *enigmatica* differ significantly, and the immature stages of *luteola* are unknown.

Although *luteola* was reported by Barraud (1934) from the Andaman Islands, there is no available evidence to indicate its occurrence in Southeast Asia. Barraud's record of *luteola* from the Andaman Islands was based on 2 misidentified females of *bicolor* (see under discussion of *bicolor*). At present, *luteola* is known for certain only from 2 males and 1 female syntype in the BMNH from Malabar Coast, India. *Uranotaenia abdita* and *enigmatica* are sympatric at least in northeastern Thailand.

The adult of *luteola* differs from *abdita* in the following: scutum without pale grayish white scales on anterior promontory; scales on *ppn* unicolorous; *psp* and *mep* bare, without transparent scales; tergum II with distinct narrow basal band of pale scales and, according to Barraud (1934), hindtarsomere 4 more than 3 times the length of tarsomere 5 (missing on syntypes). In *abdita* there are a few scales on anterior promontory of scutum grayish white; scale patch on *ppn* with anterior scales light brown and posterior scales grayish white; *psp* and *mep* usually with a few transparent scales (usually quite difficult to detect but quite conspicuous when properly oriented to light source); tergum II without basal band of pale scales and hindtarsomere 4 usually less than 2.5 of tarsomere 5. The male terminalia of *luteola* differ from *abdita* in having 7 long stout tergoapical setae on basal mesal lobe of basimere and only

one is truly apical; the distimere is about the length of basimere as is that of *abdita*, but it is more slender and curved on distal 0.5, curved from near base on *abdita;* plates of aedeagus (Fig. 48) each with 2 typical, though slightly longer subapical tergomesal teeth, but the 3, 4 teeth on apicosternal margin are equal, curved, very broad, leaf-like with edges overlapping on lateral view, appear to be grooved on posterior margin. The apicosternal teeth of aedeagal plates of *abdita* always with the medial 1-3 teeth much smaller, with blunt or rounded apex, rather straight and distinctly separated. Differences in *enigmatica* are discussed separately under that species.

The immature stages are distinct and should not prove difficult to recognize from other members in the series. The general chaetotaxy of the larva resembles that of *enigmatica* and *spiculosa* Peyton and Rattarithikul, especially in the very stout-branched stellate seta 5-III-VI. Most other members of the series, except *pylei*, have seta 5-III-VI single and spine-like, occasionally weak and branched on III. The number of branches of 5-III-VI is generally lower and typically 3 branched in *abdita*. These 3 species differ in a number of characters in the larval stage but the most significant is the spiculate apical fringe of all but the distal 1-5 pecten teeth in *abdita*. Both *enigmatica* and *spiculosa* have all pecten teeth long, simple, spine-like.

BIONOMICS. The immature stages occur principally in small freshwater crab holes at the margins of shallow running mountain or foothill streams, or at the edge of springs or seepages and generally under the cover of secondary or primary forests. They are also encountered in the same type of terrain in small deep rock holes or crevices where direct light is denied. These habitats simulate the crab hole or quite possibly often are occupied by the crab. In one such case in Thailand, I collected pupae and larvae of this species from a deep fissure high on the face of a granite cliff. The small fissure was well concealed near the base of an outcropping, and the water level was about 0.6 m below the surface. About 7.6 liters of water was extracted, and in the process of siphoning out the last amount of water remaining, a medium sized crab emerged through the fissure and escaped. This obvious symbiotic relationship appears to be quite specific for *abdita* and several other members of the *recondita* series. The immature stages have been collected in association with *enigmatica* (?), *koli* Peyton and Rattanarithikul, *spiculosa* and *stricklandi* Barraud in Thailand.

Immature collections have been examined from the following habitats: crab hole (22), rock hole (3), ground hole (crab hole?), on sloping bank of stream (1). Adults have been collected resting on rocks over streams. Twenty-two of these collections have elevations of 30-1,000 m. The larvae, when extracted from the habitat, are pale white in color. The very darkly pigmented, stellate and spine-like setae of thorax and abdomen are readily visible without the aid of a lens. The larvae do not at all resemble the typical *Uranotaenia*, nor do they exhibit any of the more commonly observed anopheline feeding and resting characteristics, rather, they are deceptively similar to several species of subgenera *Stegomyia* or *Finlaya* of *Aedes*.

URANOTAENIA (PSEUDOFICALBIA) CONFUSA NEW SPECIES
(Figs. 49, 50)

Uranotaenia philippinensis Delfinado 1966a: 36 (in part, ♂* Fig. 1b only); Delfinado 1966b: 51 (in part, ♂*, except Fig. 103); Peyton and Klein 1970: 246 (♂); Bright and Hogue 1972: 43 (bionomics).

FEMALE. *Head.* Proboscis about 0.85 of forefemur; prementum dark brown scaled, with a few small setae at apex; 1 pair of labial basal setae; palpus about 0.1 of proboscis and slightly less than antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown, with a few minute setae dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from base of flagellomere 10; Flm 1 slightly longer than Flm 2, with a few light brown scales basomesally; flagellar whorls each with 6 setae; 1 long, stout and 1 weak interocular and 3 ocular setae; decumbent scales uniformly pale creamy brown, with strong pearly-blue reflection at some angles in center and always at sides; erect scales long, moderate in number, covering most of vertex. *Thorax.* Scutal integument dark reddish rust-brown, very sharply contrasting with pale pleuron, usually indefinitely darker on supra-alar area; without conspicuous bare lines but scales on mesal border of supra-alar area sparse; scales narrow, curved, uniformly dark bronzy brown; supra-alar and dorsocentral setae moderately long, stout; prescutellar space largely bare; scutellum dark, rust-brown, scales dark brown; mesopostnotum dark reddish brown, pale yellowish at basolateral corners; paratergite pale yellow; pleuron uniformly pale yellow or yellowish orange, contrast between upper border and dark scutum strongly marked; *apn* with a few light brown scales; *ppn* with 1 seta and 2, 3 inapparent translucent scales near upper posterior corner; *sp* with 1 seta; *ppl* with 1 strong and 2, 3 weak setae; *stp* with 11-13 setae on upper and posterior margins, upper 5-7 strongest and a few scattered light bronzy brown or colorless translucent scales (depending on angle) on upper 0.33; upper *mep* with 3, 4 setae. *Wing.* Scales dark brown on anterior veins, pale translucent on posterior veins; cell R_2 about 0.42 of R_{2+3}. *Legs.* Coxae and trochanters same color as pleuron; coxae with at most a few scattered inapparent light yellowish-brown scales; femora dark brown scaled dorsally, light bronzy or grayish brown ventrally; forefemur with a few scattered weak setae on anterior and anteroventral margins, 8-10 more conspicuous setae on posterodorsal margin; midfemur with 8-10 long delicate setae on dorsal margin and several scattered less apparent setae on anterodorsal margin of basal 0.5, followed by 3, 4 longer setae on anterior and posterior margins of apical 0.5; hindfemur with 8-10 delicate setae on dorsal margin and scattered short, fine, inapparent setae on anterior, posterior and ventral surfaces; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.14 of tibia, hindtarsomere 4 about 3.33 of tarsomere 5. *Abdomen.* Terga uniformly dark bronzy brown scaled with purple-green reflections; laterotergite with a few light bronzy-brown scales; sterna light dingy or yellowish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.9 of forefemur; antennal flagellum strongly plumose, whorls each of more than 20 setae, about 1.13 of proboscis or exceeding proboscis by not more than length of flagellomere 13; flagellomeres 12, 13 about equal in length. *Wing.* Cell R_2 about 0.38 of R_{2+3}. *Terminalia* (Fig. 50). Tergum IX long, very broadly rounded on apical margin; tergum X complete but very narrow tergomesally, very weakly sclerotized, produced tergolaterally into very short broad apicolaterally rounded lobes which project slightly beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long moderately strong setae, none conspicuously stronger than others and a few weak setae basally; basal mesal lobe of basimere usually with 4, rarely with 5, long stout tergoapical setae, the most apical on raised process, 4-7 short weak setae basal to these, 1 long, stout and 2, 3 weaker setae on sternoapical margin; distimere long, slender, curved distally; spiniform stout, acute; plates of aedeagus each with 2 strong apical tergomesal

teeth, the tergal-most with a distinct narrow membranous apical margin, 3, 4 strong curved teeth on apicosternal margin, each near equal to the tergal and sternal-most teeth, grooved on posterior margin; proctiger without cercal setae.

PUPA. Not known.

LARVA (Fig. 49). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light brown; seta 4-C with 3, 4 branches, 5-C with 4-6 stiff branches, 6-C strong, single, occasionally finely barbed, 7-C with 7-11 stiff branches, 11-C with 3-5 branches; mentum with 17 teeth. *Antenna.* With a few minute scattered spicules near middle; seta 1-A double, inserted at about basal 0.45. *Thorax.* Seta 0-P with weak branches, 3, 4-P with 9-12 strongly barbed branches, 7-P with 4-6 strongly barbed branches, 14-P with 18-26 stiff, barbed, sharp, pointed branches; 1-M with 3, 4 branches; 1-T with 3, 4 branches, 5-T single, stiff, spine-like, 13-T with 5-7 branches. *Abdomen.* Seta 1-I single, minute, 2-I, II single, minute, 6-I, II double, very stout, barbed, ends acuminate, ventral branch shorter than dorsal branch, 11-I double or triple, weak; 1-II double or triple, 5-II weak, double or triple, 9-II-VI single, stiff, spine-like, pigmented, subequal, slightly shorter than 5-IV-VI, 13-II-V with 3, 4 branches, greater than 0.5 the length of each segment on III-V; 1-III-V with 3, 4 branches, 5-III minute, double or triple, 6-III-VI single, strong, sparsely barbed; 5-IV-VI single, strong, acutely pointed, pigmented, about 0.33 or less the length of 1-IV-VI; 1-VI double or triple; 1, 3-VII double or triple; 1-VIII double or triple, 3-VIII with 8, 9 strongly barbed branches, 5-VIII with 2-4 stiff branches; comb scales 15-17, on a small, narrow, sclerotized plate, all of near even length and width, evenly spaced, each rather long, narrow, rounded apically with fine spiculate fringe on lateral and apical margins, apical fringe slightly stronger. *Segment X.* Saddle incomplete, light yellowish brown, imbricate, posterior margin with a few stout spines, the more dorsal strongest; seta 1-X 2-4 branched, 2, 3-X double, 4a-e-X with 6-7, 5-7, 7-9, 6-7, 6-8 branches respectively. *Siphon.* Light brown, slightly darker apically, strongly imbricate from base to apex, spicules of imbrications not setiform but very strong with surface of siphon resembling the surface of a rasp; index about 3.3-3.6; pecten teeth 12-15, reaching to about 0.5 of siphon, each short, rather broad, slightly broadened and rounded apically, apex uniformly fringed with fine spicules; 1-S with 8-10 stiff, very sparsely barbed branches, inserted barely beyond distal pecten tooth.

TYPE-DATA. Holotype male with terminalia on slide with the following collection data: PHILIPPINES, *Mindoro*, San Jose, 3 March 1945, E. S. Ross, collector, SEAMP terminalia preparation number 70/930, collected as an adult resting in a crab hole. The following paratypes from same locality and collector as follows; 8 females, 10 males (2 females on slides) same data as holotype; 2 males, 1 larva, 15 February 1945, crab hole; 3 males, 9 March 1945 crab hole; 1 male, 21 February 1945, crab hole; 3 females, 2 males, 12 March 1945, crab hole; 22 larvae, February 1945, crab hole; 1 larva, 14 February 1945, crab hole; 3 larvae, March 1945, crab hole; 7 larvae, April 1945, crab hole; 16 larvae, 26 February 1945, crab hole; 2 males, each on slide, 22 February 1945, one from crab hole the other captured in jungle. Two of the above paratype males with terminalia on slides, collected 15 February 1945, number G 151 and 9 March 1945, also bear paratype labels of *Ur. philippinensis* Delfinado. These 2 specimens are not the same as the type of *philippinensis* which is treated here as a synonym of *obscura* (see further comments under discussion).

The holotype and paratypes are deposited in the USNM. Paratypes of 2 males, 2 females and 4 larvae will be deposited in the BMNH and 1 male, 1 female and 4 larvae will be deposited in the CAS. The holotype is in good condition. The paratypes are in good or fair condition.

DISTRIBUTION. Material examined: 30♂, 12♀, 50 L.

INDONESIA. *Sulawesi:* Palu; Pedamaran; Lambarese; 8♂, 1♀.

PHILIPPINES. *Mindoro: Occidental* - San Jose, 21♂, 11♀, 50 L. *Mindanao: Cotabato* - Kabacan, 1♂.

DISCUSSION. The identity of this species was originally confused with that of *philippinensis* Delfinado. I contributed further to this by discussing the male terminalia of this species as *philippinensis* in Peyton and Klein (1970) and provided Bright and Hogue (1972: 43) with notes on bionomics as *philippinensis*. In view of the aforementioned and ensuing comments, I have selected the name *confusa* to reflect earlier treatment of the species.

Delfinado (1966a) described *philippinensis* from a series of specimens from several different localities in the Philippines. An examination of the paratype series revealed 3 distinct species identified as *philippinensis* and included among these are 2 specimens of *confusa*. Superficially the adults do resemble each other somewhat but the male terminalia and immature stages of each are quite distinct. Although Delfinado selected a male with terminalia preparation, as the holotype for *philippinensis*, she apparently elected to describe and illustrate the terminalia preparation of a paratype male (= *confusa*). This was probably the specimen listed by her from San Jose, Mindoro, 9.111.45, slide G151, since this preparation compares very favorably with the illustration in Delfinado (1966a, Fig. 1b). The description and illustration of the male terminalia of *philippinensis* (Delfinado 1966a) does not in any way compare with the terminalia of the holotype male. The paratype male and terminalia preparation numbered G151 is listed above under type-data as a paratype of *confusa*. Delfinado (1966b) reproduced the original description of the male terminalia (= *confusa*) but this time the terminalia of the holotype male of *philippinensis* was illustrated in Fig. 103 and it does not compare with the description.

This species is recognized in the adult stage primarily by the sharply contrasting, very dark scutal integument and the very pale pleuron, 4 long ocular setae and the uniformly pale creamy brown decumbent head scales. The dark scutum and pale pleuron are somewhat similar to that of *nivipleura*, though the pleuron is more whitish and the contrast is usually more pronounced in *nivipleura*. The scutum is also without the lateral marginal line of pale scales present in *nivipleura*. While the ornamentation of the thoracic integument is somewhat similar, these 2 species are not related and there is no difficulty in separating them. Of the species of the *recondita* series without banded abdomens, none have very dark scutal integument and each has 5-7 long ocular setae and usually a faint ocular line of pale scales. The male terminalia are rather typical for members of the series, except for the absence of cercal setae. They differ little from most other members especially in development of the aedeagus.

The larva is very distinct and easily recognized. The chaetotaxy is the least developed of all known species of the series. Most species have several stellate setae with very stout, darkly pigmented branches or conspicuous long, stout, single spine-like setae or both, on the thorax and various abdominal segments. The prothoracic setae on *confusa* are similar to other members of the series but the individual branches of the stellate setae of thorax and abdomen are much weaker and not as acutely pointed as in the others. Setae 5-IV-VI and 9-II-VI are single and spine-like but they are much shorter and weaker

on each segment than all the others with these setae single. These differences along with the branched seta 5-C, greatly reduced 6-M, and incomplete saddle of segment X readily distinguishes the larva of *confusa* from all other members of the *recondita* series.

Although this species does not resemble other species of the series in adult habitus features, characters of the male terminalia and larva suggest possible affinities with *jacksoni, koli, ohamai, stricklandi* and *yaeyamana*. These include the general configuration and the number and arrangement of teeth of the aedeagal plates, branched seta 5-C and single spine-like seta 5-IV-VI of the larva and most pecten teeth fringed apically.

There are no adults with associated immature skins available, but there is sufficient information available to reasonably assure the association of the larva with the adults treated here. E. S. Ross collected 3 species of *Uranotaenia* from crab holes in San Jose, Mindoro, during a brief period of early 1945. Although each of his collections was without a collection number, his field notebook has dates and notes for each collection made for that date and the identification of the species collected. In the case of *confusa* and others which he did not recognize by a known name, he assigned a species number. He marked adult and larval specimens of *confusa* as number 15. Since he assigned different numbers to all of the specimens of the other 2 species taken from crab holes in the same areas, I am satisfied that he confirmed the association of adult and larvae of his species 15.

BIONOMICS. The immature stages have been taken only from fresh water crab holes (9) at San Jose, Mindoro. Adults were taken once resting in crab holes at San Jose and once resting along a creek at Kabacan, Mindanao, and 3 Malaise trap collections at different locations in Sulawesi.

URANOTAENIA (PSEUDOFICALBIA) ENIGMATICA NEW SPECIES
(Figs. 51, 52)

FEMALE. Apparently indistinguishable from *abdita*.

MALE. Indistinguishable from *abdita* in general habitus features. *Terminalia* (Fig. 52). As in *abdita* except for the following: basal mesal lobe of basimere with 6 long, stout tergoapical setae, 2 distinctly apical as in *abdita*, plates of aedeagus with only 3 curved teeth on apicosternal margin, with the tergal-most tooth only slightly longer and stronger than the others and grooved on posterior margin, the median tooth arising basolateral to the larger tergal tooth, tapered to sharp point and not significantly smaller than the sternal-most tooth.

PUPA (Fig. 52). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown, darker at intersegmental areas of some segments, lightly spiculate on dorsal, ventral and lateral surfaces of segments III-VII, more densely spiculate on VIII and very conspicuous on posterolateral surface. *Cephalothorax*. Seta 1, 2-CT bifid or trifid, 3-CT double or triple, 4-CT single to triple, barbed, branches distally frayed; 5-CT double or triple. *Respiratory Trumpet*. Light yellowish brown, indistinctly tracheoid on anterobasal 0.1; not noticeably expanded apically; index 5.4-6.9. *Metanotum*. Seta 10-CT bifid or trifid, lightly barbed, 11-CT single, 12-CT with 3, 4 lightly barbed branches; alveolus of 13-CT present. *Abdomen*. Seta 4-II double or triple, strong, lightly barbed, 6-I, II double, each branch usually bifid; 1-II with 5-10 lightly barbed branches, 3-II single, long, strong, 5-II, III with 3, 4 branches, inserted near posterior mar-

gin of segment, 1-III strong, double to 4 branched, each branch usually lightly barbed and bifid or trifid, 2-III-VII unusually long, stout, spike-like, darkly pigmented and finely barbed, each inserted considerably anterior to posterior margin, usually anterior to setae 3, 4 of each segment and nearer to middle of segment than to posterior margin, 2-III inserted anterolateral to 1, 3-III, 3-III long, stout, bifid or trifid, inserted anteromesal to 1-III, 5-III inserted near posterior margin of segment and much closer to 1-III than to 4-III, 6-III-V double or triple; 1-IV strong, double or triple, each branch usually bifid or trifid, 5-IV strong, single, about 1.5 of segment V; 1-V strong, double, rarely triple, branches finely barbed and bifid or trifid, 5-V, VI single, strong, each as long as or longer than 2 succeeding segments; 1-VI single or double, stiff, finely barbed, 6-VI strong, single, longer than segment VII; 1-VII single, stiff, simple or barbed, 5-VII single, much less than length of segment VIII, 6-VII with 3, 4 stiff branches, located ventrally; 9-VIII with 4, 5 stout, lightly barbed branches, with 1 median branch more than 2.0 the length of lateral branches and about length of paddle, each shorter lateral branch with 2-5 stiff distal branches. *Paddle.* Midrib light brown to near apex; outer margin with closely-set serrations from about basal 0.25 to apex; inner margin with fewer stout, straight, more widely-spaced spicules from about 0.66 to apex, usually a few minute submarginal spicules towards base; apex with very shallow emargination; outer part produced apically slightly beyond inner part.

LARVA (Fig. 51). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument of thorax and abdomen densely spiculate, individual spicules long, fine, setiform. Several setae of thorax and abdomen stellate with very stout, darkly pigmented, acutely pointed branches, most individual branches usually simple or rarely with a few fine scattered barbs. *Head.* Light yellowish brown; seta 4-C with 5-7 delicate branches, 5, 6-C single, simple, 7-C with 9-12 branches, 11-C with 5, 6 branches; mentum with 16, 17 teeth. *Antenna.* Seta 1-A double. *Thorax.* Seta 0-P stellate, with 4-6 long, stiff, barbed branches, 3-P with 7-10 strongly barbed branches, 4-P with 12-15 strongly barbed branches, 7-P with 5 barbed branches, 14-P with 15-17 strong, stiff branches, ends acute or split; 1-M stellate, with 6, 7 stout branches, 14-M stellate, with 7-12 stout branches; 1-T stellate, with 5, 6 stout branches, 3-T stellate, with 4, 5 stout branches, 5-T single, very stout, acutely pointed, about as long as 3-T, 13-T stellate, with 6, 7 stout branches. *Abdomen.* Seta 1-I stellate, with 6-9 stout branches, 2-I, II stellate, with 4, 5 stout branches, 6-I, II double, very stout, barbed, each branch acutely pointed, ventral branch shorter than dorsal branch, 11-I stellate, with 5-7 stout branches; 13-I stellate, with 5-7 short, stout branches; 1-II stellate, with 4-6 stout branches, 5-II, III stellate, with 4, 5 stout branches, 9-II-VI single, simple, long, very stout, darkly pigmented, acutely pointed, 13-II, III stellate, with 5-8 stout branches; 1-III stellate, with 3-5 stout branches, 2-III single to triple, stout, 2-III-VI inserted considerably anterior to dorsal setae of each segment, 6-III-VI with 3 strong, barbed, unequal branches; 1-IV stellate, with 4 stout branches, 5-IV-VI stellate, with 5 stout branches, 13-IV-V stellate, with 4, 5 long, stout, finely barbed branches; 1-V stellate, with 4 stout branches, 4-V double, strong, finely barbed, darkly pigmented; 1-VI stellate, with 3, 4 stout branches, 13-VI stellate, with 6-8 strong, short, acutely pointed, pigmented branches; 1-VII stellate, with 3, 4 stout branches, 3-VII with 3, 4 long, stout, lightly barbed, acutely pointed branches, 13-VII stellate, with 3, 4 stout branches; 1-VIII stout, double, 3-VIII with 6-8 strongly barbed branches, 5-VIII stellate, with 4 stout branches; comb scales 17-21, on a small, narrow, weakly sclerotized plate, all of near equal length and width, evenly spaced,

each rather long, narrow, more or less rounded apically with fine spiculate fringe on lateral and apical margins, apical fringe slightly stronger, occasionally a few scales with a stronger apical spicule. *Segment X.* Saddle complete, light yellowish brown, strongly imbricate and densely spiculate, with numerous stout, sharp spicules on dorsal posterolateral margin, each rather evenly spaced with a few of the more ventral spines conspicuously longer than the others; seta 1-X with a long, strong branch and 2 short, weak basolateral branches, 4a-e-X with 10-12, 6-9, 6-9, 6-7, 5-7 branches respectively. *Siphon.* Bright yellowish or orange-brown, strongly imbricate and densely covered with setiform spicules from base to apex; index 3.5-3.9; pecten teeth 14-23 but usually at least 17 on one side, reaching to about basal 0.48 of siphon, each long, narrow, simple, spine-like, progressively longer from base to exceptionally long distal teeth, 1-3 basal teeth occasionally reduced; seta 1-S with 7-9 strong, conspicuously barbed branches, inserted about 0.54 from base of siphon.

TYPE-DATA. Holotype female with slide of associated pupal and larval skins in the USNM with the following collection data: THAILAND, *Nan,* Ban Wang Mo, 8 August 1966, Kol Mongkolpanya, collector, collection number 1402-1, SEAMP accession number 79, collected as a larva from a small fresh water crab hole in secondary forest at an elevation of 400 m. Allotype male with slides of terminalia and pupal skin same data as holotype except number 1402-100 and SEAMP terminalia preparation number 68/1305. Paratypes: one female with slide of pupal and larval skins same data as holotype except number 1402-4 and 2 larvae on slides same data, number 1402; 2 females, (one mounted on slide) each with slides of pupal skin, same data as holotype except, Ban Pha Man, 9 August 1966, collection number 1439-101, -102, elevation 437 m.

The holotype female can at best be described as in fair condition with scutum rubbed, most setae and median scales missing. The paratypes are either in fair or poor condition. The associated immature stages are all in excellent condition. All specimens deposited in USNM.

DISTRIBUTION. Material examined: 1♂, 4♀, 2 L; 5 with associated skins (2 l, 5 p).

THAILAND. *Nan:* Ban Wang Mo; Ban Pha Man.

DISCUSSION. There appear to be no differences in adult habitus features of this species and *abdita.* The 4 female specimens examined are in poor condition but most characters can be seen. The single male specimen is in very poor condition, being partially collapsed and rubbed on scutum and pleuron and some of the legs, antennae and proboscis are moistened by the adhesive used for pinning. The single male terminalia are somewhat typical for members of this series but differ from *abdita* in the shape and size of the 3 teeth on apicosternal margin of the aedeagal plates. The aedeagal plates of the allotype are asymetrical; one plate is with the very typical pair of subapical tergomesal teeth but the other side has only the larger tergal-most tooth. The 3 apicosternal teeth are the same on each plate and the median tooth is curved and tapered to a pointed apex, arising basolateral to the slightly larger, more tergal tooth and near equal to the sternal-most tooth. In *abdita* the median teeth vary in number from 1-3 but these are always shorter and smaller than the teeth to each side, blunt or rounded apically and arising distinctly between the tergal and sternal-most teeth. Although this feature is known only from a single specimen of *enigmatica,* I have not seen a similar *abdita* specimen in 28 terminalia preparations.

The sample of the immature stages is rather small but each is quite distinct

and differs significantly from those of *abdita* and most other species of the *recondita* series. It is for these very significant differences in the pupal and larval stages and secondarily the difference in the male terminalia that *enigmatica* is treated a distinct taxon. The very unique development and position of pupal seta 2-III-VI differs from all presently known species. *Uranotaenia pylei* has this seta exceptionally well developed though not as long and stout and the position is significantly different. Except for abdominal seta 2, *pylei* differs significantly from *enigmatica* in other characters in the pupal stage. The length of the respiratory trumpet is significantly greater than in most species of the *recondita* series. The position of larval seta 2-III-VI of *enigmatica* correlates with that of the pupa. In both stages this seta is inserted significantly more anterior on the segment than other known species. The larva is more similar to that of *spiculosa* than to other members of the series, especially in the densely spiculate integument of thorax and abdomen and the long, simple, spiniform pecten teeth; but these 2 also differ in a number of characters. The most significant are: absence of 13-P in *enigmatica* and the presence of a well-developed stellate 13-P in *spiculosa;* the very long, stout, spine-like seta 9-III-VI in *enigmatica* and the greatly reduced seta 9-III-VI in *spiculosa.* In *spiculosa,* this seta is moderately long on III and progressively shorter to VI where it is a very short spine. A long, stout abdominal seta 9 is present on one or more segments in the majority of species in the *recondita* series, but it is very long on VI and similar to seta 9 on preceeding segments only on *abdita, enigmatica* and *nocticola.* Only *abdita, enigmatica, pylei* and *spiculosa* have seta 5-III-VI stellate with 3 or more very stout branches. Others of the series have 5-III-VI usually single, stout, spine-like.

BIONOMICS. Known only from the 2 immature collections of the type-series. Both were collected from fresh water crab holes at 2 localities in northeastern Thailand. These were situated in secondary rain forests in mountainous terrain at elevations of 400 and 437 m. The 2 sites are about 8 km apart. Both collections also contained a small number of specimens of *abdita.* I cannot be sure that these are true associations since I have personal knowledge that some crab hole collections from Thailand often consisted of pooled samples from several holes in the immediate vicinity, especially if the number of specimens were exceptionally low as in the case of these 2 collections. Nevertheless, the 2 do coexist in the same general locality of northeastern Thailand and occupy the same ecological niche and, therefore, must either be recognized as distinct taxa or anomalous variations of a single taxon. The very distinct consistent differences in the pupa and larva of both, seem to me, to be overwhelmingly in favor of the former.

URANOTAENIA (PSEUDOFICALBIA) HIRSUTIFEMORA PETERS
(Fig. 53, 54)

Uranotaenia hirsutifemora Peters 1964: 21 (♂*, ♀).
Uranotaenia (Pseudoficalbia) hirsutifemora Peters, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark brown scaled, with a few weak setae at apex; 1 pair of labial basal setae; palpus about 0.11 of proboscis and about 0.75 of antennal flagellomere 1; clypeus light brown; antennal pedicel light yellowish brown, with 2-4 minute setae dorsomesally; flagellum about 1.62 of proboscis or exceeding proboscis from near base of flagellomere 9; Flm 1 barely longer than Flm 2, with a few

pale brown scales basomesally; flagellar whorls each of 6 setae; 1 long, strong and 1 weak interocular and 4 ocular setae; decumbent scales mostly light grayish or bronzy brown, scales on ocular line appear more grayish at some angles but form no distinct line, scales at sides distinctly gray with bluish reflections; erect scales long, numerous, covering most of vertex, dark brown in color. *Thorax.* Scutal integument dark brown or occasionally light brown with narrow indistinct darker median and submedian lines; scales sparse, narrow, curved, light or dark bronzy brown; prescutellar space largely bare; dorsocentral and supra-alar setae long, stout, but not exceptionally so; scutellum light brown, scales darker brown; mesopostnotum dark or light brown, often slightly darker on narrow median longitudinal line; pleuron uniformly dingy brown or occasionally lighter yellowish brown on lower 0.5, with *apn* and *ppn* indefinitely darker; *apn* with a few light grayish brown scales; *ppn* with 1 weak upper posterior seta and no scales; *sp* with 1 strong seta; *ppl* with 3-5 setae and 2,3 inapparent translucent scales; *stp* with 14-16 weak setae on upper and posterior margins with only the upper 2,3 readily apparent and with scattered light grayish or bronzy translucent scales on upper 0.5 and narrowly continued down posterior margin, scales inapparent, difficult to detect at some angles; upper *mep* with 3-5 setae. *Wing.* Scales dark brown on anterior veins, lighter on posterior veins; cell R_2 0.35-0.45 of R_{2+3} and distinctly shorter than M_2. *Legs.* Coxae and trochanters light brown; C-I with a few light brown scales on anterior surface; C-II, III with a very few inapparent transparent scales laterally; femora dark brown scaled dorsally, light brown ventrally; forefemur with a conspicuous but varying number of setae more or less as follows; about 12 setae on anteroventral margin and about 12 similar setae on posterodorsal margin, 4-6 stronger setae on distal dorsal margin, 4-10 setae scattered between distal 0.50-0.75 on ventral surface, in addition there are often many very short, fine, inconspicuous, semierect setae on ventral and anteroventral surfaces; midfemur with similar but more conspicuous setae, more or less as follows: 8-10 long sinuous setae on dorsal margin from near base to 0.66, 8-14 setae on ventral margin from near base to about 0.7, 3-6 setae on posterior margin from 0.6 to near apex, 8-16 scattered setae on anterior surface between basal 0.45-0.70, 2-6 similar setae on posterior surface giving the middle 0.45-0.70 a very hirsute appearance, occasionally there are also numerous minute, inapparent, semierect setae intermingled with the larger setae; hindfemur with a few small scattered, inapparent setae on ventral margin and 2-4 conspicuous setae on dorsal margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.18 of tibia, tarsomere 4 about 3.35 of tarsomere 5. *Abdomen.* Terga dark brown scaled with weak purple-green reflections; laterotergite with 3-5 translucent scales; sterna light fawn with mauve reflection in some angles of light.

MALE. Essentially as in female except for sexual differences. *Head.* Antennal flagellum strongly plumose, whorls each of 20 or more setae, length about 1.27 of proboscis or exceeding proboscis by slightly more than length of Flm 13; flagellomeres 12,13 subequal. *Wing.* Cell R_2 about 0.53 of R_{2+3}. *Legs.* Hindtarsomere 1 about 1.19 of tibia, tarsomere 4 about 2.9 of tarsomere 5. *Terminalia* (Fig. 53). Tergum IX very broadly rounded apically; tergum X a narrow, complete, weakly sclerotized band, uniform in width, tergoapical margin continuous with and not extending beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long, strong setae with only a few short weak setae basally; basal mesal lobe of basimere with 6,7 long, stout, setae apically, with one of these distinctly inserted on sternal margin but not noticeably separated from the others, 4,6 small weak setae basal to these, 1,2 small weak setae occasionally present on lower sternal

margin; distimere slender, slightly curved and tapered to pointed apex; spiniform short, stout, acute; plates of aedeagus each with 2 strong subapical tergomesal teeth and a cluster of 3, 5 short, curved, laterally directed apicosternal teeth, all about equal; aedeagus with a strong tergal subapical bridge, with a small very distinct membranous or weakly sclerotized apicomesal leaflike projection; proctiger without cercal setae.

PUPA (Fig. 54). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument dark brown on leg and mouthpart cases, posterior half of wing case, lateral margins of metanotum, terminal 3, 4 abdominal segments and genital pouch, remaining areas pale brown. All setae except 8-CT and 1-I with simple branches. *Cephalothorax.* Seta 1-CT double or triple, 2-CT double to 4 branched, 3-CT triple to 5 branched, 5-CT with 4, 5 branches, 8-CT with 4-6 rather strong, finely barbed branches. *Respiratory Trumpet.* Medium brown basally and apically, light yellowish brown in middle; rather broad, slightly expanded apically; index 2.8-3.3; distinctly tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT very small, weak, double or triple, 11-CT double, 12-CT long, double or triple; alveolus of 13-CT present, occasionally with small distinct spur. *Abdomen.* Seta 6-I double, longer than 7-I, II; 1-II with 6-9 extremely fine branches, 2-II slightly less than length of segment III; 3-II single to triple; 1-III with 5-8 branches, 3-III double to 4 branched; 6-III-V double or triple; 1-IV with 4-6 branches, 5-IV similar, with 4, 5 branches; 1-V with 4, 5 branches, 2-V-VII lateral to 1-V-VII, 5-V similar to 1-V with 3-5 branches; 1-VI with 3-5 branches, 5-VI with 4, 5 branches, slightly longer than 1-VI, 6-VI double, noticeably longer than 6 on preceeding segments; 1-VII with 3, 4 branches, 5-VII with 2-4 branches, longer than 1-VII; 9-VIII with 3, 4 weak branches, slightly less than length of segment VIII. *Paddle.* Pale brown at extreme base; more or less rounded apically with very shallow apical indentation; outer margin with small closely set serrations; inner margin with a few small spicules near apex and a few minute crenulations.

LARVA. Not known.

TYPE-DATA. Holotype male deposited in the Department of Entomology C.S.I.R.O., Canberra, Australia, with the following information: PAPUA: Port Moresby, Central District, 22.II.1957 (Dr. W. Peters). I have not seen the holotype, though I have examined 3 males from Papua through the courtesy of Dr. N. V. Dobrotworsky of the University of Melbourne, Parksville, Australia.

DISTRIBUTION. Material examined: 19♂, 12♀; 8 with associated skins (8 p).

AUSTRALIA. *Queensland:* Innisfast, 2♂.

CAMBODIA. Kompong Sela, 2♀. *Kampot:* Sihanoukville, Tuk Sap, 8♂, 2♀.

INDONESIA. *Sumatra:* Bengkalis, 1♂, 2♀.

MALAYSIA. *East Malaysia: Sabah* - Jesselton; Tawau; 4♀.

PAPUA NEW GUINEA. New Hanover: Lavongai, 3♂.

SINGAPORE. Nee Soon Rifle Range, 5♂, 3♀, 8 p.

This species has an unusual distribution, especially since it seems to be very uncommon in most areas. The widely disjunct distribution does not necessarily suggest a lack of collections, for extremely heavy collecting in Peninsular Malaysia and Thailand has been in progress for a number of years without encountering this species. *Uranotaenia obscura* is the only other Southeast Asian species known to extend into the Papuan region.

In addition to the above, Peters (1964) records *hirsutifemora* from PAPUA,

Miwa Fly River, Western District and Marks (1970: 166) records it from Queensland, Branston Beach, AUSTRALIA.

DISCUSSION. This is a rather nondescript species exhibiting no apparent affinities with other Southeast Asian *Pseudoficalbia* but also possessing no striking adult habitus features for ready separation from several unornamented species of the region. It is a small uniformly brown species in the adult stage and except for the numerous setae of midfemur it could easily be confused with several similarly colored species. This could prove especially troublesome with trapped material. The specimens available from Papua and Australia are from either trap or sweeping collections and almost all of the setae are missing. There is considerable variation in the color of the thorax, varying from light brown to very dark brown. The specimens from Southeast Asia are generally darker than the specimens from Papua and Australia. The scaling of *stp* is sparse and very inapparent in Southeast Asian specimens and the Papuan and Australian specimens examined are badly rubbed. The original description of *hirsutifemora* records, "Scales covering about upper one-half and posterior one-third of lower half of *stp*." The illustration in Peters (1964) shows a rather conspicuous patch of scales on upper and posterior margins of the *stp*. A few of the more significant characters of the adult are as follows: light brown decumbent head scales, without distinct pale ocular line; exceptionally long female antenna; scaled *apn;* bare *ppn; sp* seta long and stout, longer and stronger than setae on *ppn* and *stp;* very weak inapparent *stp* setae and numerous setae on midfemur. The male terminalia are very distinctive and are quite different from those of other Southeast Asian species. The terminalia are well described and illustrated in Peters (1964) and all of the Southeast Asian specimens conform well to this. This structure has most strongly influenced my decision to treat the Southeast Asian specimens as *hirsutifemora*. The peculiar median apical projection from tergal bridge of the aedeagus is a rather unique character noted elsewhere only in *spiculosa*, but not as prominent. The immature stages of typical *hirsutifemora* from Papua have not been described. The description and illustration of the pupa presented here are based entirely upon a small series of skins from Singapore.

Although the species is somewhat atypical of the *recondita* series in general adult habitus features and in some features of the pupa, the male terminalia and pupa suggest a closer affinity with this series than any of the other series described.

BIONOMICS. The 2 immature collections from Singapore were taken from a marshy depression and a swamp, both near sea level on 17 and 19 March 1968. No other species of this series has been collected in this type of habitat but most are common inhabitants of crab holes often in marsh-swamp areas. The remaining specimens of *hirsutifemora* were collected as adults in resting, sweeping or trap collections. Two of these collections are recorded as from marsh or forest swamp. Three other adult collections from Jesselton, Sabah, are recorded as found resting on walls in a house in early morning, on 22, 27 July 1956 and 1 August 1956, by D. H. Colless.

URANOTAENIA (PSEUDOFICALBIA) HONGAYI GALLIARD AND NGU
(Fig. 50)

Uranotaenia hongayi Galliard and Ngu 1947: 77 (A, L); Galliard and Ngu 1950: 67 (♂*, ♀, L*, P*).
Uranotaenia (Pseudoficalbia) hongayi Galliard and Ngu, Peyton 1972: 36.

The exact status of this species is very unclear and I have seen no specimens that could be ascribed to it. A rough translation of the original (1947) description, in French, and a subsequent (1950) more complete description of the species is presented below. Figures of male terminalia and larva are reproduced (Fig. 50) from Galliard and Ngu (1950: 65).

Original description: "*Uranotaenia hongayi n. sp.* - The adult approaches *U. maxima* for its large size, but clearly differs in the absence of white bands on the abdomen. The larva differs from all known species of the Oriental Region by the great number of teeth (18) on segment 8. Larvae were found in a rocky excavation along the coast of Tonkin (Baie d'Along)."

Description of 1950: "*Uranotaenia* sp. This species was found in a grotto of the Baie d'Along (Surprise Islet) in the larval stage. It is remarkable for its large size, but different from *U. maxima* (fig. 5, 6, 7), [Fig. 5 reproduced here in Fig. 50].

FEMALE. Large, brown. Legs entirely dark. *Head.* Border of bluish-white scales on orbital margin. Erect scales on vertex dark brown. Palpus extremely short. *Thorax.* Integument brown, bristles dark brown, shiny white scales on anterior pronotal lobe and sternopleuron. Brown lanceolate scales on either side of the median line, from anterior promontory to clypeus [probably a mistake for scutellum]. Laterally, dense scaling from anterior border to insertion of wing, more scattered posteriorly. *Wing.* No white scales. As large as those of *U. maxima*. *Abdomen.* Scales flat, brown. Without pale bands. *Pupa.* Segments II, III, IV, with 2 tufts of 5 to 6 branches. Hair B [seta 5] of V, VI, VII greatly developed, simple, as long as two segments. *Larva.* Head and antennae dark brown. Antennae short (270 u). Antennal hair 3 branched, at outer third. Hairs of the extremity [antennal hairs 2-6?] short, simple. Clypeal hairs foliform, very short. Hairs B and C simple, long and slender (270 u). Hair A very short. Thoracic hairs as well developed as the hairs on the 1st and 2nd abdominal segments. Comb of segment VIII with 18 finely fringed teeth, borne on a sclerotized plate. Siphon index 3, pecten of 19 simple teeth. A tuft of 4 branches near the end of the pecten.

In summary, this species is as large as *U. maxima* but differs from it by the absence of white bands on the abdomen. It is larger than *U. macfarlanei* which has white bands on the abdomen.

The larva differs also from those of all other oriental species by the high number of teeth of the eighth segment, with apex rounded and fringed.

We have provisionally given it the name *Uranotaenia hongayi.*"

TYPE-DATA. No reference was made to a type or other specimens of this species in either article by the authors. Efforts to locate the type or other specimens of *hongayi* were unsuccessful. I examined the mosquito collection at the Pasteur Institute, Saigon and Bruce A. Harrison searched the Paris Museum collection for specimens of this species. In a letter to Dr. Botha de Meillon, in 1969, Professor Henri Galliard indicated that the type-series were not in Paris and that all of his notes and manuscripts were left behind in Hanoi when he departed in 1946. He does not recall what happened to the specimens.

DISTRIBUTION. Known only from the type-locality.

VIETNAM. Baie d'Along, Tonkin.

DISCUSSION. Although the original description is extremely brief and provides no conclusive characters for the recognition of the species, it apparently satisfies the requirements of articles 11 and 13 of the International Code of Zoological Nomenclature. Stone et al. (1959) list 1947 as the date of avail-

ability of the name. The subsequent 1950 article provisionally proposed the name *hongayi* and it is assumed both articles refer to the same species, though the habitat of the larva was listed slightly differently for the second article and no reference was made of the earlier use of the name.

From the 1950 description and illustrations of the male terminalia and larva it is clear that the species is a member of the *recondita* series. The adults of several species of this series have pale scaled abdominal bands and are therefore readily separated from *hongayi*. However, *confusa*, *nocticola*, *pylei*, *recondita*, *rossi*, *srilankensis*, *sumethi* and *yaeyamana* are without pale abdominal bands, but the adult description of *hongayi* is insufficient to separate it from any of these. The larva of all but *srilankensis* of the unbanded species are well known and none have all pecten teeth simple as described for *hongayi*. It therefore seems that *hongayi* is a distinct taxon and should be easily identified in the adult stage if accompanied by the associated larval stage. I have not reproduced the illustration of the pupa because it is very diagramatic and shows little of any significance.

URANOTAENIA (PSEUDOFICALBIA) JACKSONI EDWARDS
(Figs. 55, 56)

Uranotaenia jacksoni Edwards 1935: 130 (♂).
Uranotaenia stonei Bohart and Ingram 1946a: 47 (♂*, ♀, L*); Bohart and Ingram 1946b: 59 (♂, ♀, L*, P*); Peyton 1972: 36 (synonymy).
Uranotaenia (Pseudoficalbia) jacksoni Edwards, Peyton 1972: 36.

FEMALE. *Head.* Proboscis about 0.87 of forefemur; prementum dark brown scaled with a dorsal submedian row of 6-8 inconspicuous, apically directed setae on distal 0.5 and a few small ones at apex; 1 pair of labial basal setae; palpus about 0.1 of proboscis and slightly shorter than antennal flagellomere 1; clypeus dark brown; antennal pedicel light yellowish brown with a few minute setae and scales dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from base of Flm 11; Flm 1 barely longer than Flm 2, with a few light brown scales basomesally; basal flagellar whorls each with 6 setae; 1 long, strong and 1 weak interocular and 5, 6 ocular setae; decumbent scales mostly light brown (beige), narrowly and faintly lighter on ocular line, but forming no well defined line, scales grayish white with faint bluish green reflections laterally; erect scales long and conspicuous, moderate in number, covering most of dorsal surface, golden brown in color. *Thorax.* Scutal integument uniformly light orange-brown or brown; without conspicuous bare lines; scales narrow, curved, mostly light bronzy brown, a few scales on anterior promontory grayish or creamy white and somewhat broader at acrostichal line, occasionally inconspicuous and easily overlooked; prescutellar space bare on posterior 0.5; scutellum light brown, scales light or dark brown, a few basal scales often grayish with faint bluish reflections; midlobe with 4 (4, 5) and lateral lobes with 3 (3, 4) strong marginal setae; mesopostnotum dark brown, light grayish on basolateral corners; paratergite pale yellowish; pleuron light yellowish brown, with *psp* and extreme upper corner of *stp* usually indefinitely darker; *apn* with several loosely arranged light grayish translucent scales over most of anterior and lateral surfaces; *ppn* with 1 long, stout and 1, 3 weak setae and a few light brownish translucent scales near upper posterior corner (scales difficult to detect at some angles); *sp* with 1 strong seta; *ppl* with 1 strong and 4-8 weaker setae and with a few small inapparent grayish

translucent scales; *pra* with 1-3 setae; *stp* with 11-14 rather conspicuous setae on upper and posterior margins to basal 0.33, several very small delicate opaque setae anterior to the larger posteromarginal setae from near 0.5 to well below base of coxa, a separate patch of 3-6 very delicate opaque setae on anterior margin just dorsal to midanterior angle (very difficult to detect except from a lateral angle) and with an inconspicuous patch of scattered grayish translucent scales on upper 0.5 with a few similar scales scattered down posterior margin; *mep* with 7-12 upper setae and usually with a few small transparent scales at middle and upper margin. *Wing*. Scales dark brown; cell R_2 0.36-0.46 of R_{2+3}. *Legs*. Coxae and trochanters same color as pleuron; C-I with scattered light grayish translucent scales on anterior surface; C-II, III with a few transparent scales anterolaterally; femora dark brown scaled dorsally, grayish brown with weak blue-green reflections ventrally; forefemur with 7-9 setae on anteroventral margin, 11-13 setae on posterodorsal margin and 3,4 similar setae near middle on dorsal and ventral surfaces, numerous fine minute setae usually visible dorsally on basal 0.5; midfemur with 9-11 conspicuous setae on dorsal margin from base to 0.75, 10, 11 staggered setae along anteroventral and posteroventral margins from near basal 0.33 to near apex, a patch of 4-7 scattered setae near middle on anterior surface, numerous fine minute, inapparent, semierect setae usually visible on various aspects of basal 0.5; hindfemur with rows of very inconspicuous setae on dorsal, ventral and posterior margins, 4,5 more conspicuous setae beyond 0.5 on posteroventral margin and 2,3 larger setae on dorsal margin; tibiae and tarsi dark brown; hindtarsomere 1 about 1.0 or less of tibia, hindtarsomere 4 about 2.2 of tarsomere 5. *Abdomen*. Terga dark brown scaled with weak purple-green reflections and with narrow indistinct ochreous or gray-white scaled basal bands on terga III-VII, each rarely reaching lateral margin, very inapparent or rarely absent on VII; laterotergite with a patch of shiny grayish translucent scales; sterna light yellowish or grayish brown, with pale grayish or creamy translucent scales on II-V, light brownish on VI-VIII.

MALE. Essentially as in female except for sexual differences. *Head*. Antennal flagellum barely longer than proboscis, strongly plumose, basal flagellar whorls each of more than 20 setae; flagellomeres 12,13 subequal. *Legs*. Hindtarsomere 1 always slightly longer than tibia. *Abdomen*. Pale basal tergal bands broader, more whitish, usually reaching lateral margin; tergum I with a varying amount of grayish white or creamy brown scales dorsally, II occasionally with a very narrow basal pale band. *Terminalia* (Fig. 56). Tergum IX broadly rounded on lateral apical margin, very slightly emarginate apicomesally; tergum X complete, weakly sclerotized produced tergolaterally into short, broad, apicolaterally rounded lobes which extend slightly beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long slender setae, 1 seta tergal to basal mesal lobe conspicuously longer and stronger than the rest; basal mesal lobe of basimere with 2 very long, stout, tergoapical setae, each on raised process, 2,3 significantly shorter, weaker, strong setae basal to these and 8-12 scattered, short, weak setae, 1,2 long, strong and 1-3 weak setae on sternoapical margin; distimere rather long, slender, slightly curved and tapered to pointed apex; spiniform small, stout, acute; plates of aedeagus each with 2 stout subapical tergomesal teeth and 2-4 strong, curved teeth on apicosternal margin with the tergal and sternal-most teeth strongest and near equal, the median teeth always slightly smaller and rarely absent or only a rudimentary tooth present; proctiger usually with 2,3 (1-3) cercal setae on each side.

PUPA (Fig. 56). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown, occasionally indefinitely darker on posterior scutal plate, leg cases and metanotum. All setae except 1-I and 9-VIII with simple branches. *Cephalothorax.* Seta 1-CT with 2-4 branches, 2-CT with 3-5 branches, 4-CT with 4-6 branches, 5-CT with 4-7 branches, 8-CT with 10-14 branches. *Respiratory Trumpet.* Light yellowish brown; tracheoid on anterobasal 0.2; index about 3.0, not noticeably expanded apically. *Metanotum.* Seta 10-CT with stout basal stem and 3-4 stiff branches from about basal 0.33, 11-CT varied, usually single or double, each branch with 3-6 distal branches, 12-CT with 4-6 branches; alveolus of 13-CT present but rather inapparent. *Abdomen.* Seta 6-I, II double; 1-II with about 15-20 delicate branches, all rather tightly grouped, rather brush-like, 3-II, III stout basally, with 4-7 branches from about basal 0.3 or beyond, 5-II, III with 9-16 branches; 1-III with 9-12 branches, 6-III-V with 3-5 branches; 1-IV with 7-10 branches, 5-IV double (2-5) slightly longer than segment V; 1-V with 4-6 branches, 5-V double or triple, about 1.25 or more of segment VI; 1-VI with 4, 5 branches, 5-VI double or triple, about 1.25 or more of segment VII, 6-VI double, shorter than segment VII; 1-VII double or triple, 5-VII double (1, 2), significantly longer than segment VIII, 6-VII located ventrally; 9-VIII with 8-10 barbed branches, about equal in length to segment. *Paddle.* Midrib pale brown to apex; outer margin with rather widely spaced serrations from about basal 0.25 to apex; inner margin with a few sharp spines at apex and distinctly smaller serrations towards base on apical 0.4; apex without noticeable emargination.

LARVA (Fig. 55). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown; seta 4-C double to 4 branched, on line with, or slightly posterior to 5-C, 5-C with 2-4 stiff branches, 7-C with 5-9 simple branches, 11-C with 3-5 branches; mentum with 15-17 teeth. *Antenna.* Seta 1-A double. *Thorax.* Seta 0-P with 4-6 weak branches, 3-P with 7-9 strongly barbed branches, 4-P with 7-10 lightly barbed branches, 7-P with 3-5 strongly barbed branches, 14-P with 12-16 strong, sharply pointed, barbed branches; 1-M, T stellate, with 3-5 strong, lightly pigmented, acutely pointed branches, 14-M similar but branches weaker; 3-T single to triple, each branch strong, acutely pointed, 5-T single, stout, acutely pointed, darkly pigmented, 13-T with 4, 5 stiff branches. *Abdomen.* Seta 1-I single, minute, 2-I, II single, stout, acutely pointed, darkly pigmented, about 1.0 or less than length of antenna, 6-I, II double, branches barbed, acuminate, ventral branch shorter, 11-I stout, spine-like, similar to 2-I, II, slightly longer; 1-II-IV single or rarely double, stiff, pigmented, 5-II minute, 9-II-V single, long, stout, stiff, pigmented, 5-II minute, 9-II-V single, long, stout, acutely pointed, darkly pigmented, 13-II-V double, stiff; 5-III single, short, strong, acutely pointed, 6-III-VI usually double (1, 2); 5-IV-VI single, stout, very similar to 2-I, II and slightly shorter than similar 9-II-V, usually finely barbed towards base; 1-V, VI single or double; 1-VIII single or double, usually lightly barbed, 3-VIII with 7-9 strongly barbed branches; comb scales 15-21, on a small weakly sclerotized plate, each scale near equal in length and width, evenly spaced, rather long, narrow, rounded apically, with very fine spiculate lateral fringe and stronger apical fringe. *Segment X.* Saddle incomplete, pale yellowish, lightly imbricate, with 2-4 exceptionally long, stout spines on dorsal posterolateral margin followed by numerous stout and weak interspersed spicules ventrally, several scattered short, stout submarginal spicules near the very large dorsal marginal spines; 1-X double, 4a-e-X with 8-11, 2-6, 8-10, 6-9, 6-7 branches respectively, 4b-X on one

side consistantly double or triple and significantly longer than the others. *Siphon.* Light yellowish brown; index 3.7-4.0; pecten teeth 16-24, reaching to 0.49-0.52 of siphon; apical 1-3 teeth longer and stronger, simple, spine-like and slightly detached from others, more basal teeth fringed with rather strong spicules apically; seta 1-S with 5-10 barbed branches, usually longer than siphon width, inserted slightly beyond distal pecten tooth at 0.57-0.60 of siphon.

TYPE-DATA. Holotype male with terminalia on slide in the BMNH with the following label data: Type, *Uranotaenia jacksoni.* Det. F. W. Edwards 1934, China (Hongkong) 1934, R. B. Jackson. It is in rather good condition.

Holotype male of *Uranotaenia stonei* with terminalia on slide in USNM with the following collection data: Chizuka, Okinawa, September 1945, R. Bohart and R. Ingram, collectors, collected on damp rocks above a stream. It is in excellent condition.

DISTRIBUTION. Material examined: 31♂, 16♀, 14 L; 7 with associated skins (7 l, 7 p).

HONG KONG. 1♂.

JAPAN. *Ryukyu Islands, Okinawa:* Chizuka; E. Taira; Ganjanokobanta; Hedo; 30♂, 16♀, 14 L, 7 l, 7 p.

Bohart (1959) reported *stonei* (= *jacksoni*) from Ishigaki Island but this record was based on misidentified specimens of *ohamai* and *yaeyamana* (see under these species).

DISCUSSION. The adult of this species is recognized primarily by the characters presented in the key. There are only about 4 other species of *Pseudoficalbia* in Southeast Asia with pale scaled basal tergal bands and uniformly pale or indefinitely marked pleuron. Only 2 of these belong to the *recondita* series. These are *abdita* and *enigmatica.* The remaining 2, *demeilloni* and *lutescens* belong to the *bicolor* series and in addition to the key characters presented, there are also characters in the series description which help to separate these 2 species. Although the original descriptions of *jacksoni* and *stonei* referred specifically to the darker postspiracular area and a small dark spot on upper sternopleuron this is not a very conspicuous character on the types of either. These 2 areas could at best be termed as indefinitely darker, for they are not very distinct. The delicate opaque setae on anterior margin of the sternopleuron, just above the midanterior angle, are diagnostic, but they are difficult to detect at some angles, due to the lack of pigmentation. If the specimen is properly oriented the setae are rather conspicuous and were present on all specimens examined, including the types of *jacksoni* and *stonei.* The only other known species of *Pseudoficalbia* with similar setae on the anterior margin of the sternopleuron is *pylei,* but this species is without pale scaled abdominal bands.

The male terminalia are very similar to those of *yaeyamana* and do not differ significantly from this species. In *jacksoni,* the apical margin of tergum IX is usually very slightly emarginate, tergum X is more strongly developed tergomesally, usually the median teeth on apicosternal margin of aedeagal plates are only slightly smaller than the tergal and sternal-most teeth. In *yaeyamana,* tergum IX is more rounded on apical margin, tergum X is very weakly developed and membranous tergomesally and the median teeth on apicosternal margin of aedeagus are conspicuously smaller than the tergal and sternal-most teeth.

The larva is most similar to that of *yaeyamana* and could easily be confused with this species. Differences between the larva of the 2 are discussed under *yaeyamana.* The pupa is most similar to *ohamai* and differs mainly in

characters presented in the key.

BIONOMICS. Immature stages have been examined from the following habitats: deep rock hole of narrow diameter in rocky clay bank above a stream (1), cliffside rock hole (1) and crab hole (1). Bohart and Ingram (1946b) report, "Larvae occur in deep rock holes along banks of streams. They are shy and difficult to find even when adults are abundant. We found a total of 4 larval breeding places, all during late August and September 1945. Three of these were in heavily shaded rock holes and the other was a hillside spring. The spring was a foot below the surface in gravelly ground and opened to the surface by a hole with a diameter of 1 1/2 inches. It contained about 2 gallons of water, about 100 larvae and pupae of *stonei* and a few larvae of *Culex tritaeniorhynchus*. Larvae of *U. stonei* hang straight down from the water surface and have a very sinuous movement when disturbed. Adults rest in hillside spring holes and in other damp situations along streams. They were not observed to bite." From the above observations it would appear that the immature habitat is rather typical of several members of the *recondita* series, namely, fresh water crab holes or small concealed holes simulating the crab hole environment. More recent collections of *jacksoni*, made by personnel of the U. S. Army Medical Laboratory Pacific are from crab holes (Kazuo Tanaka, personal communication).

URANOTAENIA (PSEUDOFICALBIA) KOLI PEYTON AND KLEIN
(Figs. 1, 57, 58)

Uranotaenia koli Peyton and Klein 1970: 246 (A, ♂, L, P).
Uranotaenia (Pseudoficalbia) koli Peyton and Klein, Peyton 1972: 36; Tanaka, Mizusawa and Saugstad 1975: 30 (A, L, taxonomy).

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark brownish black, a few fine inconspicuous setae scattered on dorsal and ventral aspects near apex; 1, 2 pairs of labial basal setae; palpus about 0.1 of proboscis and slightly less than length of antennal flagellomere 1; clypeus dark brownish black; antennal pedicel light brown with a few minute setae and grayish translucent scales dorsomesally; flagellum about 1.34 of proboscis or exceeding proboscis by combined length of flagellomeres 11-13, Flm 1 about equal to Flm 2, with a small patch of brown scales near base; flagellar whorls each with 6 setae; 1 long, strong and 1 very weak interocular and 5, 6 ocular setae; decumbent scales dark brown on vertex, surrounded by a narrow continuous line of gray scales on anterior, lateral and posterior margin, gray scale line on posterior margin meeting at nape and extending forward to midvertex; erect scales long, numerous, covering most of dorsal surface, dark brownish black. *Thorax* (Fig. 1). Scutal integument light orange-brown, a narrow anterolateral grayish area above *ppn;* scales mostly narrow, curved, light bronzy brown, small distinct patches of narrow and moderately broad gray-white scales with bluish reflections on anterior margin from about middle of *ppn* to dorsocentral line and at acrostichal line; prescutellar space with scales on anterior half; scutellum orange-brown, scales dark brown; mesopostnotum dark brown or brownish black, whitish at basolateral corners; paratergite light brown; pleuron yellowish white with very conspicuous dark brownish black areas as follows: whole of *apn, ppn, psp, ppl,* upper *ssp* and *pra* lobe, *stp* dark on upper 0.25 and with a large midanterior dark spot, *mep* dark on upper posterior corner and with a large dark spot involving most of lower

0.33; *apn* with a line of loosely arranged light grayish brown scales; *ppn* with 1 seta and a conspicuous upper posterior patch of brownish black scales with weak blue-green reflections; *sp* with 1, 2 setae; *ppl* with 1, 2 strong and 5, 6 delicate setae and 2, 3 gray translucent scales; *stp* with 15, 16 setae along upper and posterior margin, upper 6, 7 more darkly pigmented than lower 9, 10 and with a large inconspicuous patch of flat shiny colorless translucent scales on upper 0.33-0.40, with a narrow extension down posterior margin; *mep* with 4-6 upper setae and 2, 3 pale translucent scales near upper setae. *Wing*. Scales dark brown; cell R_2 about 0.42 of R_{2+3}. *Legs*. Coxae, trochanters and pale areas of pleuron concolorous; C-I with a distinct basal anterior brown spot, covered with dark brown scales; C-II, III each, with a few inapparent anterolateral translucent scales; femora dark brown scaled dorsally, light grayish brown ventrally; forefemur with about 14 setae along length of posterodorsal margin and 20-30 long setae scattered on all aspects between basal 0.25 and 0.75, longest and more concentrated near middle, a dense patch of minute, shiny, semierect setae usually visible on middorsal surface; midfemur with a distinct dorsal row of 9-11 long sinuate setae from near base to beyond 0.5 and 28-32 long setae scattered about anterior, ventral and posterior aspects, longest and more concentrated near 0.5, a dense patch of minute, shiny semierect setae usually visible on midposterior surface; hindfemur with a few inconspicuous setae on dorsal margin; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 about 1.1 of tibia, hindtarsomere 4 about 2.4 of tarsomere 5. *Abdomen*. Terga predominantly dark brownish black scaled with very distinct creamy white scaled basal bands on III-VI, bands equal to about 0.25 the length of each tergum dorsally, narrowing laterally but usually reaching lateral margin; terga II, VII with narrow incomplete basal pale bands or a few dorsal pale scales only, tergum VIII entirely whitish or ochreous scaled dorsally, light brown scaled laterally; laterotergite with a small patch of gray translucent scales; sterna with pale creamy white integument and scales, with distinct narrow basal bands of light brown scales on VI, VII and occasionally V.

MALE. Similar to female in general habitus but with the following differences. *Head*. Proboscis about 0.98-1.00 of forefemur; flagellum strongly plumose, length about 0.98-1.00 of proboscis, flagellomeres 12, 13 subequal in length, each longer than combined length of 10-11; flagellar whorls each of 20 or more setae. *Wing*. Cell R_2 about 0.45 of R_{2+3}. *Legs*. Hindtarsomere 1 about 1.14 of tibia, hindtarsomere 4 about 2.38 of tarsomere 5. *Abdomen*. Terga III-VI with creamy white basal bands wider, occupying about 0.3-0.5 the length of each tergum, pale band on II narrow but more obvious than in female, band on VII incomplete as in female but usually 0.25 or more the length of tergum; VIII (when visible) with a basolateral and median apical patch of creamy white scales. *Terminalia* (Fig. 58). Tergum IX lightly pigmented, basal emargination shallow and broad; tergum X complete dorsally but very weakly sclerotized, produced tergolaterally beyond apical margin of tergum IX into short, broad, rounded lobes; tergomesal surface of basimere with numerous long slender setae but with one seta tergolateral to basal mesal lobe conspicuously longer and stronger than the rest; basal mesal lobe of basimere with 1 very long stout apical seta and 1, 2 similar but shorter subapical setae, several short weaker setae basal to these, 1 long strong and several short weaker setae along sternal margin; distimere slender, curved and tapered at apex, distal 0.3 with several small setae, spiniform small, stout, acute; plates of aedeagus each with 2 strong subapical tergomesal teeth and a row of 3 (3, 4) broad grooved teeth on apicosternal margin, the median 1, 2 not signi-

ficantly smaller than the others; proctiger with 1, 2 cercal setae on each side.

PUPA (Fig. 58). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Most setae with rather stout primary branches which are often split into numerous, highly variable, secondary end branches or with heavy lateral barbs distally, which often produce a brush-tipped appearance. Generally, the higher the range of individual branches for a given seta, the weaker, more simple, the branches and in the lower range, the stronger the branches and the more extensive the distal splitting or lateral barbs. Integument light brown, slightly darker on posterior 0.5 of scutal plate, on metanotal plate and segments II, III. *Cephalothorax.* Setae 1-3-CT with 2-6 branches from beyond base, 5-CT with 3-7 branches, 8-CT with 6-8 branches, 9-CT with 2-9. *Respiratory Trumpet.* Light brown, indistinctly tracheoid on anterobasal 0.2; index 3.8-5.1, not noticeably expanded distally. *Metanotum.* Seta 10-CT single with 2-5 distal branches, 11-CT single or double with a few distal branches, 12-CT with 3-6 primary branches, with or without heavy distal barbs. *Abdomen.* Seta 1-II with 3-9 branches, 2-II single, longer than segment III, 3-II, III stout, single, usually distally barbed or weakly brush-tipped; 1-III with 2-5 barbed branches, 6-III-V short, with 2-4 lightly barbed branches; 1-IV with 3-6 branches, 5-IV usually single, rarely double, about 1.5 the length of segment V; 1-V double or triple, 5-V single, about equal to combined length of segments VI, VII; 1-VI usually double (1-3), 5-VI single, longer than combined length of segments VII, VIII, 6-VI usually double, rarely single, longer than 6 on preceeding segments but less than length of segment VI; 1-VII single with distal branching, 5-VII single or double, usually rather strong with fine distal barbs, usually slightly less than length of segment VIII, 6-VII with 2-4 barbed branches, located ventrally, 9-VII single to triple; 9-VIII with 7-12 stout, strongly barbed branches. *Paddle.* Outer margin with short saw-tooth spicules from about basal 0.25 to apex, inner margin with 8-15 long, stout, straight, widely spaced spines, each spine usually expanded at margin of paddle and then tapered to a narrowed, often pointed, lightly pigmented base which is anchored well within the paddle margin, a few spines toward base much smaller.

LARVA (Fig. 57). Chaetotaxy as figured. Diagnostic characters as in series description and the following. A few stellate setae of thorax and abdomen with stout, pigmented, acutely pointed branches. *Head.* Light brown, darker posterolaterally and on collar; apicomesal projection of labral process short and rounded, about 0.25 of 1-C; seta 4-C with 3-6 branches, inserted on line with and mesad of 5-C, 5-C with 5-9 stiff branches, 7-C with 9-13 branches, 11-C with 3-6 branches, 14-C single; mentum with 15-17 teeth. *Thorax.* Seta 0-P dendritic, 1-P double, 3-P with 8-13 branches, 4-P with 7-12 branches, 7-P with 4-6 branches, 14-P with 16-24 stout, barbed branches; 13-M dendritic; 14-M stellate, with 4-7 stout branches; 3-T with 3-4 stout branches, 13-T with 5-8 branches. *Abdomen.* Seta 1-I stout, pigmented, usually single, spine-like, occasionally branched (2-4), 2-I, II a long stout acutely pointed, simple or finely barbed spine, 6-I double, with ventral branch slightly shorter, 11-I with 2, 3 long, stout, acutely pointed simple branches; 1-II with 2-4 stout branches, rarely single, 5-II stout spine-like about 0.25 of 2-II, 6-II double, significantly shorter than 6-I, 9-II-V a long, stout, acutely pointed, simple spine, longer than antenna and slightly longer than the very similarly developed 5-III-VI, 13-II-VI with 3, 4 stout, sharp pointed branches; 1-III, V with 3, 4 stout, sharp pointed branches, 6-III-V with 2 (2, 3) subequal branches; 1-IV with 4 stout, sharp pointed branches; 1-VI with 2-4 stout, sharp pointed branches, 6-VI with 3 unequal branches, 9-VI a small simple spine; 1-VII stout,

double or triple; 1-VIII with 3 long, stout, lightly barbed branches, inserted on a long narrow sclerotized plate with 2-VIII; comb scales 11-16 on a small sclerotized plate, scales of near uniform length and width, each lightly fringed laterally from base to apex, terminal spicules slightly stronger. *Segment X.* Saddle complete, with a few short, stout, sharp spines on posterolateral margin; 1-X triple, branches subequal, 4a-e-X with 5-8, 3-7, 7-8, 6-8, 5-8, branches respectively. *Siphon.* Light brown; index 3.6-4.0; pecten teeth 14-22, not extending beyond 0.5 of siphon, each tooth with fine fringe of spicules on side toward base of siphon and on apex, apical spicules only slightly stronger; 1-S with 6-11 strong, lightly barbed branches, about 1.5 the median width of siphon, inserted at about basal 0.48 of siphon and slightly beyond distal pecten tooth.

TYPE-DATA. Holotype female with slide of pupal and larval skin in the USNM with the following information: THAILAND, Khao Sai Dao Mountain, *Chanthaburi,* 24 March 1966, Kol Mongkolpanya, collector, collection number 00937-1, SEAMP accession number 79, collected as a larva from a small fresh water crab hole along the bank of mountain stream at an elevation of 700 m. The allotype male and several paratypes also in USNM; 2 males, 2 females and 2 larvae of the paratype series are to be deposited in the BMNH.

DISTRIBUTION. Material examined: 38♂, 43♀, 92 L; 66 with associated skins (13 l, 66 p).

CAMBODIA. *Kompong Speu:* Kirirom, O-Tachat, 2♂.

THAILAND. *Chon Buri:* Khao Mai Ha Wa; Bang Lamung; 5♂, 9♀, 22 L, 6 l, 11 p. *Tak:* Khao Salak Phra, 1♀, 4 l, 1 L, 1 p. *Prachin Buri:* Ban Bu Phram, 6♂, 11♀, 16 L, 17 p. *Chanthaburi:* Khao Sai Dao, 22♂, 15♀, 35 L, 2 l, 30 p. *Lampang:* Ban Pa Khoi, 4 L. *Nakhon Ratchasima:* Khao Suan Hom; Khai Phai; 3♂, 3♀, 11 L, 5 p. *Chiang Mai:* Ban Mae Nam Nauk, 2♀, 2 p.

VIETNAM. *Tuyen Duc:* Fyan, 2♀.

DISCUSSION. In general adult ornamentation, this species is very similar to *stricklandi* and to a lesser extent *spiculosa.* The dark areas of the pleuron vary from a light brown to occasionally black but the 2 separate dark areas on *stp* and *mep* are always visible and the middle of *mep* is always bare. The immature stages of this species, *ohamai* and *stricklandi* are also similar but the differences in the keys and descriptions are constant for the sample examined. The chaetotaxy of the pupa is quite variable, as many of the individual setae have stout primary branches with secondary branching or strong lateral barbs or split ends. However, the general pattern of branching is somewhat typical and recognizable for the species. As stated earlier the nature of individual branches varies with the range of primary branching. The fewer the branches the more extensive the lateral barbs or terminal splitting and the greater the number of branches for an individual seta the more simple the individual branches. Some specimens with a seta in the higher range of branching have the individual branches often simple. These conditions appear to be environmentally induced since it has been observed from most localities and in crab holes from the same locality. Specimens of both types were observed in single collections but crab hole collections from Thailand were often pooled and therefore it is not possible to say that this occurs in a single habitat. By far the most common form is with fewer, heavily barbed branches as figured. The spicules on the inner margin of paddle are typical for the species and there is little variation within the various populations.

The multiple-branched seta 5-C of the larva of *koli* is rather unusual for the genus and is known elsewhere only in *confusa, jacksoni, ohamai, stricklandi* and *yaeyamana,* all of which belong to the *recondita* series. Variation of

individual setae is within normal limits, there are no obvious differences that can be correlated with the pupal differences although a few specimens exhibit slightly stronger branches of some setae. Generally, the stout stellate setae of thorax and abdomen are stronger and more acutely pointed than in *stricklandi* and *yaeyamana*.

BIONOMICS. This species is restricted to forested hills and mountainous areas. The immature stages have been collected in Thailand from the following habitats: crab holes along the banks of shallow fresh running streams (27); elephant footprint in a bog where crab holes were present (1). On 29 occasions it has been recorded at elevations of 15-1,000 m. The species was often collected in Thailand in association with *abdita* and *spiculosa* both of which are common crab hole breeders. Adults have been collected resting on vegetation or rocks along stream margins.

URANOTAENIA (PSEUDOFICALBIA) NOCTICOLA NEW SPECIES
(Figs. 59, 60)

FEMALE. *Head.* Proboscis about 0.92 of forefemur; prementum dark brown scaled and with a few inapparent setae on distal ventral and dorsal margins and at apex; 1 pair of labial basal setae; palpus about 0.12 of proboscis and slightly longer than antennal flagellomere 1; clypeus dark, brownish black; antennal pedicel light yellowish brown, bare; flagellum about 1.2 of proboscis or exceeding proboscis from near apex of flagellomere 11; Flm 1 slightly longer than Flm 2 and with a few brown scales basomesally; flagellar whorls each of 8-9 setae; 1 long, stout interocular and 5, 6 ocular setae; decumbent scales uniformly dull gray with a tinge of light brown in center in some lights and with faint bluish green reflections laterally; erect scales long, numerous, covering most of dorsal surface, dark brown in color. *Thorax.* Scutal integument uniformly pale yellowish or straw-brown; scales narrow, curved, uniformly light grayish brown; prescutellar space mostly scaled, a very small posterior bare space; scutellum same color as scutum, scales a medium brown with strong blue-green reflections; mesopostnotum and paratergite light grayish brown; pleuron uniformly pale grayish brown, almost whitish, no strong contrast with slightly darker scutum; *apn* with usual number (2 upper, 1 lower) of strong setae and devoid of scales; *ppn* with 1 seta and 2-4 broad light brown translucent scales on upper posterior corner; *sp* with 1 seta; *ppl* with 1 long, strong and 3-5 short, weak, setae; *stp* with 13-16 setae on upper and posterior margins, upper 7-8 long, strong, remainder short, delicate, and with a few scattered, broad light brown translucent scales on upper 0.5; upper *mep* with 3-5 setae. *Wing.* Scales dark brown; cell R_2 about 0.4 of R_{2+3}. *Legs.* Coxae and trochanters same color as pleuron; C-I with a few scattered, light brown translucent scales on anterior surface; C-II, III with a few similar, less apparent scales anterolaterally; femora dark brown scaled dorsally, lighter grayish brown ventrally, without a conspicuous arrangement of setae; forefemur with the usual anteroventral and posterodorsal rows of setae and midfemur with a few dorsomarginal setae on basal 0.5; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.13 of tibia, hind tarsomere 4 about 2.35 of tarsomere 5. *Abdomen.* Terga uniformly dark brown scaled with purple-green reflections; laterotergite with a few light brown translucent scales; sterna uniformly light grayish brown.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.9 of forefemur; 1, 2 pairs of labial basal setae; antennal

flagellum strongly plumose, whorls each of more than 20 setae, about 1.1 or slightly less of proboscis; flagellomeres 12, 13 subequal or 12 slightly longer. *Wing.* Cell R_2 about 0.35 of R_{2+3}. *Legs.* Hindtarsomere 4 about 2.0 of tarsomere 5. *Terminalia* (Fig. 60). Tergum IX long, broadly rounded on apical margin; tergum X complete tergomesally, weakly sclerotized, produced tergolaterally into short, very broad rounded lobes which project beyond apical margin of tergum IX; tergomesal surface of basimere with numerous scattered, short, weak, setae only; basal mesal lobe of basimere with 2 long stout, tergoapical setae, each on raised process, 2, 3 strong but much shorter and weaker setae slightly basal to these and 8-11 short, weak, basal setae, 1 long, strong, and 1, 2 weak setae on sternal margin; distimere curved and tapered to pointed apex; spiniform small, stout, acute; plates of aedeagus each with 2 stout subapical tergomesal teeth and a row of 3 (2-4) stout curved teeth on sternoapical margin, each nearly equal to the tergal and sternal-most teeth, grooved; proctiger with 1 cercal setae on each side.

PUPA (Fig. 60). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown. *Cephalothorax.* Seta 1-CT with 3, 4 branches, 2, 3-CT with 2-4 branches, occasionally bifid or trifid, 4, 5-CT with 3-5 sparsely barbed branches, 8-CT with 5-7 sparsely barbed branches. *Respiratory Trumpet.* Pale brown, distinctly tracheoid on anterobasal 0.2; index about 3.8, not noticeably expanded apically. *Metanotum.* Seta 10-CT single to 4 branched, 11-CT single, strongly brush-tipped, 12-CT with 2-4 sparsely barbed branches; alveolus of 13-CT very inapparent or occasionally absent, developed 13-CT very rarely present (1 specimen). *Abdomen.* Seta 3-I single, strongly brush-tipped, 6-I-II single or double very lightly barbed; 1-II with 14-25 branches, individual branches varied, simple, sparsely barbed or with terminal fringes, 3-II, III stout basally, strongly brush-tipped; 1-III with 5-8 sparsely barbed branches, 6-III-V single or double, usually finely barbed; 1-IV with 4-6 sparsely barbed branches, 5-IV double, rarely single, lightly barbed, occasionally with split ends, about 1.25-1.50 of segment V; 1-V with 2-4 sparsely barbed branches, 5-V usually double, occasionally single on one or both sides, sparsely barbed about 1.5 or more of segment VI; 1-VI usually double, rarely triple, sparsely barbed, 5-VI usually double, occasionally single, sparsely barbed, 1.5 or more of segment VII, 6-VI single or double or with 2-5 terminal branches, longer than segment VII; 1-VII single or double, sparsely barbed, 5-VII single or double, slightly less than length of segment VIII, 6-VII located ventrally, single or double, branches stiff, lightly barbed, 0.5 or more of segment VIII, 9-VII similar to 6-VII with 2-4 stiff branches; 9-VIII with 5-8 strongly barbed branches, individual branches often with terminal branching, significantly longer than segment VIII. *Paddle.* Midrib light brown from base to apex; outer margin with rather widely spaced serrations from about basal 0.33 to apex; inner margin with scattered spicules on apical 0.33 and a few smaller submarginal spicules, spicules toward apex slightly stronger and more concentrated; apex with very shallow emargination.

LARVA (Fig. 59). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown; seta 4-C with 3-6 delicate branches, 7-C with 6-10 simple or finely barbed branches, 11-C with 3, 4 branches; mentum with 13 or 15 teeth. *Antenna.* Light brown, slightly darker than cranium, seta 1-A double or triple. *Thorax.* Seta 0-P small, with 4, 5 weak branches, 3-P with 7-9 barbed branches, 4-P with 9-12 branches, 7-P with 3-6 strongly barbed branches, 14-P with 18-23 strong, sharply pointed branches, each with short, stout, lateral barbs to

near apex; 1-M stellate, with 6-9 strong, simple or finely barbed, sharply pointed branches, 14-M stellate, with 7-9 stiff branches; 1-T with 4-6 strong, acutely pointed, lightly barbed branches, 3-T stellate, with 4-7 strong, sharply pointed, sparsely barbed branches, 5-T single to 4 branched, each strong, acutely pointed, 13-T stellate, with 6, 7 strong, sharply pointed branches. *Abdomen.* Seta 1-I stellate, with 4-6 moderately stout, acutely pointed, lightly barbed, darkly pigmented branches, 2-I, II with 3-5 similar branches, 6-I, II double, moderately stout, acuminate, strongly barbed, 11-I stellate, with 4-8 moderately stout, acutely pointed, lightly barbed, darkly pigmented branches; 1-II-VI stellate and similar to 1-I except that individual branches become progressively longer, weaker and less acutely pointed on each segment, 5-II with 2-4 stiff branches; 9-II-VI single, stout, acutely pointed, spine-like, darkly pigmented, long, each about equal in length; 13-II-V stellate, with 4, 5 stiff, simple or finely barbed branches; 2-III double or triple, branches long, moderately stout, acutely pointed, darkly pigmented, 5-III-VI single, long, stout, spine-like, darkly pigmented, sparsely barbed, slightly shorter than similar 9-II-VI, 6-III-VI with 3 unequal, barbed branches; 2-IV-VII single (rarely double), long, spine-like, simple or sparsely barbed on basal 0.5; 1, 3-VII with 3, 4 long, barbed branches; 1-VIII double, long, strong, barbed, 3-VIII with 5-7 heavily barbed branches; comb scales 8-10, on a small distinctly sclerotized plate, all scales of near equal length and width, closely approximated, bases usually touching, each scale long, broad, sharply pointed, with conspicuous short stout lateral spicules from base to near apex, distal spicules slightly stronger. *Segment X.* Saddle incomplete, pale brown, very weakly and inconspicuously imbricate on basal 0.80, more apical imbrications strongly spiculate, with several (8-11) short, stout, subequal, darkly pigmented spines on dorsal posterolateral margin, followed by numerous fine marginal and submarginal spicules; seta 1-X double or triple, 4a-e-X with 4-6, 2-3, 3-4, 3-4, 2-4 branches respectively, branches of each arising from near the same point, 4b-X on one side, conspicuously longer than 4b-X on opposite side and the others. *Siphon.* Light brown, inconspicuously imbricate from base to apex; index about 3.3-4.0; pecten teeth 16-20, reaching to about 0.42 of siphon; each tooth conspicuously fringed apically with strong sharp spicules, variously fringed laterally, usually with fine spicules on side toward base of siphon and a few teeth often with a few fine spicules on opposite side; seta 1-S with 7, 8 barbed branches, inserted beyond distal pecten tooth at about 0.48-0.50 of siphon.

TYPE-DATA. Holotype male with slides of terminalia and pupal and larval skins with the following collection data: THAILAND, *Chiang Mai*, Chiang Dao, 26 September 1970, Kol Mongkolpanya, collector, collection number 4832-16, SEAMP accession number 241 and SEAMP terminalia preparation number 70/1119, collected as a larva from a pool inside a cave at an elevation of 1,520 m. Paratypes: 7 females (3 on slides), 8 males (2 on slides), each with associated skins on slides, same data as holotype, numbers 4832-2, -3, -4, -6, -7, -8, -9, -10, -12, -13, -14, -15, -17, -100, -101, -102, -103 and 6 fourth stage larvae on slides, number 4832, SEAMP accession number 271.

The holotype and paratypes are in excellent condition and are deposited in the USNM. Paratypes of 1 male and 1 female with associated skins will be deposited in the BMNH.

DISTRIBUTION. Material examined (including type-series): 12♂, 7♀, 6 L; 19 with associated skins (14 l, 19 p).

THAILAND. *Chiang Mai:* Chiang Dao, 12♂, 6♀, 6 L, 14 l, 18 p. *Kan-*

chanaburi: Ban Sai Yok, 1♀, 1 p.

DISCUSSION. This species resembles *pylei* and *sumethi* in adult habitus features but differs significantly from these 2 species in the male terminalia and immature stages. Although the sample is rather small, characters in all stages appear to be stable and each stage is distinctive. The species does not appear to be closely related to either of the above 2 species. The most significant adult characters for separating this species from *pylei* and *sumethi* are discussed under *sumethi*. The most significant characters of the male terminalia are as follows: all setae on tergomesal surface of basimere are uniformly short and weak; plates of aedeagus with 2 stout superimposed, subapical, tergomesal teeth; basal mesal lobe with 2 long stout tergoapical setae and 2, 3 strong but significantly weaker setae basal to these. In the other 2 species the setae on tergomesal surface of basimere are of varied lengths and thickness, at least some long and usually strong; plates of aedeagus with a single broad subapical tergomesal tooth; basal mesal lobe with 3 or more stout tergoapical setae. The 2 stout setae on basal mesal lobe of *noticola* are the least developed of all species in the *recondita* series. At least one of these setae on the other species is exceptionally stout.

The pupa is easily separated from that of *pylei* and *sumethi* by characters in the key. Abdominal seta 5-IV-VI varies from single to double but it is usually double. One specimen has 5-V single on both sides, but generally seta 5-V is single only on one side of one or 2 segments, but never single on all segments. This seta is single in both *pylei* and *sumethi*, therefore, the character used in the key will separate this species. The strong brush-tipped setae 11-CT, 3-I-III are not as heavily brush-tipped as on *sumethi*. Seta 3-II on the holotype pupa is mesal to 2-II on the right side of the specimen but on the left side the position of 3 and 2-II are reversed. This appears to be a true case of shifting since both setae on each side are equally developed.

The most significant larval characters are as follows: seta 14-P with 18-23 branches; moderately stout branched seta 2-I-III and long, single, spine-like 2-IV-VII; long, single, stout, spine-like setae 5-III-VI and 9-II-VI; 8-10 apically pointed comb scales with short stout lateral spicules; incomplete saddle of segment X. All of these differ from the aforementioned species.

BIONOMICS. The species has been collected in the immature stages on 2 occasions from pools inside caves. A single pupa was collected from a pool far inside a cave at Ban Sai Yok, Kanchanburi Province at an elevation of 130 m in 1965 and again in 1970 (type-series). The 2 localities are widely separated but both are from the same mountain range along the northwestern border of Thailand. The cave in Kanchanaburi Province is located only a few miles west of the Gang Lawa cave where *sumethi* was commonly found. Since caves have not been systematically examined in Southeast Asia, very little is known of their fauna. The 2 known cave inhabiting species may prove to be rather widely distributed in Thailand.

URANOTAENIA (PSEUDOFICALBIA) OHAMAI TANAKA, MIZUSAWA AND SAUGSTAD
(Figs. 61, 62)

Uranotaenia stonei of Bohart 1959: 196 (in part, misidentification).
Uranotaenia (Pseudoficalbia) ohamai Tanaka, Mizusawa and Saugstad 1975: 27 (♂*, ♀, L*).

FEMALE. *Head.* Proboscis about 0.92 of forefemur; prementum dark brown scaled, with a few small inconspicuous setae on ventral margin and at apex; one pair of labial basal setae; palpus about 0.11 of proboscis and about 1.0 of antennal flagellomere 1; clypeus dark brown; antennal pedicel dark brown mesally, lighter laterally, with a few fine setae and scales dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from base of flagellomere 11; Flm 1 about 1.0 of Flm 2 or slightly less, with a few light brown scales basomesally; flagellar whorls each of 6 setae; 1 long, strong and 1 weak interocular and 6 ocular setae; decumbent scales dark grayish brown in center, narrowly grayish or creamy white on ocular line and at sides; erect scales exceptionally long, dense, covering vertex to ocular line. *Thorax.* Scutal integument uniformly pale brown; scales narrow, curved, uniformly grayish brown; prescutellar space scaled on anterior 0.5; scutellum same color as scutum, scales dark brown; mesopostnotum a darker brown than scutum; paratergite whitish brown; pleuron mostly very pale brown or grayish brown with small distinctly dark brown areas on upper *apn*, whole of *ppn*, *psp* and upper 0.25 of *stp; apn* with grayish brown translucent scales, those on upper part faintly darker; *ppn* with 1, 2 setae and a few translucent scales near upper posterior corner; *sp* with 1, 3 setae; *ppl* with 1, 2 strong and 4-6 weak setae; *stp* with 14-17 setae on upper and posterior margin, upper 4-6 strong, dark and with a distinct patch of near colorless translucent scales on upper 0.33 with a few narrowly extending down posterior margin; upper *mep* with 5-7 setae and with a few pale transparent scales. *Wing.* Scales dark brown; cell R_2 about 0.5 of R_{2+3}. *Legs.* Coxae and trochanters pale brown; C-I with pale gray scales on anterior surface; C-II, III with a few transparent scales anterolaterally; femora dark brown scaled dorsally, grayish ventrally towards base; forefemur with 13-16 strong setae on posterodorsal margin for most of length, 3-5 stronger setae on distal anterodorsal margin and 3-5 stiff setae near middle on dorsal surface; midfemur with 9-12 weaker setae on dorsal margin of about basal 0.6, midanterior surface with about 8-10 scattered setae, apical 0.5 of posterior surface with about 8-10 scattered setae; tibiae and tarsi dark brown scaled; hindtarsomere 1 about equal to or slightly longer than tibia. *Abdomen.* Terga predominantly dark brownish black scaled, with complete pale creamy white scaled basal bands on III-VI, each band near equal in dorsal width, VII sometimes with an indistinct basal pale band; laterotergite with a few pale scales; sterna pale whitish, covered with creamy white scales, VI, VII often with a few darker scales.

MALE. Essentially as in female except for sexual differences. *Head.* Antennal flagellum strongly plumose, whorls each of more than 20 setae. *Terminalia* (Fig. 62). Tergum IX broadly rounded on apical margin; tergum X weakly developed, apparently membranous tergomesally, produced into short broad weakly sclerotized lateral lobes; tergomesal surface of basimere with a conspicuously long strong seta tergolateral to basal mesal lobe in addition to several smaller setae; basal mesal lobe of basimere with 2 long, stout tergoapical setae, 1 smaller strong seta and several weak setae basal to these, 1 long, stout and 2-4 weak sternoapical setae; aedeagus similar to other members of *recondita* series, sternoapical margin of each plate with 3, 4 curved teeth, with the most sternal strongest; distimere gently curved and tapered to apex; proctiger with 1, 2 cercal setae on each side.

PUPA (Fig. 62). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown on posterior scutal plate, metanotum and first 2-4 abdominal segments, lighter on other areas. *Cephalothorax.* Seta 4-CT with 4-6 branches; 5-CT with 5-9 strong,

lightly barbed branches; 8-CT with 6-10 strong, lightly barbed branches; 9-CT with 5, 6 branches. *Respiratory Trumpet.* Light brown, distinctly tracheoid on anterobasal 0.25; index about 4.0. *Metanotum.* Seta 10-CT with 3-8 branches usually from about 0.5, 11-CT single to triple; 12-CT with 5, 6 branches; alveolus of 13-CT present. *Abdomen.* Seta 1-II with 7-12 branches, 2-II 1.5 or more the length of segment III; 3-II, III stout on basal 0.5 or more, with 5-10 delicate terminal branches; 1-III with 5, 6 branches; 5-III with 5-10 branches; 1-IV with 5 (3-6) branches, 5-IV strong, double about 1.5 the length of segment V; 1-V with 3, 4 branches, 5-V, VI strong, double, each about equal to 2.0 the length of succeeding segments; 1-VI double or triple, 6-VI strong, single, longer than segment VII; 1-VII single or double, 5-VII single or double, slightly less than length of segment VIII, 6-VII located ventrally, with 2-4 branches; 9-VIII strong, with 6-10 strongly barbed branches, some strongly frayed terminally, longer than segment VIII. *Paddle.* Midrib lightly pigmented to apex; outer margin with fine saw-tooth spicules, with a few apically much closer together, straight and spine-like; inner margin with fewer straight spicules on apical 0.3, with a few minute crenulations towards base; apex very shallowly emarginate.

LARVA (Fig. 61). Chaetotaxy as figured. Diagnostic characters as in series description and the following. All stout setae of thorax and abdomen dark brown, most stout setae of abdomen with acutely pointed branches. *Head.* Light yellowish brown, collar darker; seta 4-C double to 4 branched, on level with 5-C; 5-C with 3-7 stiff branches, 6-C single, stout on basal 0.5, 7-C with 7-11 branches, 11-C double or triple, 14-C single; mentum with 14-16 teeth. *Thorax.* Seta 3-P with 5-10 barbed branches, 4-P with 4-9 barbed branches, 7-P with 3, 4 barbed branches, 14-P stellate, with 5-12 stout, barbed branches, ends acute or frayed; 1-M with 3-7 and 1-T with 4-6 acute branches. *Abdomen.* Seta 1-I single to 4 branched, stout, 2-I single, long, single, spine-like, 11-I double or triple, long, stout; 1-II double to 4 branched, stout, 2-II single, long, stout, spine-like, 6-II double, branches equal, shorter than 6-I and slightly shorter than 6 on succeeding segments, 9-II-V single, long, stout, spine-like, 13-II-V with 2-4 stout branches; 1-III single to 4 branched, stout, 5-III-VI single, long, stout, 6-III single to triple, lightly barbed; 1-IV-VII with 2-4 stout branches, 6-IV-VI double or triple, branches equal; 4-V double or triple, stiff; 13-VI with 3-7 stiff branches; 3-VII triple, branches unequal; 1-VIII double or triple, 3-VIII with 6-9 barbed branches; comb scales 13-17, on a small poorly sclerotized plate, each scale long, narrow, of near uniform width from base to apex, fringed with fine spicules laterally and slightly stronger ones apically. *Segment X.* Saddle narrowly complete ventrally, light yellowish brown, posterolateral margin with short stout spicules; 1-X double or triple. *Siphon.* Light yellowish brown; index 3.5-4.0; pecten teeth 14-24, evenly spaced, reaching to basal 0.40-0.48, each tooth fringed with spicules on basal side and on apex, those on apex slightly stronger; 1-S with 4-7 lightly barbed branches, usually inserted slightly beyond distal pecten tooth, longer than width of siphon.

TYPE-DATA. Holotype male with slides of terminalia and pupal and larval skins deposited in the National Science Museum, Tokyo, with the following information: JAPAN, *Yaeyama Gunto*, Yashigawa, Iriomote Is., 18 November 1971, K. Mizusawa, collector, collection number K-1028-7, collected as a larva from crab hole. A small paratype series of 2 males and 2 females with associated pupal and larval skins are deposited in the USNM. The holotype was not examined and the illustrations here were made from the paratype series.

DISTRIBUTION. Material examined: 9♂, 3♀, 2 L; 9 with associated skins (9 l, 9 p).

JAPAN. (Taken principally from Tanaka, Mizusawa and Saugstad 1975). *Iriomote Island:* Yashigawa, Funaura, Itokawa-rindô, Mt. Goza, Shirahama, Sonai, Yashigawa, Uehara. *Ishigaki Island:* Arakawa, Kabira, Mt. Banna, Mt. Maeshi, Yarabu, Yoshiwara.

Bohart (1959) reported this species from Ishigaki Island as *stonei*, however, I have borrowed most of Dr. Bohart's specimens from Ishigaki and find a mixture of *ohamai* and *yaeyamana*. I have not seen specimens of *stonei* (= *jacksoni*) from Ishigaki. Specimens of *ohamai* kindly loaned to me by Richard M. Bohart consist of 1 male and 7 females, all from sweeping on Mt. Banna and Mt. Maeshi (see also under *yaeyamana*).

DISCUSSION. Superficially this species resembles *approximata* in general adult habitus features, but the 2 are not related and the characters presented in the adult key will separate them. Of species in the *recondita* series, it appears to be more closely related to *koli* and *stricklandi*. The general resemblance of the 3 is greatest in the larval stage. In the adult stage, *ohamai* differs most significantly in the dark and light pleural pattern. In both *koli* and *stricklandi* the sternopleuron has 2 distinct dark spots and the mesepimeron is all dark in *stricklandi* and with 2 dark spots in *koli*. In the larva, *ohamai* differs significantly from *koli* in the following: seta 4-C, 1-A, 14-P. It differs from *stricklandi* significantly in the following: fewer teeth on mentum; complete anal saddle; fewer and stouter branches of 14-P; fewer and equal length branches of 6-III-VI; fewer branches of 1-S.

BIONOMICS. Tanaka, Mizusawa and Saugstad (1975) record the immature habitat as fresh water crab holes along shaded streamlets in lowlands or at the foot of mountains, very often found associated with *U. yaeyamana* and *Culex (Lophoceraomyia) tuberis* Bohart, occasionally with *C. (L.) minor* (Leicester), *C. (L.) infantulus* Edwards and *C. (Culiciomyia) ryukyensis* Bohart, and rarely with *A. (Stegomyia) albopictus* (Skuse) - group and *U. (U.) macfarlanei* (Edwards. The adults were commonly found resting in shrubbery or crab holes.

URANOTAENIA (PSEUDOFICALBIA) PYLEI BAISAS
(Figs. 2, 63, 64)

Uranotaenia pylei Baisas 1946: 45 (♂*, ♀, P*, L*). Delfinado 1966b: 52 (♂, ♀, L, P); Peyton and Rattanarithikul 1970: 411 (A, taxonomy). *Uranotaenia (Pseudoficalbia) pylei* Baisas, Peyton 1972: 37.

FEMALE. *Head* (Fig. 2). Proboscis about 0.82 of forefemur; prementum dark brown scaled, no conspicuous setae except a few small ones at apex; 2 pair of labial basal setae; palpus about 0.13 of proboscis or about equal to antennal flagellomere 1; clypeus dark brown; antennal pedicel light yellowish brown with 1, 2 minute setae dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from about flagellomere 11; Flm 1 barely longer than Flm 2 and with a few light grayish brown scales basomesally; flagellar whorls each of 6 setae; 1 strong and 1 minute interocular and 4, 5 ocular setae; decumbent scales light grayish or beige brown on vertex, narrowly and distinctly dull grayish white on ocular line but forming no sharply defined ocular line; grayish white with distinct blue-green reflections at sides; erect scales exceptionally long, numerous, covering most of dorsal surface, dark brown. *Thorax.*

Scutal integument light brown or a pale straw-brown; scales narrow, curved, uniformly light grayish or bronzy brown; prescutellar space mostly scaled, a very small posterior bare space; scutellum same color as scutum, scales dark brown; mesopostnotum dark brown, light grayish brown at basolateral corners; paratergite light yellowish brown; pleuron uniformly pale, light yellowish or grayish brown, little contrast with slightly darker scutum; *apn* with 2, 3 long, strong and 1-3 short, weak, lower setae and with a few loosely arranged, broad grayish brown scales; *ppn* with 3-5 setae and several scattered, light brown, broad, translucent scales with faint blue-green reflections on upper posterior corner; *sp* with 1, 2 setae; *psp* with a few inapparent, broad, shiny, transparent scales on posterior edge; *ppl* with 2, 3 long, strong, and 5-8 short, weak, setae; *pra* with 1, 2 setae, *stp* with a continuous row of 15-18 setae on upper and posterior margins, upper 12, 13 long, strong, remainder short, delicate, 3-6 delicate, opaque setae on midanterior margin just above midanterior angle and with a few small, broad, light brown translucent scales scattered over upper 0.5; upper *mep* with 5-7 setae and a few inapparent light grayish brown translucent scales, middle *mep* with a few small, scattered inapparent light transparent scales, which are difficult to detect at some angles. *Wing*. Scales dark brown; cell R_2 about 0.4 of R_{2+3}. *Legs*. Coxae and trochanters same color as pleuron; C-I with a few scattered light brown translucent scales; C-II, III with a few inapparent anterolateral scales; femora dark brown scaled dorsally, except near base, light grayish brown near base ventrally; forefemur with 9-12 setae on anteroventral margin, 9-12 setae on posterodorsal margin, 2-4 long setae at about middle on dorsal surface; midfemur densely setose on basal 0.33, all setae conspicuous but distinctly longer and more sinuous on dorsal and anterior surfaces, shorter and much more dense on posteroventral surface, and with 2, 3 small setae beyond middle; hindfemur with a few inconspicuous setae on ventral margin and 2, 3 longer ones on dorsal subapical surface; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 about 1.33 of tibia, hindtarsomere 4 about 3.0 of tarsomere 5. *Abdomen*. Terga dark bronzy brown scaled with strong purple-green reflections; laterotergite with a few pale brown translucent scales; sterna uniformly dingy, grayish or yellowish brown scaled.

MALE. Essentially as in female except for sexual differences. *Head*. 2, 3 pairs of labial basal setae; antennal flagellum slightly longer than proboscis, exceeding proboscis by less than length of flagellomere 13, strongly plumose, whorls each of 20 or more setae; Flm 13 longer than Flm 12. *Legs*. Hindtarsomere 4 about 2.7 of tarsomere 5. *Terminalia* (Fig. 64). Tergum IX rather short, broadly rounded on apical margin; tergum X complete, moderately sclerotized, very strongly spiculate laterally, produced apically into very distinct, short, moderately broad, apically rounded, tergolateral lobes which extend beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long, slender and a few weaker setae basally; basal mesal lobe of basimere with 3 long, stout tergoapical setae, 4-7 scattered weak setae basal to these, 1 long, stout and 1, 2 weaker setae on sternal margin; distimere rather straight, gradually tapered from base to pointed and slightly curved apex; spiniform small, stout, acute; plates of aedeagus very widely separated, joined by a narrow tergal and sternal sclerotized band, each with 2 large apical, tergomesal, laterally directed teeth, with the more tergal strongest, very broad at base, rounded on posterior margin, and tapered to pointed apex, the more sternal slender, longer, straight, and slightly apical to the larger tooth, apicosternal margin with 1 very large, twisted, basally directed tooth which is deeply grooved on outer (posterior) margin with a dis-

tinct pigmented ridge on lateral margin and narrowly membranous on mesal margin; proctiger strongly spiculate tergoapically, with 2-4 cercal setae on each side.

PUPA (Fig. 64). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly brown. All setae except 1-I and occasionally 9-VIII with simple branches. *Cephalothorax.* Seta 1-CT double, 2,3-CT with 3,4 branches, 4-CT with 3-5 branches, 5-CT with 4-6 long, stout, acutely pointed, darkly pigmented branches, 8-CT with 6-9 branches. *Respiratory Trumpet.* Dark brown, lighter apically, tracheoid on anterobasal 0.3-0.4; index about 4.25-4.80, slightly expanded apically. *Metanotum.* Seta 10-CT with 5-9 branches, with 1-3 branches usually stronger and longer than the rest and longer than single or double 11-CT, 12-CT with 4,5 branches, alveolus of 13-CT conspicuous. *Abdomen.* Seta 6-I, II single, rarely double; 1-II with 7-9 (6-13) delicate branches, inserted noticeably anterior to posterior margin of segment, 3-II double or triple, 5-II with 4-6 delicate branches, inserted at or anterior to middle of segment; 1-III with 4-6 branches, 2-III-VII subequal, long, very stout, spine-like, darkly pigmented, inserted conspicuously mesad of seta 1 and posterior to seta 3 of each segment, 3-III single, strong, pigmented, usually longer than segment, 5-III with 8-10 delicate branches, inserted near middle of segment, 6-III-VI subequal, with 3-5 weak branches, each inserted conspicuously sublateral, 9-III-VII subequal, moderately long, spine-like, darkly pigmented; 1-IV with 4,5 branches, 5-IV-VII single, strong, about 1.5-2.0 the length of each succeeding segment; 1-V, VI with 3-5 branches; 1-VII double to 4 branched, 6-VII located dorsally, with 4-6 weak branches; 9-VIII with 4-6 unequal branches, with at least 1 branch conspicuously longer and stronger than the others, the strongest branch usually very lightly barbed near base. *Paddle.* Midrib faintly pigmented on basal 0.5; outer margin with closely set serrations from about basal 0.2 to apex; inner margin with a few small, well spaced spicules on apical 0.25; apex with distinct shallow emargination.

LARVA (Fig. 63). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Thorax and abdomen with numerous stellate setae, each with very stout, darkly pigmented, barbed branches, with a varying number of branches of each either acutely pointed or distinctly notched apically. *Head.* Light brown; seta 4-C with 4-6 delicate branches, bases of 5-C farther apart than bases of 6-C, 7-C with 3,4 simple branches, 11-C double or triple; mentum with 13 or 15 teeth. *Antenna.* Seta 1-A single. *Thorax.* Setae 0-4, 8-P stellate, rather similar, with 12-18 branches, 7-P with 3,4 barbed branches, 9-P stellate, with 6-11 branches; 14-P stellate, with 24-39 branches; 1,13,14-M stellate, with 20-35 branches; 1,3,13-T stellate, with 15-32 branches, 5-T, short, stellate, with 5-8 branches, 8-T stellate, with 12-15 branches. *Abdomen.* Seta 1-I-VII stellate, with 14-25 branches, 2-I-VII stellate, with 9-22 branches, 6-II-VI double, barbed; 11-I stellate, with 17-23 branches; 5-II-VII stellate, with 7-15 branches, inserted anterior to 6-III-VI, 9-II-VII stellate, with 6-11 branches, 13-II-VII stellate, with 14-28 branches; 7-III-VI stellate, with 6-13 branches; 6,8,11-VII stellate, with 8-17 branches; 1-VIII minute, triple, not inserted on plate with 2-VIII, 5-VIII stellate, with 8-12 branches; comb scales 32-43, on a very large, strongly spiculate, sclerotized plate which nearly meets the plate on opposite side dorsally, each scale, long, narrow, finely fringed laterally and pointed apically, a few teeth near middle exceptionally long, narrow. *Segment X.* Saddle incomplete, light brown, covered with dense setiform spicules, entire posterolateral margin with long, very stout, closely set spines and numerous

smaller spines some of which are submarginal, the more dorsal 2-4 large spines simple but most others with an apical fringe of sharp spicules; seta 2-X with 6-8 branches, 3-X single, 4a-e-X with 11-13, 11-13, 9-12, 8-11, 5-7 branches respectively. *Siphon.* Light brown, lightly imbricate from base to apex; index about 3.0; pecten teeth 12-15, reaching to 0.75-0.95 of siphon; each varied in length, usually long, slender and tapered apically, fringed on side toward base of siphon and at apex, becoming progressively shorter, broader, apically rounded and fringed on both sides toward apex; seta 1-S small, single to triple, inserted at about 0.73 from base of siphon.

TYPE-DATA. Holotype male (Lot No. TH-II-7) and allotype female (Lot No. TH-II-9), both with larval and pupal skin mounts, collected as larvae from a tree hole in Llavac, *Laguna*, Luzon, Philippines on 7 December 1940, F. E. Baisas, were designated in the original description along with several paratypes "from the same tree hole obtained at different dates by Mr. Pablo Sunico." Stone et al. (1959) list the location of these in the Philippine Bureau of Health (PBH). Although F. E. Baisas was then located at the PBH he does not reference it in the text of his 1946 article as to the repository of types. Delfinado (1966b) lists the types as lost and Stone (1970) lists them as non-extant. None of the paratypes are in the USNM or BMNH. However, there is a male specimen with terminalia mounted on slide by Delfinado, 26 February 1964, labeled "Lot No. TH II-2". While this specimen is not sufficiently labeled to positively associate it with the original series, I am assuming it is of the series, since lot No. TH-II was used only with *pylei* in the text. It is probably a specimen sent to Dr. Alan Stone for confirmation, which Baisas indicated in the 1946 article. Although the specimen is not in the best of condition, it exhibits most of the more significant diagnostic features. No slide of immature stages was found in the USNM.

DISTRIBUTION. Material examined: 15♂, 9♀, 17 L; 8 with associated skins (8 l, 9 p, 1 incomplete).

PHILIPPINES. *Luzon: Nueva Ecija* - Calso, 2♂, 4 L, 3 l, 3 p; *Nueva Viscaya* - Malete, 3♂, 2♀, 11 L, 2 l, 5 p; *Quezon* - Lucban, Tayabas; Mt. Banahao; 3♂, 1♀, 2 L; *Pangasinan* - Llavac, 1♂. *Negros: Occidental* - *Fabrica*, 4♂, 2♀, 3 l, 1 p. *Samar:* Osmena, 1♂, 2♀, *Mindanao: Surigao* - Mt. Cantugas, 1♂, 2♀.

DISCUSSION. A uniformly brown species without striking features in the adult stage but very distinctive in the male terminalia, pupa and larva. The adult resembles *nocticola* and *sumethi* in the general brown color and uniformly pale pleuron, but each is quite distinct. Except for the general resemblance in color of the adults of these 3 species, *pylei* does not seem to be closely related to any species of the series. Differences from the adults of *nocticola* and *sumethi* are discussed under each of these species. The few delicate, opaque setae on midanterior margin of sternopleuron are significant but are extremely difficult to detect. If the sternopleuron is viewed from the posterior side at about a 60-80° angle the setae are conspicuous. Such setae on anterior margin of sternopleuron are known elsewhere only in *jacksoni*. This feature in combination with the numerous setae on lower *apn* and the dense setae encircling basal 0.33 of midfemur readily distinguishes this species from all others. The very distinctive aedeagus of the male terminalia is unique. The immature stages possess several unique characters. The stout multiple branched stellate setae of the larva suggest a resemblance to the larva of *maxima*, the only known species with somewhat similar branched stellate setae but there are multiple differences between the 2.

BIONOMICS. The immature stages are found almost exclusively in tree

holes in dense forest at relatively high elevation. Collections were examined from the following habitats: tree hole (9), cut bamboo (2). Six collections have recorded elevations of 610-1,128 m. Baisas (1946) states, "Larva: Strikingly different from other known larvae of Philippine *Uranotaenia* in having many large stellate tufts on the thorax and abdomen, and in attitude when at rest - the head and body being straight downward. When feeding, it crawls rapidly like a legged organism in and through the debris at the bottom of the breeding water. In movements and appearance closely similar to treehole breeding *Ficalbia* and *Finlaya*." I can personally attest to this, having made the same observations along with Dr. Yiau-Min Huang in June 1969. We collected several larvae of this species in northern Luzon and were completely unaware that they were larvae of *Uranotaenia* until we had actually reared an adult from one of the larvae. In the natural habitat the larvae are rather pale white in color.

URANOTAENIA (PSEUDOFICALBIA) ROSSI DELFINADO
(Figs. 1, 65, 66)

Uranotaenia rossi Delfinado 1966a: 36 (♂*, ♀); Delfinado 1966b: 53 (♂*, ♀); Peyton and Hochman 1968: 380 (♂*).
Uranotaenia (Pseudoficalbia) rossi Delfinado, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.9 of forefemur; prementum dark brown scaled, with a few small setae at apex; 2 pairs of labial basal setae; palpus about 0.1 of proboscis and slightly shorter than antennal flagellomere 1; clypeus dark brown; antennal pedicel light brown mesally, yellowish laterally, with a patch of minute setae dorsomesally; flagellum about 1.29 of proboscis or exceeding proboscis from about base of flagellomere 11; Flm 1 slightly longer than Flm 2, with a few light gray scales basomesally; flagellar whorls each of 6 setae; 1 long, strong and 1 very weak interocular and 5, 6 ocular setae; decumbent scales mostly dark brown with bluish green reflections, but often appearing light bronzy brown or grayish depending on light angle, narrowly and faintly dull grayish on ocular line but forming no well differentiated line, grayish white with blue-green reflections laterally; erect scales exceptionally long, numerous, covering most of dorsal surface, dark brown. *Thorax* (Fig. 1). Scutal integument dark brown or light rust brown, without conspicuous bare lines; scales narrow, curved, uniformly dark bronzy brown; prescutellar space bare on posterior half; scutellum light brown, scales dark brown; mesopostnotum dark rust-brown, light yellowish brown at basolateral corners; paratergite dark brown; pleuron mostly dark brown but with a very distinct pleural pattern of light grayish or yellowish brown areas surrounding the dark sclerites; distinct dark areas are as follows: *apn*, *ppn*, *psp*, *ppl*, part of *ssp*, usually *pra* lobe, all of *stp* except for narrow line on lower posterior edge, all of *mep* except for narrow pale margins, lower half of mesomeron; *apn* with 2 long, stout and 2-3 weak lower setae, covered with sparsely arranged grayish scales with bluish green reflections; *ppn* with 2-4 setae and a conspicuous patch of broad light grayish brown scales with strong blue-green reflections on upper posterior corner; *sp* with 1, 2 setae; *ppl* with 7-11 setae, usually 2-4 are stout and the remainder weaker, and a very few light gray translucent scales usually present; *pra* with 2-5 setae, (rarely 1); *stp* with 24-26 setae on upper and posterior margins, upper 12-14 closely set, evenly spaced, long, stout, lower posterior setae short, weak, and with a

very large patch of broad, shiny, grayish translucent scales on upper 0.33 and down posterior margin; *mep* with 6-8 upper setae, and a large conspicuous patch of loosely arranged, broad, grayish translucent scales covering most of sclerite. *Wing*. Scales dark brown; cell R_2 about 0.54 of R_{2+3}. *Legs*. Coxae and trochanters same color as pale areas of pleuron; C-I with an anterior patch of light brown translucent scales; C-II, III with a few inapparent, translucent scales; femora dark brown scaled dorsally, light grayish brown ventrally; forefemur with an anteroventral row of 16-20 very short, stout, darkly pigmented spiniform setae from base to 0.75 followed by 3, 4 longer setae, a posterodorsal row of 12-14 long setae from base to near apex, and numerous, short, fine, setae on basal 0.25 of ventral surface; midfemur usually conspicuously and densely setose on all aspects of basal 0.33 with individual setae variable in degree of development, predominently fine, but 5-8 on dorsal margin and 3, 4 on anterior margin distinctly longer and stronger, a few similar setae near apex on ventral surface; hindfemur with at most 1-4 conspicuous setae on dorsal margin; tibiae and tarsi uniformly dark brown scaled; hindtarsomere 1 about 1.33 of tibia, hindtarsomere 4 about 2.8 of tarsomere 5. *Abdomen*. Terga dark brown scaled, usually with strong purple-green reflections; laterotergite with a patch of grayish translucent scales; sterna dingy grayish brown scaled.

MALE. Essentially as in female except for sexual differences. *Head*. Proboscis about 0.95 of forefemur; 2, 3 pairs of labial basal setae; antennal flagellum slightly longer than proboscis, exceeding it in length by much less than flagellomere 13, strongly plumose, whorls each of 20 or more setae; flagellomeres 12, 13 subequal. *Wing*. Cell R_2 about 0.44 of R_{2+3}. *Legs*. Hindtarsomere 1 about 1.4 of tibia, hindtarsomere 4 about 2.65 of tarsomere 5. *Terminalia* (Fig. 66). Tergum IX rather short, rounded on apical margin, slightly produced apicomesally; tergum X complete, rather broad, lightly sclerotized, produced tergoapically into short, apically rounded, laterally projected, closely approximated, tergolateral lobes, most of sclerotized tergum and lobes extending conspicuously beyond apical margin of tergum IX; tergomesal surface of basimere with numerous short, weak setae only, a long stout, seta slightly sternoapical to basal mesal lobe; basal mesal lobe of basimere with 6 long, stout, tergoapical setae, the most apical on a distinct finger-like process, at least 4 of the more basal setae arise from distinct raised bases and are usually exceptionally broad and stout with curved or wavy ends, often stronger than the more apical of the group, usually 2-4 small weak setae basal to these, 1 long, stout and 1, 2 weak setae on sternoapical margin; distimere straight, of near uniform width to tapered and pointed apex; spiniform small, stout, acute; plates of aedeagus very widely separated, joined by a long, very narrow sclerotized tergal bridge and a similar slightly broader sternal bridge, each plate with 2 large apical, tergomesal teeth, the tergal-most short, very broad, rounded, foliform, with small pointed apex directed laterally, the sternal-most long, narrow, grooved, slightly curved, directed laterally and slightly apical to the broader tergal tooth, sternoapical margin with a single large, curved, basally directed tooth; proctiger with 3, 4 cercal setae on each side.

PUPA (Fig. 66). Chaetotaxy as figured. Diagnostic characters as follows. Integument uniformly light brown. All setae except 1-I simple, most single, few with very few branches. *Cephalothorax*. Setae 1-3-CT single to triple, 4, 5-CT double or triple, 8-CT 3, 4 branched. *Respiratory Trumpet*. Light brown, indistinctly tracheoid on anterobasal 0.2; index about 3.8-4.2, not noticeably expanded apically. *Metanotum*. Seta 10-CT stiff, with a few fine

terminal branches, 11, 12-CT single or bifid; alveolus of 13-CT conspicuous often with slightly raised spur. *Abdomen.* Seta 6-I, II long, single; 1-II usually weakly dendritic, with 7-13 delicate branches, 3-II single, strong; 1-III single to triple, 3-III single, strong, slightly mesal to 1-III, about as long as segment IV, 6-III-VII single, stiff, longer on VI but significantly shorter than segment VII, located dorsally and rarely double on VII; 1-IV single or double, stiff, 5-IV-VI single, strong, about equal to 2 succeeding segments in length; 1-V-VII single, stiff, 3-V, VI mesal to 1-V, VI; 5-VII single, stiff, less than length of segment VIII; 9-VIII with a single strong branch as long as or longer than paddle and 1-3 much shorter weaker branches on one side of stronger branch. *Paddle.* Midrib light brown from base to apex; outer margin with rather widely spaced serrations from about basal 0.2-0.4 to apex; inner margin with a few scattered, small spicules on apical 0.2 followed by a few minute spicules or crenulations toward base; apex not noticeably emarginate.

LARVA (Fig. 65). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Thorax and abdomen with several stellate setae with stout, acutely pointed, darkly pigmented branches, with those on thorax and segment I generally stronger, more acutely pointed and usually finely barbed at least near base, generally progressively weaker, more sharply pointed and simple on II-VII. *Head.* Light yellowish brown, darker posterolaterally and on collar; seta 4-C double to 4 branched, 7-C with 4-6 simple branches, 11-C double or triple; mentum with 15 or 17 teeth. *Antenna.* Seta 1-A single. *Thorax.* Seta 0-P stellate, with 4-7 strong, sharply pointed branches, 1-P with 5-9 long, barbed branches, 3-P with 6-9 barbed branches, 4-P with 7-10 barbed branches, 7-P triple, strongly barbed, 14-P stellate, with 13-18 strong, acutely pointed, lightly barbed branches or occasionally branches with only a few scattered fine lateral barbs; 1-M stellate, with 4-6 branches, 14-M stellate, with slightly weaker simple branches; 1, 3-T stellate, with 4, 5 branches, 5-T single, stout, spine-like, 8-T with 3 stiff branches, 13-T stellate, with 5-8 strong, sharply pointed, simple branches; 1-I stellate, with 4 branches, 2-I stellate, with 3-5 branches, 4-I stellate, short, with 4 branches, 6-I, II double, strongly barbed, ventral branch shorter than dorsal branch, each branch sharply or acutely pointed, 11-I stellate, long, with 3-5 simple branches; 1-II-VII stellate, with 3, 4 branches, occasionally double on II, 5-II double or triple, branches stout, acutely pointed, darkly pigmented, 9-II-VI single, short, strong, spine-like, 13-II-VII stellate, with 3-5 branches, shorter and slightly weak on VI; 5-III-VI single, short, strong, spine-like, each about equal in length and slightly longer than similar 9-III-VI, 6-III-VI double, lightly barbed; 3-VII single, long, stout, barbed; 1-VIII double or triple, not inserted on sclerotized plate with 2-VIII, but inserted at the posterior edge of comb plate and often appearing as if on plate, 3-VIII with 8-10 strongly barbed branches; comb scales 13-20, on a large distinctly sclerotized plate, each scale rather long, narrow, near equal in length and width, slightly tapered and rounded apically with fine lateral spiculate fringe and slightly stronger apical fringe. *Segment X.* Saddle incomplete, pale yellowish brown, lightly imbricate, with numerous irregularly spaced, long, stout, spines and a few weaker spines intermingled on posterolateral margin; seta 1-X with 3 stiff branches, 2-X double, 3-X single, 4a-e-X with 8-9, 8-10, 6-9, 7-10, 5-6 branches respectively. *Siphon.* Light brown, strongly imbricate from base to apex, spicules of imbrications producing a rasp-like surface; index 3.3-3.7; pecten teeth 14-20, reaching to about 0.58-0.61 of siphon; each conspicuously fringed with sharp spicules apically and on side toward base of siphon, occasionally a few similar spicules on opposite side of some teeth;

seta 1-S with 5, 6 stiff, simple branches, inserted slightly beyond distal pecten tooth at 0.64-0.69 of siphon.

TYPE-DATA. Holotype male with terminalia on slide in the USNM with following data: PHILIPPINES, *Mindoro*, San Jose, 21 March 1945, E. S. Ross, collector, genitalia slide U-2 prepared 4 March 1964. The specimen is in good condition.

DISTRIBUTION. Material examined: 165♂, 122♀, 91 L; 25 with associated skins (10 l, 27 p, 2 incomplete).

MALAYSIA. *Malaysia: Sabah* - Kudat 1♂, 1♀.

PHILIPPINES. *Palawan:* Panitan; Mt. Molinao; Iwahig; Tinabog; Tarampitao; 86♂, 61♀, 25 L, 16 p. *Busuanga:* St. Nicolas; 4 km. N. San Nicolas; 4♂, 7♀. *Mindoro: Occidental* - San Jose, 65♂, 49♀, 53 L, 1 l. *Oriental* - Victoria, San Antonio; Alcate; Mataptap; San Pedro; 9♂, 4♀, 14 L, 9 l, 11 p.

DISCUSSION. This species is moderately variable in adult habitus features but it is rather easily distinguished from all species of the series. The dark scutal integument and the predominately dark pleuron with narrow distinct pale areas, pale coxae and trochanters, uniformly dark scaled terga, and conspicuous anteroventral row of short spiniform setae on forefemur readily distinguishes this species from all other known species. In addition, the numerous setae usually present on the prealar lobe and the number of setae on lower anterior pronotum are unusual. Most species, except *harrisoni* and *jacksoni*, usually have a single *pra* seta with an occasional specimen exhibiting 2, none have 4, 5 as is rather common on *rossi* and all others except *nocticola*, *pylei* and *sumethi* have a single strong lower *apn* seta but each of these 3 has a very pale pleuron and differs in numerous other features. The male terminalia are quite distinctive but the aedeagus resembles that of *pylei* more closely than any of the other members of the series. The immature stages are distinct and easily recognized. Although there are similarities in the male terminalia of this species and *pylei*, no significant features in any stage suggests a closer affinity with any particular species within the series.

BIONOMICS. This species appears to be specifically adapted to the fresh water crab hole habitat. These small crab holes are common along the banks of small fresh running streams and seepages on Mindoro Island. Those that contain larvae are usually encountered only in situations with some vegetative cover. However, breeding is not necessarily restricted to forested areas. Larvae of this species were collected from small crab holes along the bank of a small spring-fed stream at the edge of a cultivated field in Victoria, Mindoro, in 1969. Immature collections from 14 crab holes from Mindoro were examined. In addition, E. S. Ross collected many adults resting in crab holes at San Jose, Mindoro. Several larvae and pupae were examined from Palawan Island but the habitat for these was not recorded. The male holotype was collected by E. S. Ross in 1945 resting under tree bark. Living larvae are similar to most species of this series in having the same general appearance and movements as *Aedes*.

URANOTAENIA (PSEUDOFICALBIA) SPICULOSA PEYTON AND RATTANARITHIKUL
(Figs. 1, 67, 68)

Uranotaenia spiculosa Peyton and Rattanarithikul 1970: 409 (A, ♂, L).
Uranotaenia (Pseudoficalbia) spiculosa Peyton and Rattanarithikul, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.92 of forefemur; prementum dark brown, a few fine setae at apex; 2 pair of labial basal setae; palpus about 0.13 of proboscis and equal to or slightly greater than antennal flagellomere 1; clypeus brownish black; antennal pedicel light brown mesally, light yellowish brown laterally, with a few minute setae and 2, 3 light grayish translucent scales dorsomesally; flagellum about 1.3 of proboscis or exceeding proboscis from base of Flm 11 or more; Flm 1 only slightly longer than Flm 2, with a few grayish brown scales near base; flagellar whorls each of 6 setae; 1 long, strong interocular and 4, 5 ocular setae; decumbent scales fawn-brown, tips of scales on ocular line often appearing grayish white but forming no distinct line, usually grayish white with blue-green reflections laterally; erect scales long, dense, covering most of dorsal surface, light brown. *Thorax* (Fig. 1). Scutal integument uniformly light yellowish or rust-brown; scales narrow, curved, predominantly light bronze-brown, inconspicuous patches of grayish white or ochreous scales on anterior margin at dorsocentral and acrostichal lines of setae, a few of these scales slightly broader than those on midscutum; prescutellar space mostly bare; scutellum light brown, scales dark brown; mesopostnotum dark brown, whitish at basolateral corners; paratergite light brown, with a few broad, inconspicuous, grayish translucent scales posteriorly; pleuron light grayish brown with very distinct dark brown or brownish black areas as follows; whole of *apn*, *ppn*, *psp*, *pra*, and *mep*, upper half or more of *stp*, most of metapleuron; *apn* with light brown scales; *ppn* with 1 seta and a patch of brown scales with blue-green reflections on upper posterior corner; *sp* with 1 seta; *psp* with a small patch of flat, grayish translucent scales on posterior edge; *ppl* with 1 long, strong and 5, 6 delicate setae and a few pale grayish translucent scales; *stp* with 16, 17 setae and a large patch of flat grayish translucent scales on upper 0.3; *mep* with 5-8 upper setae and 3, 4 translucent scales, a large patch of grayish translucent scales at middle. *Wing.* Scales dark brown; cell R_2 about 0.43 of R_{2+3}, distinctly shorter than M_2. *Legs.* Coxae and trochanters same color as light areas of pleuron; C-I light brown basoanteriorly and with a distinct patch of light brown scales; C-II, III each with an inapparent patch of shiny, translucent scales; femora dark brown scaled dorsally, light gray with purple greenish reflections ventrally, without conspicuous groupings of setae, forefemur with a posterodorsal row of 12, 13 setae from base to near apex, an anteroventral row of 5, 6 stronger setae from near middle to apex; midfemur with a row of 4, 5 long setae and several minute setae on basal 0.25 of dorsal aspect, 5, 6 short setae on anterior and posterior ventral margins beyond middle; hindfemur with a few scattered inconspicuous setae; tibiae and tarsi uniformly dark brown; hindtarsomere 1 about 1.1 or slightly more of tibia, hindtarsomere 4 about 2.45 of tarsomere 5. *Abdomen.* Terga predominantly dark brownish black scaled with conspicuous narrow creamy white scaled basal bands on II-VI, bands on III-VI near equal in width, each occupying about 0.2 or slightly more length of each tergum and reaching lateral margin at least on V, VI, much less conspicuous on II, a very narrow incomplete basal band usually present on VII; laterotergite with a few grayish translucent scales; sterna mostly pale creamy white, V, VI with light brown scaled apical bands, VII completely light brown.

MALE. Essentially as in female. *Head.* Proboscis about 0.95 of forefemur; antennal flagellum slightly longer than proboscis, exceeding it by less than flagellomere 13, strongly plumose; flagellar whorls each of more than 20 setae; flagellomeres, 12, 13 long, near equal, each about equal to combined length of flagellomeres 10, 11. *Wing.* Cell R_2 about 0.4 of R_{2+3}. *Abdomen.* Pale basal tergal bands generally slightly wider than in female, a

very narrow incomplete band on tergum VIII: sternum IV with an indistinct light brown scaled apical band, VI mostly light brown with a narrow creamy white basal band. *Terminalia* (Fig. 68). Tergum IX very broadly rounded on apical margin; tergum X complete, well developed tergomesally, produced into a broad median apical lobe with shallow median apical emargination and broadly rounded lateral corners which extends well beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long setae, those on apical 0.5 significantly longer and stronger than the basal-most; basal mesal lobe of basimere with 2 very long stout apical setae, each on raised process, 3 similar slightly shorter setae basal to these and 6-10 short, weak, more basal setae, 1 long, stout and 2-4 weak setae on sternal margin; distimere rather strongly curved and tapered to pointed apex; spiniform small, stout, acute; plates of aedeagus each with 2 strong subapical tergomesal teeth and a row of 3-5 strong curved teeth on sternoapical margin, with the tergal and sternal-most strongest and grooved, the median 1-3 usually slightly smaller; median tergal bridge of aedeagus with small indistinct apical membranous projection; proctiger with 1 cercal setae on each side.

PUPA (Fig. 68). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light yellowish brown, darker at intersegmental areas of some segments, densely spiculate on dorsal, ventral and lateral surfaces of segments III-VIII, spicules becoming progressively stronger and prominent to segment VIII. *Cephalothorax.* Seta 1-CT bifid or trifid, 2-CT with 3, 4 terminal branches, 3-CT with 2-4 bifid branches, 4-CT with 3-5 barbed branches, 5-CT with 3-7 barbed branches, 6-CT sparsely barbed, 8-CT with 3-6 barbed branches, ends often frayed. *Respiratory Trumpet.* Pale brown; index 3.1-3.8, not noticeably expanded apically, tracheoid on anterobasal 0.2. *Metanotum.* Seta 10-CT bifid or trifid, barbed 11-CT single or with a few terminal branches, 12-CT with 3-5 lightly barbed branches; alveolus of 13-CT usually distinct, occasionally a small raised pigmented spur or rarely a well developed seta present. *Abdomen.* Seta 4-I with 3-5 stiff, barbed branches, 6-I, II single or double, each branch usually with a few fine terminal branches; 1-II with 6-10 barbed or frayed branches, 3-II with 2-5 distal branches; 1-III with 3-5 barbed or terminally fringed branches, 3-III stout, single or double or with 2-4 branches beyond middle, 6-III-V 2-4 branched; 1-IV with 2-4 barbed or terminally fringed branches, 5-IV single, rarely double on one side, sparsely barbed, at least 1.5 of segment V; 1-V double or triple, barbed, 5-V single, rarely double, sparsely barbed, about 1.75 of segment VI; 1-VI double or triple, barbed, 5-VI single, sparsely barbed, about equal to or slightly less than 2 succeeding segments, 6-VI single, strong, about 0.75 of segment VII; 1-VII single, rarely double, simple or sparsely barbed, 5-VII single, simple, about 1.0 or slightly less of segment VIII, 6-VII located ventrally with 2-4 weak branches, 9-VII single to 4 branched, branches stiff or strong, lightly barbed or when single, lightly brush-tipped, longer and stronger than 6-VII; 9-VIII with 4-7 stout, strongly barbed branches, 1, 2 median branches significantly longer than lateral branches, shorter lateral branches always frayed or branched terminally and longer median branches occasionally with distal branches. *Paddle.* Midrib light brown to near apex; outer margin with serrations widely spaced on basal 0.5 and closely set on apical 0.5; inner margin with numerous strong, sharp spines from about apical 0.4 to apex and several scattered small submarginal spicules on apical 0.5; apex with very shallow emargination.

LARVA (Fig. 67). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument of thorax and abdomen with

dense setiform spicules. Several setae of thorax and abdomen stellate with very stout, darkly pigmented, acutely pointed branches, usually with sparse, fine lateral barbs at least near base, but occasionally branches simple, especially on ventral setae. *Head.* Bright orange-brown, slightly darker posterolaterally and on collar. Seta 4-C with 4-7 delicate branches, 7-C with 8-10 simple or very sparsely barbed branches, 11-C with 4, 5 branches; mentum with 14-17 teeth. *Antenna.* Coloration same as head capsule; seta 1-A usually double, rarely single. *Thorax.* Seta 0-P usually stellate, with 3-5 branches, occasionally double, 3-P with 7-9 barbed branches, 4-P with 10-13 barbed branches, 6-P usually single, occasionally double, 7-P with 4-7 strongly barbed branches, 13-P stellate, with 4-7 branches, 14-P with 11-17 stout, acutely pointed, heavily barbed branches; 1-M stellate, with 4-6 branches, 14-M stellate, with 3-6 branches; 1-T stellate, with 3-7 branches, 3-T stellate, with 3-5 branches, 5-T single, stout, acutely pointed, 13-M stellate, with 4-6 branches. *Abdomen.* Seta 1-I stellate, with 5-9 branches, 2-I stellate, with 3-5 branches, 4-I stellate, with 3-5 branches, similar to 2, 3-I but branches, simple and slightly weaker, 6-I, II double, strongly barbed, sharply pointed, ventral branch shorter than dorsal branch, 11-I stellate, with 4-6 branches, 13-I stellate, with 4-6 branches; 1-II-V stellate, with 4-7 branches, 2-II stellate, with 3-4 branches, 5-II stellate, with 3-5 branches, similar to 1, 2-II but branches simple, shorter and slightly weaker, 9-II single or double, stout, acutely pointed, long, near 0.5 of segment length, 13-II-V stellate, with 4-7 branches; 5-III, IV stellate, with 4-6 branches, 6-III-VI with 3 unequal, barbed branches, 9-III-VI single, stout, acutely pointed, 9-III about 0.5 the length of 9-II and each becomes progressively shorter and weaker on each succeeding segment; 1, 5, 13-VI stellate, each with 3-5 branches; 1-VIII double, 5-VIII double or triple, branches stout, acutely pointed; comb scales 15-16 (14-19), on a small weakly sclerotized plate, all of near equal length and width, each rather long, narrow, more or less rounded apically, fringed laterally and apically with fine spicules, apical fringe slightly stronger. *Segment X.* Saddle complete, light yellowish brown, strongly imbricate, with numerous strong spines on posterolateral margin; seta 1-X with 1 long branch and 1 very short, weak branch, 4a-e-X with 9-13, 6-8, 7-9, 7-9, 7-10 branches respectively. *Siphon.* Light brown, strongly imbricate from base to apex, setiform spicules of imbrications very conspicuous; index about 3.3-3.7; pecten teeth 18-24, reaching to about 0.53-0.58 of siphon; each tooth long, stout, simple, spine-like, except an occasional 1-3 poorly developed basal teeth; seta 1-S with 7-9 barbed branches, inserted slightly beyond distal pecten tooth.

TYPE-DATA. Holotype female with slide of associated pupal and larval skin in USNM with the following collection data: THAILAND, *Chon Buri,* Khao Mai Ha Wa, 30 June 1965, E. L. Peyton, collector, collection number 00247-15, SEAMP accession number 79, collected as a larva from a crab hole at the edge of a small stream at an elevation of 150 m. Allotype male and several paratypes also in USNM; 2 males, 2 females and 2 fourth stage larvae will be deposited in the BMNH.

DISTRIBUTION. Material examined: 13♂, 21♀, 37 L; 24 with associated skins (15 l, 24 p).

CAMBODIA. *Battambang:* Pailin, 1♂.

THAILAND. *Chon Buri:* Siracha, Bang Phra; Ban Rai; Khao Mai Ha Wa; 8♂, 12♀, 27 L, 11 l, 19 p. *Khon Kaen:* Tham Photi Yan, 1♀. *Prachin Buri:* Ban Bu Phram, 3 L. *Chanthaburi:* Khao Sai Dao, 5 L. *Sara Buri:* Saohai, Ban Pukae, 4♂, 7♀, 2 L, 4 l, 5 p.

VIETNAM. *Quang Tri:* An Khe, 1♀.

DISCUSSION. This species is well marked in all stages. Superficially it resembles *koli* and *stricklandi* in the adult habitus and especially in the light and dark pleural integument. The larva is quite different from those of *koli* and *stricklandi* and resembles the larva of *enigmatica* more closely than others of the series. In the adult, *spiculosa* differs mainly in the characters presented in the adult key. Differences in the larva of *spiculosa* and *enigmatica* are fully discussed under *enigmatica* and *abdita*. The larva of *hongayi* is the only other known member of the series besides *enigmatica* with pecten teeth all simple, however, the adult is apparently very unlike the adult of *spiculosa* and few other characters of the larva are known. Except for the more obvious affinities shared with all members of the *recondita* series this species does not appear to be more closely related to one than to another.

Features of all stages show little variation. In the adult stage the dark integumental areas of the pleuron vary from light brown to blackish but appear to be somewhat dependent upon age of the specimen, an inherent problem with freshly reared specimens. This species was originally described from a series of reared specimens. The dark areas on most of these specimens were a moderate brown and a few were light brown yet still conspicuously contrasting with the very pale areas. Some of the specimens are obviously teneral. Since the original description I have examined a small series of adults collected while resting in crab holes in Thailand by Bruce A. Harrison. These specimens have the dark areas of the pleuron very dark blackish. Due to the darker background most of the scales are more conspicuous, and especially those on the paratergite and postspiracular area, which are generally inconspicuous on some of the lighter (teneral?) specimens. The presence of scales on the paratergite is apparently unique.

BIONOMICS. The immatures stages have been collected only in Thailand from small fresh water crab holes (15) along the banks of shallow running streams, generally with heavy forest cover at elevations ranging from 20-650 m. Adults have been collected on 3 occasions resting in crab holes. Specimens of *koli* and *abdita* are found in crab holes in the same general areas or occasionally in association with this species in the same crab hole.

URANOTAENIA (PSEUDOFICALBIA) STRICKLANDI BARRAUD
(Figs. 1, 69, 70)

Uranotaenia stricklandi Barraud 1926: 345 (♂*, ♀); Barraud 1934: 80 (♂*, ♀); Peyton and Klein 1970: 246 (A, L, taxonomy); Peyton and Rattanarithikul 1970: 409 (A, taxonomy).

Uranotaenia (Pseudoficalbia) stricklandi Barraud, Peyton 1972: 37; Tanaka, Mizusawa and Saugstad 1975: 30 (A, L, taxonomy).

FEMALE. *Head.* Proboscis about 0.83 of forefemur; prementum dark brownish black, with a few fine inconspicuous setae scattered along ventral margin and a few at apex; one pair of labial basal setae; palpus about 0.13 of proboscis and near equal to antennal flagellomere 1; clypeus dark brownish black; antennal pedicel light brown with a few minute setae and light brown scales mesally, light yellowish laterally; flagellum about 1.33 of proboscis or exceeding proboscis from about base of flagellomere 11; Flm 1 about 1.2 of Flm 2 and with a small but conspicuous patch of light grayish scales near base; flagellar whorls each with 6 setae; 1 long, strong and 1 very delicate

interocular and 6 ocular setae; decumbent scales light grayish brown, narrowly and indistinctly grayish white on ocular line and occasionally at nape, grayish with blue-green reflections laterally; erect scales conspicuously long, numerous, covering most of dorsal surface, light brown. *Thorax* (Fig. 1). Scutal integument predominantly medium brown, supra-alar area slightly darker and narrowly light yellowish brown anterolaterally from scutal angle to anterior dorsocentral line; scales, narrow, curved, mostly light bronzy brown, a few inconspiuuous grayish or ochreous scales on anterior margin; prescutellar space largely bare; scutellum light brown; mesopostnotum dark brownish black, whitish at basolateral corners; paratergite light brown; pleuron pale grayish or whitish brown with very conspicuous dark brownish black areas as follows: whole of *apn, ppn, psp, ppl,* upper *ssp,* most of *pra,* a large spot on upper 0.25 and a large midanterior spot on *stp,* most of *mep* except for narrow rim on lower and posterior margin; *apn* with a few loosely arranged light gray or brownish scales; *ppn* with 1 seta and an upper posterior patch of light brown translucent scales; *sp* with 1 seta; *ppl* with 1 long, strong and 3, 4 delicate setae and a few gray translucent scales; *stp* with 14, 15 setae, upper 6, 7 conspicuous and with a conspicuous patch of gray-white translucent scales between the 2 dark areas with a narrow extension down posterior margin; *mep* with 4, 5 upper setae, 2, 3 upper translucent scales, and a distinct patch of gray-white scales at middle. *Wing.* Scales dark brown, cell R_2 about 0.5 of R_{2+3}. *Legs.* Coxae, trochanters and pale areas of pleuron concolorous; C-I with a distinct basal anterior light brown spot, covered with light bronzy brown scales; C-II, III each with an inapparent anterolateral patch of shiny, translucent scales; femora dark brown scaled dorsally, light gray with purple greenish reflections ventrally; forefemur with a conspicuous arrangement of setae as follows: anteroventral margin with about 5, 6 stout setae, posterodorsal margin with about 12 setae, a distinct patch of fine, minute, shiny setae and 4, 5 longer setae just beyond middle of posteroventral aspect; midfemur with a dorsal row of 9-11 long delicate setae from base to 0.5, 18-22 long setae scattered about middle on anterior, ventral and posterior surfaces; hindfemur with a few inconspicuous setae along dorsal aspect; tibiae and tarsi uniformly dark brown; hindtarsomere 1 about equal to hindtibia or barely longer, hindtarsomere 4 about 2.3 of tarsomere 5. *Abdomen.* Terga predominantly dark brownish black scaled, with indistinct, narrow, basal ochreous scaled bands on III-VI, widest on V, VI and usually reaching lateral margin, tergum I light brown; laterotergite with a small patch of shiny grayish translucent scales; sterna pale creamy white with faint basal bands of grayish brown scales on VI and VII.

MALE. Essentially as in female. *Head.* Proboscis about 0.95 of forefemur; antennal flagellum about equal to proboscis or barely longer, strongly long-plumose; whorls each of 20 or more setae; flagellomeres 12, 13 long, with 12 longest and greater than combined length of 10, 11. *Wing.* Cell R_2 about 0.4 of R_{2+3}. *Legs.* Hindtarsomere 1 about 1.1 of tibia; hindtarsomere 4 about 2.14 of tarsomere 5. *Abdomen.* Basal ochreous bands slightly more conspicuous than on female, width of bands on terga V, VI about 0.25 of tergal length. *Terminalia* (Fig. 70). Very similar to *koli* except for the following: basal mesal lobe of basimere with 1 very long stout apical seta and 2, 3 shorter stout subapical setae; plates of aedeagus with an apicosternal row of 4, 5 teeth as follows: a single, broad grooved tooth on tergal and sternal ends and 2, 3 small short simple median teeth.

PUPA (Fig. 70). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown, slightly darker

on posterior 0.5 of scutal plate, on metanotal plate and segments II, III. Branches of most setae simple with little or no secondary branching or lateral barbs. *Cephalothorax.* Setae 1-3-CT with 3-5 branches, 5-CT with 5-9 branches, 8-CT with 6-10 lightly barbed branches, 9-CT with 4-6 branches. *Respiratory Trumpet.* Light brown, indistinctly tracheoid on anterobasal 0.25; index about 3.5, distinctly expanded distally. *Metanotum.* Seta 10-CT with 2-6 branches from about basal 0.4, 11-CT with 4-10 branches from about basal 0.4, 12-CT with 4-6 branches. *Abdomen.* Seta 1-II with 21-29 delicate branches, 2-II single, as long as or slightly longer than length of segment III, 3-II, III with 2, 3 strong primary branches from beyond base, each with 2, 4 secondary fine end branches or lateral barbs; 1-III with 4-8 branches, 6-III-V short, weak, single or double; 1-IV with 4-6 branches, 5-IV double or triple and 1.5-2.0 the length of segment V; 1-V with 2-4 branches, 5-V double, rarely single or triple on one side, about equal to or slightly greater than combined length of the 2 succeeding segments; 1-VI single or double, 6-VI single or double, strong, about equal to or slightly greater than length of segment VII; 1-VII usually single, rarely double on one side, 5-VII single or double, less than length of segment VIII, 6-VII double or triple, located ventrally, 9-VII with 2-4 branches, about equal to 6-VII; 9-VIII with 8-12 barbed branches, about 0.6 of paddle. *Paddle.* Outer margin with fine saw-tooth spicules, inner margin with straight sharp pointed spines on apical 0.5 and a few very short submarginal spines.

LARVA (Fig. 69). Chaetotaxy as figured. Diagnostic characters as in series description and the following. A few stellate setae of thorax and abdomen with stiff, pigmented, acutely pointed branches. *Head.* Light brown, darker on collar; apicomesal projection of labral process short and rounded, about 0.25 length of 1-C; seta 4-C inserted on line with and mesad of 5-C, with 4-7 branches, 5-C with 5-8 stiff, lightly barbed branches; 7-C with 9-13 branches; 11-C with 3-6 branches, 14-C with 3-7 weak branches; mentum with 17 or 19 teeth. *Thorax.* Seta 0-P stellate, with 3-7 weak branches; 1-P double, 3-P with 8-12 branches, 4-P with 9-13 branches, 7-P with 4-6 branches, 14-P with 17-21 stiff, lightly barbed branches; 13-M dendritic, 14-M with 7-12 branches; 3-T with 3, 4 stout branches; 13-T with 7-10 branches. *Abdomen.* Seta 1-I stout, spine-like, single or double, 2-I, II a long stout, acutely pointed, simple spine, 6-I double, with dorsal branch shorter than ventral branch, 11-I with 2-4 long, stout, acutely pointed, simple branches; 1-II with 4, 5 stiff branches, 5-II stout, spinelike, about 0.5 of 2-II, 6-II double, significantly shorter than 6-I, 9-II-V a very long stout, darkly pigmented, simple, acutely pointed spine, longer than antenna and slightly longer than the similarly developed seta 5-III-VI; 1-III-VI with 4 (3, 4) stiff branches, 6-III-VI with 3 (3, 4) unequal branches; 9-VI a small simple spine; 1-VII with 3, 4 branches; 1-VIII stout, double, lightly barbed, inserted on a long narrow sclerotized plate with 2-VIII; comb scales 10-13, on a small lightly sclerotized plate, scales of near uniform length and width, each lightly fringed from base to apex, terminal spicules slightly stronger. *Segment X.* Saddle incomplete ventrally, with a few sharp spines on posterolateral margin, a few fine spicules arising from the more apical imbrications; 1-X with 3, 4 equal branches; 4a-e-X with 8-10, 2-10, 9-12, 7-10, 6-8 branches respectively. *Siphon.* Light brown; index about 3.0-3.6; pecten teeth 14-20, not extending beyond 0.5 of siphon, each tooth with fine lateral spicules on basal side and strong sharp spines apically; seta 1-S with 8-11 strong, lightly barbed branches, about 1.7 the median width of siphon, inserted at about basal 0.48 of siphon and slightly beyond distal pecten tooth.

TYPE-DATA. Type-male with terminalia on slide in BMNH with the following information: Type ♂ 1880 *U. stricklandi* Barraud, India E. Himalayas, Kurseong Balasum River, June 1923 (C. Strickland), Capt. P. J. Barraud, BM 1926-262. There is also a female labeled "type" in the BMNH (see discussion section). Barraud did not specifically designate the above male as the holotype and it is not labeled as such. However, the evidence clearly suggests that this was his intention and therefore, I do not see a need to designate this specimen as "lectotype." Barraud specifically referred to the female as "Allotype" and further, listed the type-locality for the male in first order, and named the species in honor of Strickland based on the specimen collected by Strickland. This is a critical point since the female quite likely represents a different species and should be viewed as such until further material from Nilgiri Hills, southern India, becomes available.

DISTRIBUTION. Material examined: 4♂, 7♀, 7 L; 10 with associated skins (8 l, 10 P).

INDIA. *Darjeeling:* Kurseong, Balasum River, 1♂.

THAILAND. *Chiang Mai:* Chiang Dao, Ba Pa Miang; 2♂, 7♀, 6 L, 7 l, 9 p. *Lampang:* Ban Pha Daeng, 1♂, 1 l, 1 p. *Kanchanaburi:* Khao Na Chang, 1 L.

Chu (1957: 147) records this species from Hainan Island, CHINA, but I have not seen specimens from this area. Specimens recorded as this species may refer to *koli* or *spiculosa* since both have been encountered in southern Vietnam.

DISCUSSION. This is a well-marked species with only slight variation in the adult. In general the adult appears closest to *koli* and *spiculosa* but differs in a number of respects as seen from the description of these 3 species. Barraud (1934) described the female allotype and briefly stated that the male type had similar markings. He failed to point out a very significant difference in the 2 specimens before him. The type-male has a conspicuous median patch of gray-white scales on the mesepimeron. The female allotype shows no such patch but has a few scales near upper *mep* setae. These may have been rubbed off in the allotype female but most likely they were not. The 2 specimens came from widely separated localities in India with the female from the Nilgiri Hills, southern India. I have recently obtained 8 reared specimens of males and females from Coonoor, Nilgiri Hills, southern India, which resemble the type very closely except for the absence of scales on the middle *mep* and a few other minor points. The associated immature stages differ significantly from those of *stricklandi* from Thailand. Although the adult specimens from Coonoor are in a poor, rubbed condition (or somewhat smashed), it seems quite unlikely that all would have the *mep* rubbed, especially since all have most of the scales on upper *stp* intact. Barraud also said of *stricklandi* that the dorsum of abdomen was with well-marked basal ochreous bands but the female allotype shows rather indistinct bands on IV-VI only. Abdominal segments of the type-male are missing and some are mounted with the terminalia. The basal abdominal bands on female specimens from Thailand are rather indistinct but appear to be partly due to the teneral condition of most specimens.

In view of the above, I am provisionally recognizing the "allotype" female of *stricklandi* and other specimens from Nilgiri Hills, southern India, as representing a new unnamed form to be treated at a later date when additional adult specimens in good condition become available. The allotype female in the BMNH is labeled as follows: Type ♀ 1881 *U. stricklandi,* India, Malabar Coast, Oct. 1915 (Kazan Chand) Capt. P. J. Barraud, BM 1926-262. Since

all Thailand specimens have a patch of scales on middle mesepimeron and are otherwise marked as the type-male of *stricklandi*, I am treating the 2 as conspecific. The illustrations of the immature stages were made from Thailand specimens, as immatures from the type-locality of *stricklandi* are unknown. There seems little doubt at the moment that this interpretation is correct. However, the collection of immature stages from the type-locality of *stricklandi* may show that a complex of closely related species exists, since several species within the *recondita* series show greatest divergence in these stages.

BIONOMICS. The data sheets for the 3 Thailand collections of immatures are unclear as to the specific nature of the habitats. Two of these are recorded as small rock pools. One of the pools was in volcanic rock at the base of a mountain and contained larvae of *Ae. albopictus* (Skuse), *An. maculatus* Theobald and *C. (Eumelanomyia)* species. The second was from a pool in the middle of a stream and contained larvae of *U. (P.) bicolor*, *U. (U.) macfarlanei* Edwards and *C. (Lophoceraomyia)* species. Most of these species are often found in rock pools, so it is assumed the 2 collections were from rather typical rock pool habitats. The third collection was recorded as a "ground hole" with the added notation that it was on the sloping bank of a seepage area. Larvae of *abdita* were also present in this collection. Larvae of *abdita* are most commonly found in fresh water crab holes or small deep rock crevices. It is assumed that the latter collection was from either a crab hole or simulated crab hole near the seepage area which is typical for most species of this series. The 3 collections are recorded at elevations of 75, 700 and 1, 000 m.

URANOTAENIA (PSEUDOFICALBIA) SUMETHI PEYTON AND RATTANARITHIKUL
(Figs. 71, 72)

Uranotaenia sumethi Peyton and Rattanarithikul 1970: 411 (A, ♂, L, P).
Uranotaenia (Pseudoficalbia) sumethi Peyton and Rattanarithikul, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.83 (0.81-0.89) of forefemur; prementum uniformly light bronzy brown scaled, a few minute setae at apex; 1 pair of labial basal setae; palpus about 0.13 of proboscis and about 1.2 of antennal flagellomere 1; clypeus light brown; antennal pedicel a very pale yellowish brown, a few minute setae and scales usually present dorsomesally; flagellum about 1.33 of proboscis or exceeding proboscis from base of flagellomere 11; Flm 1 barely longer than Flm 2 and with several light brown scales basomesally; flagellar whorls each of 8, 9 setae; 1 long, stout and 1 minute interocular and 4 ocular setae; decumbent scales light grayish brown in center, narrowly and distinctly dull grayish white on ocular line and at sides; erect scales exceptionally long, dense, covering most of vertex, light golden brown in color. *Thorax.* Scutal integument uniformly pale straw or grayish brown; scales narrow, curved, uniformly light bronzy brown; prescutellar space largely bare; scutellum, mesopostnotum and paratergite same color as scutum; scutellar scales broad, dark brown; pleuron uniformly pale grayish or whitish brown, only slightly lighter than scutum; *apn* covered with light grayish brown scales and with 1 long, stout and 4-8 shorter delicate setae on lower margin; *ppn* with 1, 2 setae and a patch of light brown scales with blue-white reflections on upper posterior corner; *sp* with 1, 2 setae; *ppl* with 1 long, strong and 3, 4 shorter, weaker setae and with a few inconspicuous pale bronzy brown scales;

stp with 16-18 setae on upper and posterior margins, upper 9, 10 long, strong, remainder short delicate, and with a very inconspicuous patch of near colorless translucent scales on upper 0.5; upper *mep* with 4, 5 setae. *Wing.* Scales dark brown; cell R_2 about 0.4 (0.31-0.40) of R_{2+3}. *Legs.* Coxae, trochanters and pleuron concolorous; C-I with a few light brown scales on anterior surface; C-II, III with a few inapparent translucent scales anterolaterally; femora dark brown scaled dorsally, indistinctly lighter ventrally, without conspicuous arrangement of setae; forefemur with about 5 setae on anteroventral margin, 11-13 setae on posterodorsal margin and occasionally several very short, fine setae on basal 0.5 of anterior surface; midfemur with 3, 4 long setae on basal dorsal margin, 4, 5 similar ones on mid-posteroventral margin, 7, 8 on anteroventral margin and a very few scattered minute setae on basal anterior or posterior surfaces; tibiae and tarsi dark brown scaled; hindtarsomere 1 about equal to tibia or barely longer, hindtarsomere 4 about 2.4 of tarsomere 5. *Abdomen.* Terga uniformly light bronzy brown scaled with weak purple-green reflections; laterotergite with a few light grayish brown scales; sterna pale whitish or creamy brown with shiny translucent scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.9 (0.85-0.92) of forefemur; 1, 2 pairs of labial basal setae; antennal flagellum strongly plumose, whorls each of 20 or more setae, about 1.1 of proboscis; flagellomeres 12, 13 subequal, or 13 barely longer. *Legs.* Hindtarsomere 4 about 2.8 of tarsomere 5. *Terminalia* (Fig. 72). Tergum IX long, broadly rounded on apical margin, basal emargination very broad and shallow; tergum X complete, but very narrow tergomesally, produced tergolaterally into short apicaly rounded finger-like lobes which extend beyond apical margin of tergum IX; tergomesal surface of basimere with numerous long slender setae, a few of the more basal setae shorter and weaker; basal mesal lobe of basimere with 3 long stout tergoapical setae and 1, 2 shorter, moderately strong setae slightly basosternal to these and 8-10 weak more basal setae, 1, 2 long, stout and 2, 3 weak setae on sternal margin; distimere long, slender, slightly curved, of near uniform width to near tapered apex; spiniform stout, acute; plates of aedeagus each with 1 broad, flat, apically expanded, subapical tergomesal tooth and 2 strong, curved, apicosternal teeth, with the tergal-most shortest and directed laterally; proctiger without cercal setae but with numerous minute setiform spicules apicolaterally.

PUPA (Fig. 72). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument pale brown. *Cephalothorax.* Seta 1-CT double or triple, 2, 3-CT usually double (2, 3), branches barbed and occasionally frayed distally, 4-CT with 4, 5 lightly barbed branches, 5-CT with 4, 5 distally barbed branches, 6-CT with scattered, fine lateral barbs, 8-CT with 6-9 branches which are strongly barbed distally. *Respiratory Trumpet.* Light brown; index about 3.9-4.6, not noticeably expanded apically. *Metanotum.* Seta 10-CT single, with a conspicuous lateral fringe at or near middle, 11-CT single or double, strongly brush-tipped, 12-CT with 3, 4 distally barbed branches; alveolus of 13-CT not evident. *Abdomen.* Seta 3-I single or double, strongly brush-tipped, 6-I single or bifid, barbed or frayed distally; 1-II with 5-11 strongly barbed branches, 3-II long, stout, strongly brush-tipped, 6-II single or double, occasionally with strong lateral fringe distally; 1-III with 4-8 barbed branches, 3-III long, stout, lightly barbed basally and strongly brush-tipped, 6-III-V double; 1-IV with 4-7 finely barbed branches, 5-IV single, lightly barbed, 1.5 or more the length of segment V; 1-V double or triple, lightly barbed, 5-V-VII single, lightly barbed, about 2.0 the length of each succeeding segment; 1-VI single or double, lightly barbed,

6-VI single, occasionally bifid or trifid, 0.75 or more the length of segment VII; 1-VII single, lightly barbed, 6-VII located ventrally, strong, single or double, barbed; 9-VIII with 6-10 strongly barbed branches. *Paddle.* Midrib pale brown to apex; outer margin with closely set serrations from about basal 0.33 to apex and a few scattered, smaller submarginal spicules; inner margin with a few straight spicules on apical 0.25 and a few smaller submarginal ones; apex with a very shallow emargination.

LARVA (Fig. 71). Chaetotaxy as figured. Diagnostic characters as in series description and the following. *Head.* Light yellowish brown; seta 4-C with 3, 4 delicate branches, 7-C with 5-7 simple branches, 11-C with 5, 6 branches; mentum with 11-13 teeth. *Antenna.* Light yellowish brown; darker basally; seta 1-A double or triple, inserted beyond 0.5 of shaft. *Thorax.* Seta 0-P with 4-6 weak branches, 3-P with 5-7 barbed branches, 4-P with 6-9 barbed branches, 7-P double or triple, barbed, 14-P with 6-9 moderately stout, acutely pointed, strongly barbed branches; 1-M with 3, 4 stiff, sharply pointed branches, 14-M with 4-7 weak branches; 1-T with 2, 3 stiff, sharply pointed branches, 3-T stellate, with 3, 4 strong, sharply pointed branches, 5-T single, strong, spine-like about equal in length to 3-T, 13-T stellate, with 4-6 rather weak, sharply pointed branches. *Abdomen.* Seta 1-I double or triple, branches stout, acutely pointed, light brown, 2-I branches similar to 1-I, single to 4 branched, 6-I, II double, very stout, barbed, ends acuminate, ventral branch shorter than dorsal branch; 11-I branches similar to 1, 2-I but longer, double or triple; 1-II single, strong, sharply pointed, lightly pigmented, 2-II single, stout, spine-like, darkly pigmented, very disimilar to much weaker 2-III-VII, 5-II-VI single, short, stiff, acuminate, 6-III-VI single or double, long, stout, conspicuously barbed; 9-II-VI single, moderately long, stout, acutely pointed, progressively shorter and slightly weaker to VI; 13-II-V with 3, 4 moderately strong, sharply pointed branches; 1-III, VI usually single (1, 2), strong, sharply pointed, lightly pigmented; 1-IV, V, similar, usually double (1-2); 1, 3-VII single or double, long, stout, barbed, sharply pointed, 13-VII double or triple, branches strong, sharply pointed; 1-VIII single or double, strong, sparsely barbed, 3-VIII with 6-8 branches, each strongly barbed and brush-tipped, 5-VIII double to 4 branched, branches strong, sharply pointed; comb scales 8-14, on a small narrow weakly sclerotized plate, all of near equal length and width, evenly spaced, each rather long and tapered to pointed apex, darkly pigmented medially from base to apex, appearing as sharp narrow single spines but with narrow unpigmented finely spiculate lateral border to near apex. *Segment X.* Saddle complete, pale brown, lightly imbricate, with several short stout spines on dorsal posterolateral margin and numerous fine spicules ventral to these; seta 1-X single, 2-X usually double (1, 2), 3-X single or double, 4a-e-X with 3-4, 2-3, 3-5, 4-5, 3-4 branches respectively, with the 2 branched 4b-X on one side significantly longer than the others. *Siphon.* Light brown, imbricate from base to apex; index about 4.0-4.8; pecten teeth 21-23 (20-30), reaching to 0.50-0.61 of siphon, each tooth short, broad, with conspicuous apical fringe of spicules, a few teeth also laterally fringed, occasionally several teeth out of line with the others; seta 1-S with 3-5 strong, barbed branches, individual branches often expanded apically and occasionally lightly brush-tipped, inserted slightly beyond distal pecten tooth at 0.60-0.65 of siphon.

TYPE-DATA. Holotype male with slides of terminalia and pupal and larval skins in the USNM with following collection data: THAILAND, *Kanchanaburi*, Gang Lawa Cave, Huey Bong Ti, 18 March 1964, Sumeth Chunchulcherm and Kol Mongkolpanya, collectors, collection number KB35-11, SEAMP ac-

cession number 79 and SEAMP terminalia preparation number 68/1248, collected as a larva from a clear, shallow pool on floor of cave at an elevation of about 200 m. Allotype female and several paratypes also in USNM; 2 males, 2 females and 2 larvae of the paratype series will be deposited in the BMNH.

DISTRIBUTION. Material examined: 9♂, 17♀, 50 L; 14 with associated skins (5 l, 14 p).

THAILAND. *Kanchanaburi:* Huai Bong Ti, Gang Lawa Cave, 9♂, 17♀, 45 L, 5 l, 14 p. *Nakhon Nayok:* Khao Yai National Park, Pha Kleuy Mai, 5 L.

DISCUSSION. In general adult habitus this species is most similar to *nocticola* and *pylei* however, the 3 do not appear to be closely related. The male terminalia of each are distinct in a number of characters but most especially in the aedeagal plates. The immature stages of these are also very distinct. The adults of *pylei* look much like *sumethi* in the general light brown thoracic integument and brown scaled abdominal segments but differ most significantly from *sumethi* in the following: *apn* with 2, 3 long, stout and 1-3 short weak lower setae; *ppn* with 3-5 setae and scattered scales on upper posterior corner; *stp* with a few small scattered, inapparent light brown scales on upper 0.33; *mep* with similar scales at middle; mesopostnotum dark brown, contrasting with pale pleuron; abdominal terga dark bronzy brown; basal 0.33 of midfemur densely setose. In *sumethi* these are as follows: *apn* with only 1 long, stout and 4-8 short delicate setae on lower margin; *ppn* with 1, 2 setae and a distinct patch of scales; *stp* with a patch of colorless translucent scales on upper 0.5; *mep* without scales; mesopostnotum same color as scutum and not sharply contrasting with pleuron; abdominal terga light bronzy brown scaled; midfemur not densely setose on basal 0.33. *Uranotaenia nocticola* has pleural scaling somewhat like *pylei* but differs from both *pylei* and *sumethi* in having only a single lower seta and no scales on the *apn*.

BIONOMICS. The immature stages have been collected on several occations from clear shallow pools (13) on the floor of a single cave during the months of January, March, June and August and once from a tree hole (?). In the natural habitat the large larvae are pale white in color and have a slow, sluggish, undulating movement and can remain immobile on the bottom for long periods. Immatures were difficult to rear to the adult stage. Larvae collected in June 1965 remained alive in the laboratory for more than a month with only a few emerging as adults.

McClure et al. (1967) refer to a similar cave-inhabiting species in Kuala Lumpur, Malaysia. It is not possible to determine which species these authors observed but their observations were somewhat similar to mine for *sumethi*. They state, "*Uranotaenia* sp. (Table 18) was found breeding in semidarkness in Pool B in 1959 and in the Geometric Pools. The population was a winter one and the larvae were very slow to develop. In both 1960 and 1961 only one generation of larvae developed in the Geometric Pools followed by several months of absence." In view of the very slow development of the larvae of *sumethi*, the above cited months of collections may not necessarily indicate more than one or 2 generations a year for this species also. However, collections of *sumethi* for the year 1964 from the same cave were made in January, March and August and the following year in June.

URANOTAENIA (PSEUDOFICALBIA) YAEYAMANA TANAKA, MIZUSAWA AND SAUGSTAD
(Figs. 2, 73, 74)

Uranotaenia stonei of Bohart 1959: 196 (in part, misidentification).
Uranotaenia (Pseudoficalbia) yaeyamana Tanaka, Mizusawa and Saugstad 1975: 31 (♂*, ♀, L*).

FEMALE. *Head.* Proboscis about 0.85 of forefemur; prementum dark brown scaled, with a few scattered minute setae on ventral margin and at apex; one pair of labial basal setae; palpus about 0.11 of proboscis and about equal to antennal flagellomere 1; clypeus dark brown; antennal pedicel yellowish brown, with a few minute setae and scales dorsomesally; flagellum about 1.4 of proboscis or exceeding proboscis from near base of flagellomere 10; Flm 1 about equal to or slightly less than Flm 2 and with a few pale brown scales basomesally; flagellar whorls each of 6, 7 setae; 1 strong and 1 weak interocular and 5 ocular setae; decumbent scales dark grayish brown in center, narrowly grayish or creamy white on ocular line and at sides; erect scales exceptionally long, dense, covering vertex to ocular line. *Thorax* (Fig. 2). Scutal integument light brown; scales mostly narrow, curved, grayish brown, occasionally a few rather grayish scales on anterior promontory with a few in front of acrostichal line broader; prescutellar space bare on posterior 0.5; scutellum pale brown, scales dark brown; mesopostnotum not noticeably darker than scutum; paratergite pale brown; pleuron mostly pale grayish brown, with *ppn*, *psp*, upper 0.2 of *stp* and most of *mep* distinctly darker brown, occasionally *apn* and midanterior *stp* indefinitely darker; *apn* covered with dark gray scales; *ppn* with 1, 2 setae and a patch of grayish brown scales near upper posterior corner; *sp* with 1 seta; *ppl* with 1 strong and 4-7 weak setae; *stp* with 14-16 setae on upper and posterior margins, the upper 9-12 strong and dark, lower 4-6 fine, yellowish and with a distinct patch of rather scattered pale grayish translucent scales on upper 0.5 and a few scattered down posterior margin; *mep* with 5-13 weak upper setae, a few translucent scales on upper posterior corner and with a distinct median patch of sparsely arranged grayish translucent scales. *Wing.* Scales dark brown; cell R_2 about 0.4 of R_{2+3}. *Legs.* Coxae and trochanters pale grayish brown; C-I with a few grayish brown scales on anterior surface; C-II, III with a few inconspicuous pale translucent ones anterolaterally; femora dark brown scaled dorsally, grayish brown ventrally towards base, with very distinct arrangement of setae on fore- and midfemora; forefemur with 14-16 stiff setae on posterodorsal margin from base to near apex, about 7 stronger setae on anterodorsal margin from basal 0.45 to near apex and 4, 5 well spaced setae on distal anteroventral margin; 3, 5 stiff setae on middorsal margin, a dense patch of minute, shiny semierect setae on dorsal surface near middle, not visible in some angles of light; midfemur with numerous setae encircling middle, with a greater concentration on anterior surface and a dense patch of minute, shiny semierect setae on posterior surface, 7-10 long delicate setae on basal 0.5 of dorsal margin and a few small scattered setae distally; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 1.0 of tibia. *Abdomen.* Terga uniformly dark brown scaled; laterotergite with a few pale scales; sterna pale grayish brown, covered with pale grayish or creamy translucent scales.

MALE. Essentially as in female except for sexual differences. *Head.* Proboscis about 0.93 of forefemur; antennal flagellum about 1.13 of proboscis

or exceeding proboscis by less than length of flagellomere 13, strongly plumose, whorls each of more than 20 setae; Flm 13 barely longer than Flm 12. *Terminalia* (Fig. 74). Tergum IX broadly rounded on apical margin; tergum X weakly developed, membranous tergomesally, produced into short broad weakly sclerotized lateral lobes; tergomesal surface of basimere with a conspicuously long, strong seta basolateral to basal mesal lobe in addition to several smaller setae; basal mesal lobe of basimere with 2 very long, stout, tergoapical setae, 2, 3 shorter strong more basal setae and 6-8 weaker setae basal to these, 1 long, stout and 3, 4 weaker sternoapical setae; aedeagus similar to other members of the *recondita* series; apicosternal margin of each plate with 2-4 (usually 3) curved teeth, the most tergal largest and grooved, middle 1, 2 very small, occasionally reduced or absent; distimere curved and tapered to apex; proctiger with 1, 2 cercal setae on each side.

PUPA (Fig. 74). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument uniformly pale brown. All setae except 1-I and 9-VIII without lateral barbs. *Cephalothorax.* Seta 4-CT with 3-5 branches, 5-CT with 2-5 branches, 8-CT with 5-7 branches, 9-CT with 3, 4 branches. *Respiratory Trumpet.* Light brown, tracheoid on antero-basal 0.2; index about 3.5. *Metanotum.* Setae 10, 11-CT single, 12-CT double or triple, alveolus of 13-CT present. *Abdomen.* Seta 1-II with 7-13 branches, 2-II single, strong, slightly longer than segment III, 3-II, III single or double, usually with a very few terminal branches; 1-III, IV with 3, 4 branches, 6-III-V double or triple; 5-IV-VI single, strong, each slightly longer than succeeding segment; 1-V double; 1-VI single or double, 6-VI single, strong, about 0.75 the length of segment VII; I-VII usually single, occasionally double, 5-VII single, weak, about 0.5 the length of segment VIII, 6-VII single or double, located ventrally; 9-VIII single to triple, strong, branches simple or very lightly barbed, as long as or longer than segment VIII. *Paddle.* Midrib light brown from base to near apex; outer margin with fine saw-tooth spicules, with a few apically longer and straight; inner margin with fewer stout straight spicules which become more widely spaced and much smaller towards base; apex with narrow, shallow emargination.

LARVA (Fig. 73). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Stout spine-like setae of abdomen darkly pigmented and acutely pointed. *Head.* Light brown; seta 4-C double to 5 branched, on level with 5-C, 5-C with 3-6 stiff branches, 7-C with 7-10 branches, 11-C with 4-7 branches, 14-C double to 4 branched; mentum with 14-17 teeth. *Thorax.* Seta 1-P usually double, occasionally single, 3-P with 7-13 strongly barbed branches, 4-P with 8-12 lightly barbed branches, 7-P strong, with 3-6 barbed branches, 14-P stellate, with 9-20 strong, heavily barbed branches; 1-M with 3-6 strong, acutely pointed branches; 1-T with 2-5 strong, acutely pointed branches. *Abdomen.* Seta 1-I single or double, spine-like, 2-I, II long, stout, single, longer than antenna, 11-I double or triple, long, stout, 6-I, II with unequal branches; 1-II, IV-VII with 2-4 stiff branches, 5-II small, weak, 9-II-V long, stout, single, 13-II with 2-6 stiff branches; 1-III single to 4 branched, stiff, 5-III single, short, stiff, spine-like, 6-III-VI double or triple, long, strong, branches equal, lightly barbed, 13-III, IV with 2-5 stiff branches; 5-IV-VI single, long, stout; 13-V with 2-4 stiff branches; 1-VII single, long, 3-VIII with 6-9 strongly barbed branches; comb scales 13-20, on a small poorly sclerotized plate, each scale uniform in width to near apex, slightly tapered apically, fringed with fine spicules laterally and apically, with apical spicules slightly stronger. *Segment X.* Saddle incomplete, light yellowish brown, posterolateral margin with stout and weak

spicules interspersed, 2-4 more dorsal spicules exceptionally long, stout, about equal to length of comb scales; 1-X double to triple, 4a-e-X with 4-7, 2-7, 4-8, 5-7, 4-6 branches respectively, 4b-X on one side usually with only 2 branches and significantly longer than 4b-X on opposite side. *Siphon.* Light yellowish brown; index 3.2-4.0; pecten teeth 15-24, apical 2-4 distinctly longer, stronger, simple, spine-like and detached from others, more basal teeth fringed with rather strong spicules apically, reaching 0.58-0.64 of siphon; 1-S with 4-7 barbed branches, as long as width of siphon, inserted beyond distal pecten tooth at 0.61-0.68 of siphon.

TYPE-DATA. Holotype male with slides of terminalia and pupal and larval skins deposited in the National Science Museum, Tokyo, with the following information: JAPAN, *Yaeyama Gunto*, Funaura, Iriomote Is., 28 November 1971, K. Mizusawa, collector, collection number K-1094-28, collected as a larva from a crab hole. A small series of male and female paratypes with associated pupal and larval skins deposited in USNM. The holotype was not examined and the illustrations and pupal description in this revision were made from paratypes from the same collection (K-1094) as the holotype.

DISTRIBUTION. Material examined. 10♂, 13♀, 25 L; 8 with associated skins (8 l, 8 p).

JAPAN. (Taken principally from Tanaka, Mizusawa and Saugstad 1975). *Iriomote Island:* Funaura, Itokawa-rindô, Mt. Goza, Shirahama, Sonai, Uehara. *Ishigaki Island:* Arakawa, Mt. Banna, Mt. Kawara, Mt. Maeshi, Mt. Omoto, Yarabu Peninsula, Yoshiwara.

Bohart (1959) reported this species from Ishigaki Island as *stonei*, however, borrowed specimens from Dr. Bohart from Ishigaki showed a mixture of *yaeyamana* and *ohamai*. No specimens of *stonei* (= *jacksoni*) from Ishigaki have been seen by me. Specimens of *yaeyamana* kindly loaned to me by Richard M. Bohart consist of 5 males, 10 females and 23 whole larvae.

DISCUSSION. This is a rather easily recognized species in the adult stage but the larva is very similar to that of *jacksoni*. Eight species of the *recondita* series are without pale scaled abdominal bands in the adult, but except for a dark posterior pronotum in *srilankensis*, all are without light and dark pleural markings. Superficially the adult resembles a few members of the *bimaculata* series with somewhat similar pleural markings but these are all without a patch of scales on the mesepimeron and except for *maculipleura* all have the anterior pronotum bare and usually the posterior pronotum bare or with at most a few scattered scales. Although, several species of the *recondita* series have numerous setae on midfemur, the setae encircling the midfemur in *yaeyamana* are significant when considered with other features such as the absence of pale abdominal bands and the rather distinctly marked pleuron. The dark areas of the pleuron are distinct but are not as dark and sharply contrasting with pale areas as most species having distinct pleural patterns of light and dark. The mesepimeron is occasionally only faintly darker or the middle indefinitely lighter, however, the median patch of scales readily distinguishes it from others that might be confused with it. The male terminalia are similar to terminalia of several other species of the series and are not readily distinguished from them. The weakly sclerotized tergum X differs from several species but is similar to that in *ohamai*. The aedeagus is more like that of *stricklandi* and *jacksoni* with only minor differences in the size of teeth on the apicosternal margin of each plate.

The larva is closest to that of *jacksoni*. Differences are few but the characters presented in the key separate the 2. The following is from Tanaka, Mizusawa and Saugstad (1975) since their analysis was based upon a much

larger sample of both species. "In the larva, the labral process [apicomesal projection of labral process] at the base of 1-C is pointed and longer than the basal width in *yaeyamana*, rounded and as long as the basal width in *jacksoni*. The detached apical pecten teeth are much larger than the basal fringed teeth and more widely spaced in *yaeyamana*, only a little larger and not very widely spaced in *jacksoni;* 1-S is as long as the siphon diameter and located at apical 0.32-0.39 (x:0.36) in *yaeyamana*, longer than the siphon diameter and located at apical 0.40-0.46 (x:0.43) in *jacksoni*. Setae 1-M and 1-T are a little longer and stiffer in *yaeyamana;* 2-I-II are longer than the antenna in *yaeyamana*, equal to the antenna in *jacksoni;* 1-II-IV have more branches in *yaeyamana;* x:1.9, 1.9, 2.1 in *yaeyamana*; 1.0, 1.1, 1.2 in *jacksoni*, respectively." Little can be added to this except for the difference in branching of seta 4a-X (used in the key) and 13-II-V is generally lower in average number of branches in *jacksoni*. Of all of the species with branched seta 5-C (except *confusa*) and very long, stout, pigmented spine-like abdominal setae 5 and 9 of various segments, *yaeyamana* and *jacksoni* are the only ones with a weakly developed 5-II and greatly reduced 5-III. The others have 5-II reduced but stout, spine-like and 5-III is about equal in length to 5-IV-VI.

BIONOMICS. According to Tanaka, Mizusawa and Saugstad (1975) the habits of this species are very similar to that of *ohamai*. Immature stages are often found together in fresh water crab holes and seem to be rather common on Iriomote and Ishigaki islands. These species apparently do not occur on Okinawa where the closely related *jacksoni* is fairly common in fresh water crab holes. Bohart (1959) reported this species as *stonei* from cave springs, rock holes and crab holes from Ishigaki Island. The specimens from Ishigaki borrowed from Richard M. Bohart are labeled with the following biological data: Yarabu Peninsula, rock hole No. 43, and tree hole No. 42; Kawara, cave spring No. 6; Mt. Banna and Mt. Maeshi, sweeping. All were collected by Bohart in October 1951.

SECTION B, Peyton (1972)

For characters see key on p. 13.

maxima series

DISCUSSION. This series was first described by Peyton (1972). The following taxa are currently known for the series, *anhydor* and ssp. *syntheta*, *maxima*, *unguiculata* Edwards and ssp. *pefflyi* Stone. Only *maxima* occurs in Southeast Asia. Species of this series are well marked in all stages and are easily separated from all other known species of *Pseudoficalbia*. Adults are highly ornamented and are marked much like many species of the subgenus *Uranotaenia*. They all utilize ground water habitats for egg laying but *maxima* is occasionally found in tree holes, bamboo, and artificial containers.

ADULT. As previously listed for Section B and with the following. *Head*. Proboscis shorter than forefemur; erect head scales strong, numerous, covering vertex. *Thorax*. Scutum with a distinct supra-alar and prescutal line of white or blue-white scales, at least some of the scales distinctly short, broad. *Wing*. Vein R with at least a basal anterior row of pale scales extending beyond humeral crossvein (usually extensively pale); cell R_2 long, near equal to cell M_2; microtrichia more obvious than in any other *Uranotaenia* species. *Legs*.

Claws of male foreleg same as those of midleg.

MALE TERMINALIA. Tergum IX without setae; tergum X well developed, produced tergolaterally beyond apical margin of tergum IX into long fingerlike lobes; distimere with prominent spiniform; plates of aedeagus with very short, stout, hooked teeth on apicosternal margin; proctiger with cercal setae.

PUPA. As previously listed for Section B and with the following: abdominal segment IX strongly developed, wrinkled only at basolateral corners; seta 1-IX conspicuous; trumpets with weak inconspicuous denticles basally; paddle with marginal spiculate serrations; 1-P present, 2-P absent.

LARVA. As listed for Section B and with the following: seta 1-C strong, spine-like, distance between the bases greater than the combined length of both; 5-C distinctly shorter and stronger than 6-C; mentum with 11-13 teeth; 4-X with 5 pair of setae usually on grid.

URANOTAENIA (PSEUDOFICALBIA) MAXIMA LEICESTER
(Figs. 75, 76)

Uranotaenia maxima Leicester 1908: 221 (♀); Barraud 1934: 77 (♂*, ♀, L*).
Uranotaenia (Pseudoficalbia) maxima Leicester, Peyton 1972: 37.

FEMALE. *Head.* Proboscis about 0.85 of forefemur; prementum uniformly dark brown scaled, a dorsal submedian row of small inconspicuous curved setae along most of length and a few very small ones apically and ventrosubapically; one pair of labial basal setae; palpus about 0.1 of proboscis and slightly less than length of antennal flagellomere 1; clypeus dark brownish black; antennal pedicel light yellowish brown with a few minute setae and small brown scales on inner aspect; flagellum about 1.1 of proboscis or exceeding proboscis by length of Flm 13; Flm 1 about 1.5 of Flm 2 and with a few light brown scales near base; flagellar whorls each with 10-12 setae; 1 long, stout and 1 short delicate interocular and 4 ocular setae; decumbent scales dark brown except for a conspicuous, narrow, dull gray-white ocular line expanded laterally; erect scales moderately long, numerous, covering most of vertex, black in color. *Thorax.* Scutal integument dark orange-brown with prescutellar space slightly darker brown; scales mostly narrow, curved, dark brown, a broad continuous band of white scales around lateral margin, narrowly interrupted only at anterior dorsocentral line, band composed of scales as follows: exceptionally long, lanceolate and erect near wing root, progressively shorter and semierect to scutal angle, with some being distinctly broad, decumbent from scutal angle to anterior margin, narrow, except for a few small broad ones at anterior dorsocentral and achrostichal lines; prescutellar space densely scaled, at most a very small posterior bare space; dorsocentral and supra-alar setae moderately long and stout; scutellum dark brown, scales dark and broad, midlobe with 4, 5 long stout marginal setae, lateral lobe with 3, 4 long, stout, marginal setae and 5-8 much smaller setae; mesopostnotum light orange; paratergite dark brown; pleuron a dark yellow to light orange brown with distinct dark brown areas as follows: whole of *apn*, *ppn* and *psp*, upper 0.2, lower 0.3 and usually a faint to dark line across middle of *stp*, *pra*, upper and lower edges of *mep*, lower edge of metameron and upper area of metapleuron; *apn* with a conspicuous line of short, broad, white scales; *ppn* with one strong seta, devoid of scales; *sp* with 1 seta; *ppl* with 1 strong and 2-5 small, delicate setae and with a small but distinct patch of grayish white scales; *stp* with about 9 strong upper and 7 weaker lower posterior setae and

with a broad line of flat white scales across upper 0.33 and a separate small patch of semierect shiny white scales on lower posterior margin; *mep* with 4-7 upper setae. *Wing.* Scales mostly dark; costa with 2-3 pale grayish or ochreous scales or a distinct small patch of white scales at extreme base; remigium usually with white, gray, or light ochreous scales, usually extending to basal 0.2 or more of R, occasionally reduced to a few grayish scales intermixed with dark scales in this area or rarely 4, 5 light grayish scales beyond remigium only; cell R_2 about 0.61 of R_{2+3} and about equal to cell M_2 or barely less. *Legs.* Coxae and trochanters pale grayish white; C-I covered with shiny, grayish white scales on anterior surface; C-II, III with a few inconspicuous, pale translucent scales anterolaterally; femora dark brown scaled dorsally, distinctly gray-white with bright pearly white reflections from base to near apex ventrally; forefemur with 10-12 short stiff setae from base to near apex on posterodorsal margin and 5-7 similar setae from near middle to near apex on anteroventral margin; mid- and hindfemora with at most 2, 3 small inconspicuous setae on distal dorsal margin; tibiae and tarsi dark brown scaled; hindtarsomere 1 about 0.94 of tibia. *Abdomen.* Terga dark brown scaled, occasionally with very faint, narrow incomplete grayish basal bands on one or more terga from II-VII, usually without visible pale bands but with a basolateral white scale patch on VII; laterotergite with 2-4 light grayish translucent scales; sterna creamy white scaled.

MALE. Essentially as in female but pale scaling of wing and abdomen much more conspicuous and stable. *Head.* Proboscis about 0.92 of forefemur; 1, 2 pairs of labial basal setae; antennal flagellum slightly less than proboscis in length; Flm 13 longest and slightly greater than combined length of flagellomeres 9-11; flagellar whorls strongly plumose, each with 20 or more setae. *Wing.* Cell R_2 about 0.5 of R_{2+3}; basal 0.2-0.3 of R usually always conspicuously white or grayish white scaled, rarely reduced to a few scattered ochreous scales. *Legs.* Anterior claw of foreleg enlarged, posterior claw small, very similar to claws of midleg; hindtarsomere 1 about equal to or barely less than length of tibia. *Abdomen.* Terga usually with broad basal white bands on II-VII, not reaching to sides on II-VI, always complete to sides on VII, occasionally II extensively pale scaled with a broad subdorsal line from base to apex; sterna VII, VIII dark scaled. *Terminalia* (Fig. 76). Tergum IX with apical margin slightly concave and with very slightly produced, rounded, tergolateral corners; basimere with several long, stout tergolateral setae, tergomesal surface covered with a mixture of long and short setae, the shorter and weaker ones generally more basal; basal mesal lobe of basimere well developed with 2 long, strong tergoapical setae, 1 strong sternoapical seta and 5, 6 much smaller setae; distimere slightly curved and near uniform width on basal 0.33, distended on apical tergomesal 0.33 and tapered to pointed apex; aedeagus with 2 very short closely-set tergal apicolateral teeth and 3 very short closely-grouped sternoapical teeth appearing on tergal view as short, stout hooks; tergum X complete but narrowly and weakly sclerotized between the lobes; lobes rounded apically; proctiger with 1, 2 stiff cercal setae on each side.

PUPA (Fig. 76). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Integument light brown with median basal areas of abdominal segments distinctly darker. *Cephalothorax.* Setae 1-3-CT double or triple; 6-CT distinctly closer to 7-CT than to 5-CT and about 2.0 the length of 7-CT; 7-CT single to triple. *Respiratory Trumpet.* Light brown, slightly darker on tracheoid area; index 4.5-5.2; pinna diagonally truncate, a distinct slit in meatus. *Metanotum.* Seta 10-CT well developed

with 3-6 branches and longer than 12-CT; alveolus of 13-CT clearly visible, but no seta present. *Abdomen.* Seta 1-II with 5-10 branches, 2-II mesad of 5-II, 3-II single or bifid, 6-II single or double; 1-III with 4-7 branches, 3-III single or double, 6-III-VI single; 1-IV with 4-6 branches, 5-IV with 2-4 branches and longer than segment V; 1-V with 2-5 branches, 5-V with 2-4 branches and longer than segment VI; 1-VI double or triple, 5-VI double or triple and about equal in length to segment VII; 1-VII double, 5-VII single or double and about equal to or slightly less than length of segment VIII, 6-VII double or triple; 9-VIII short, with 6-9 strong branches, a few of which are often bifid; 1-IX stout, darkly pigmented. *Paddle.* Midrib darkly pigmented; outer margin with closely-set, sharp serrations on apical 0.5 or more, inner margin with apical serrations gradually becoming much smaller, more widely-spaced and submarginal towards base; inner part distinctly wider than outer part.

LARVA (Fig. 75). Chaetotaxy as figured. Diagnostic characters as in series description and the following. Thorax and abdomen with numerous stellate setae of stout, darkly pigmented individual branches, each branch with stout, lateral barbs and notched apically into 2, 3 minute sharp points. *Head.* Brown; seta 1-C lightly pigmented, 4-C weak with 2-4 branches and about on level with 6-C, 5-C short, very stout, spike-like, darkly pigmented, 6-C single, long, slender, about 2.0 times the length of 5-C; 7-C with 4, 5 branches, 14-C small, stout, spine-like; mentum with 11-13 teeth. *Thorax.* Seta 0-P stellate, with 17-19 strong branches, 1-P double or triple, 3-P with 12-16 branches, 4-P with 3, 4 branches, 7-P with 3, 4 branches, 8-P stellate, with 16-24 strong branches, 14-P stellate, with 29-38 branches. *Abdomen.* Seta 1-I-VII stellate, with 21-31 branches, 2-I-VI single, 4-I stellate, with 9-16 branches, 11-I stellate, with 21-28 branches; 4-II, V distinctly stronger than on other segments, pigmented and single to triple, 5-II stellate, with 9-12 branches, 7-II with 3-5 branches, 9-II stellate, with 3-6 branches, 13-II-VII stellate, with 21-37 branches; 5-III stellate, with 12-15 branches; 7-III-V stellate, with 9-12 branches; 5-IV stellate, with 14-21 branches; 5-V stellate, with 12-17 branches; 5-VI stellate, with 12-14 branches; plate of segment VIII large, comb scales 14 (11-21), each scale long, slender, sharp pointed, with fine lateral fringe from base to slightly to beyond 0.66. *Segment X.* Saddle complete, light brown, posterolateral margin with dense, long, pointed spines, a few of which are split into 2, 3 short, sharp points and with many fine spicules arising from the more apical imbrications; 2-X triple, 3-X double, 4-X with 5 pairs of setae, without apparent grid but surrounded by darkly sclerotized barred area, 4a-e-X with 5-7, 2, 2-3, 2-3, 2-4 branches respectively. *Siphon.* Yellowish brown with basal 0.5 often darker brown and a narrow basal brown band, exceptionally broad on basal 0.5 and tapered to rather narrow apex, index 3.3-3.8; seta 1-S with 7, 8 barbed branches, inserted before middle and slightly beyond distal pecten tooth; pecten of 14-16 long teeth with conspicuous lateral fringe gradually increasing in length to distinct sharp spines distally; trachea terminates in a short, curved, strongly sclerotized filament.

TYPE-DATA. Leicester (1908) did not designate a holotype for any of his new species of Malayan *Uranotaenia.* Two cotype females are in the BMNH. A female cotype with the following data on the underside of label, selected and labeled as LECTOTYPE by E. L. Peyton, Dec. 1968: "In Jungle, The Gap, 24/4/04, Leicester." The other female designated as paralectotype, bears the following information on the underside of the label: "By edge of stream in jungle, The Gap, 16/4/04, Leicester." The lectotype is in good condition but

it has both hindlegs and one midleg missing. The paralectotype is in fair condition with one wing and all legs missing on one side.

DISTRIBUTION. Material examined: 26♂, 30♀, 15 L; 24 with associated skins (21 l, 26 p, 2 incomplete).

INDIA. *Darjeeling:* Suriel, 1♂, 2♀, 1 l.

INDONESIA. *Java*, 1 L.

MALAYSIA. *Peninsular Malaysia: Pahang* - Tana Rata, Cameron Highlands; Frasers Hill; Robinson Falls, Cameron Highlands; Sunong Brinchang, Cameron Highlands; 16♂, 19♀, 4 L, 14 l, 17 P. *Perak* - 23rd and 27th mile Cameron Highlands Rd., 3♂, 5♀, 2 L, 3 l, 3 p. *Selangor* - The Gap, 2♀.

THAILAND. *Chiang Mai:* Doi Sutep; Doi Inthanon, Doi Pak Kha; 3♂, 1♀, 1 L. *Tak:* Doi Sam Sao, 3♂, 1♀, 7 L, 3 l, 6 p.

Reported also from Hainan, CHINA by Chu (1957: 147).

DISCUSSION. This species shows no apparent relationship to any Southeast Asian *Pseudoficalbia*. It is one of the largest species found in the region. The species showing closest relationship to *maxima* is *unguiculata* which occurs principally in the Eastern Mediterranean Region and apparently does not occur east of Pakistan. The adult ornamentation is highly variable and that of wing vein R and abdomen of female is particularly unstable. Even though an occasional female exhibits one or more narrow, basal, pale scaled tergal bands, the bands are generally absent. The males always exhibit pale scaled bands on 3 or more terga. The short male antenna is rather unusual since most known species of *Pseudoficalbia* have the antenna slightly longer than the proboscis. The pupa has a distinct slit in the meatus of the respiratory trumpet which differs from all Southeast Asian *Pseudoficalbia* except *harrisoni*. The very strong spike-like seta 5-C of the larva is atypical of *Pseudoficalbia* and is found elsewhere only in species of the subgenus *Uranotaenia*. In species of the subgenus *Uranotaenia*, both 5 and 6-C are usually spike-like. The stellate setae of the larval thorax and abdomen have a higher range of individual branches than in any other Indomalayan or Oriental species. Only *pylei* has stellate setae approaching this range but there are numerous other differences between the 2 species. The development of seta 7-II is greater in *maxima* than in all other known species of Section B, but still significantly less in degree than either 7-I or 6-II. The peculiar tracheal filament is similar to that reported in *unguiculata* by Montschadsky (1930).

BIONOMICS. This species appears to be confined to the forested mountains of Southeast Asia. On 18 separate occasions it has been recorded at elevations of 731-1,829 m, with 11 above 1,219 m. It does not appear to be common in any area but this may be due to restricted collecting at the higher elevations. Habitats based on 15 confirmed immature collections are as follows: rock pool (5), tree hole (3), split bamboo (2), stream or seepage pool (3), elephant footprint (1), and artificial container (1). Adults have been collected in the forest resting on tree trunks or rocks on 6 occasions. All of the above were in partial to heavy shade. The utilization of both ground water and container habitats by this species is rather unusual, but there are no apparent morphological differences in specimens from either type of habitat. Collection records indicate that fallen, decaying leaves were a common denominator in most of the collections. It is not uncommon to find tree hole breeding species of other genera in small ground water pools, especially rock pools, if there is sufficient shade and an abundance of dead leaves and sticks in the habitat.

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75. *Uranotaenia (Pseudoficalbia) maxima*--larva
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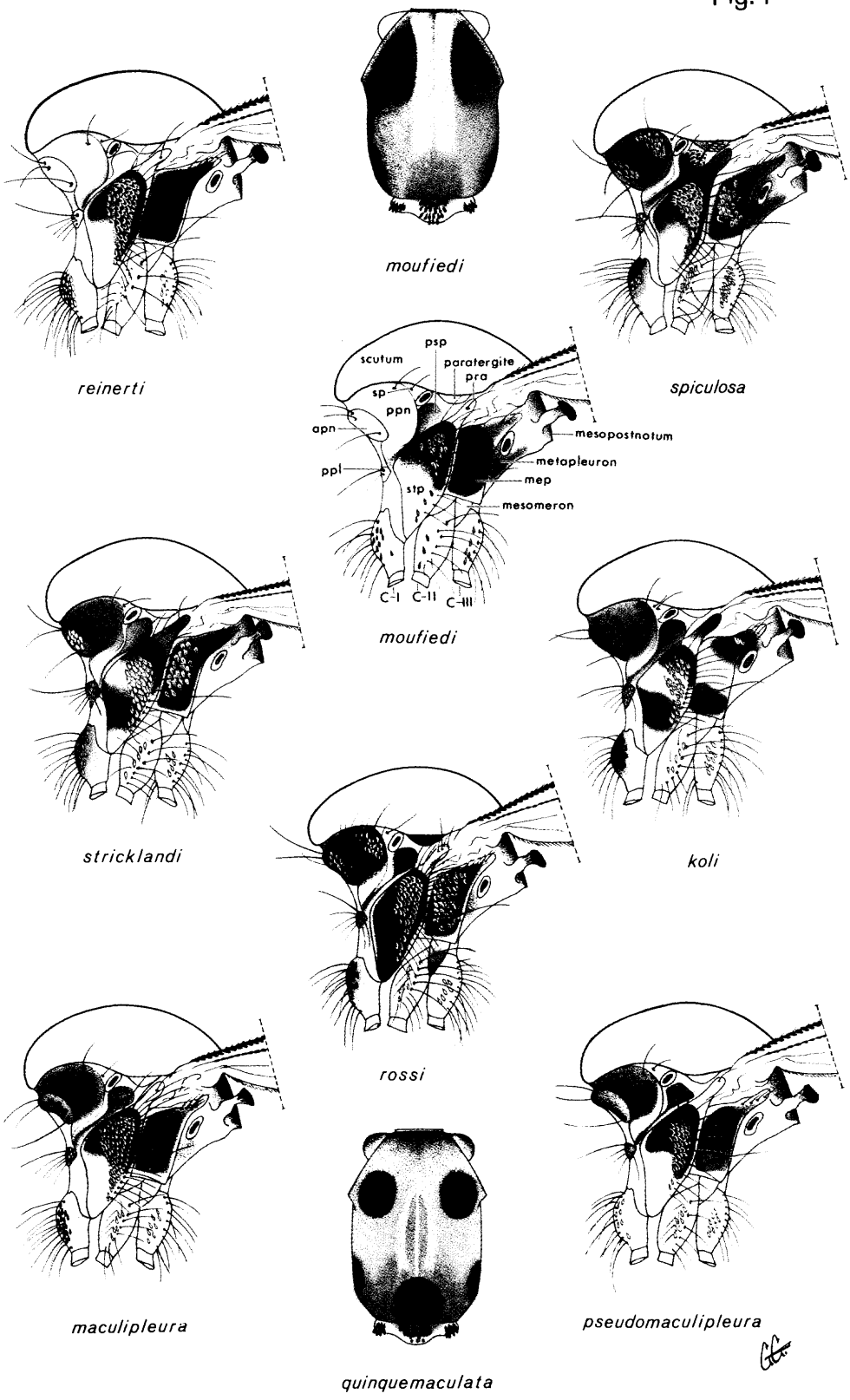
FIGURES

Fig. 1


moufiedi
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mesopostnotum
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ppl
mep
stp
mesomeron
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C-II
C-III
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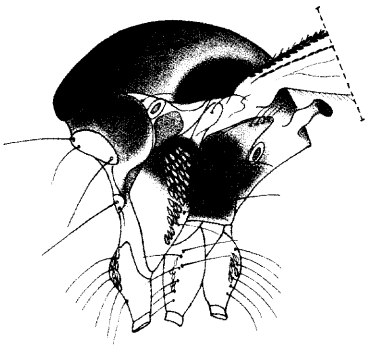
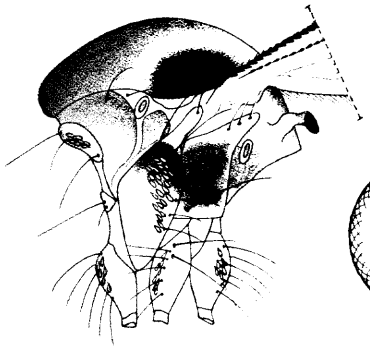
stricklandi
koli
rossi
maculipleura
pseudomaculipleura
quinquemaculata

Fig. 2



novobscura



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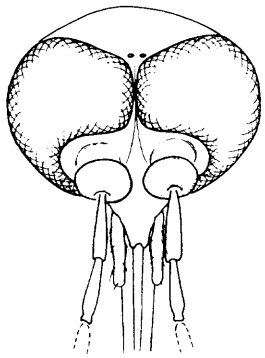
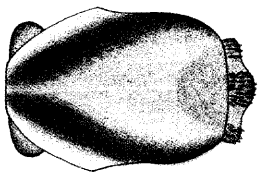


eye separation ♀

pylei



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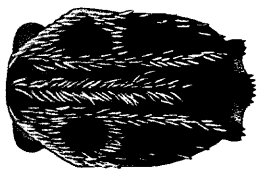

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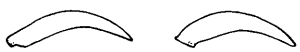
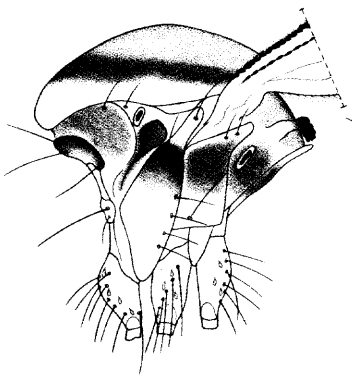


claws of foreleg ♀

obscura



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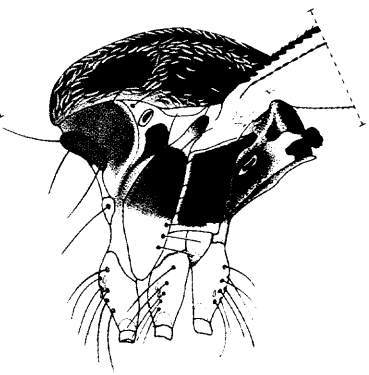

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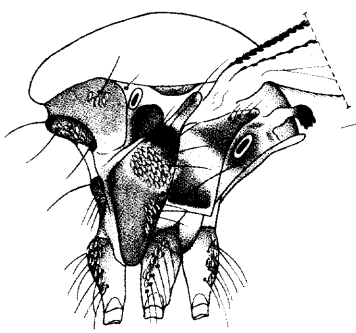
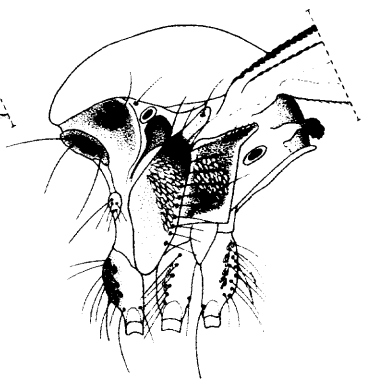


bicolor



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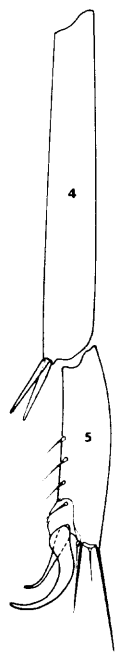


xanthomelaena

♂ midtarsus

Fig. 3

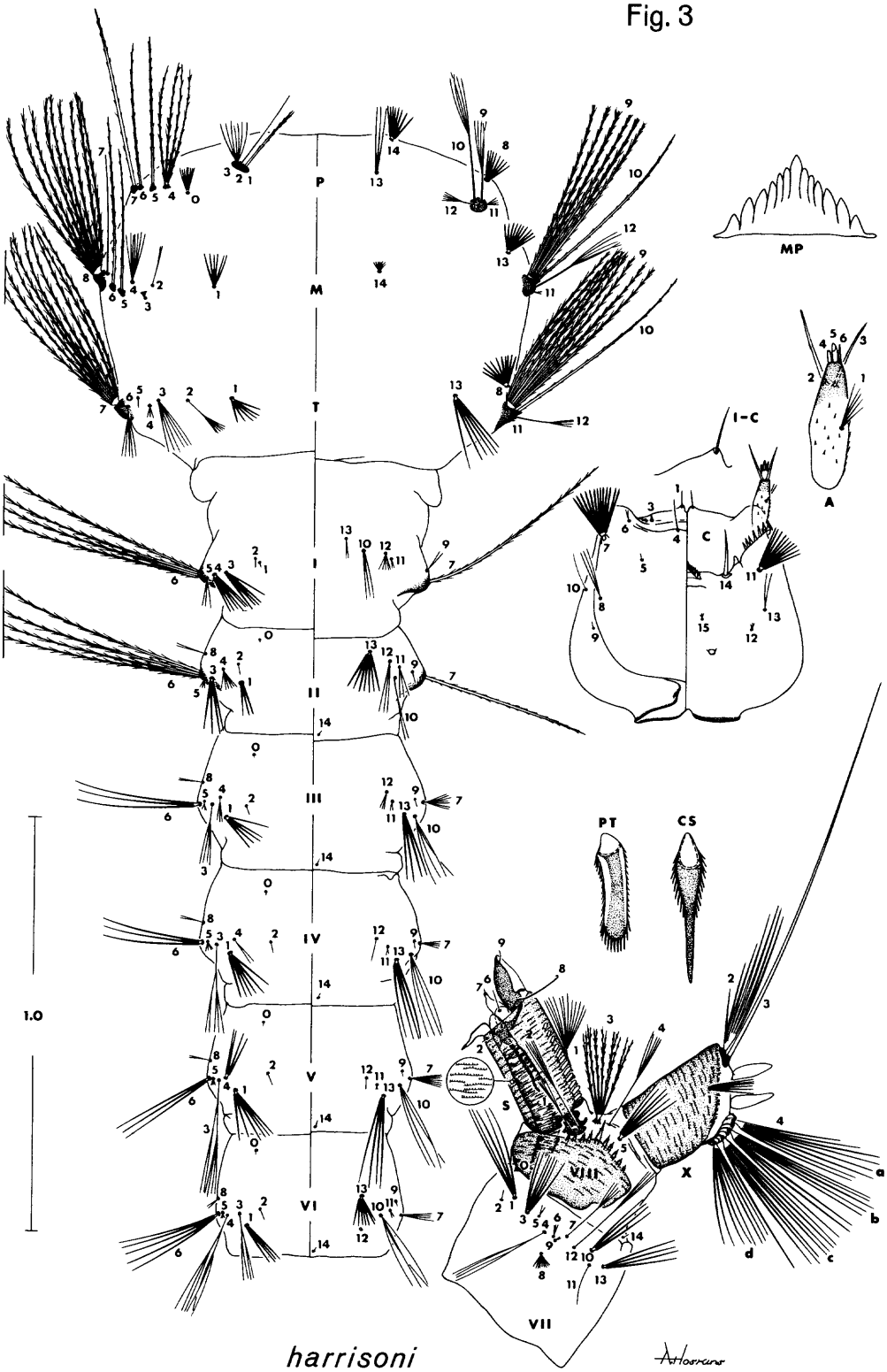
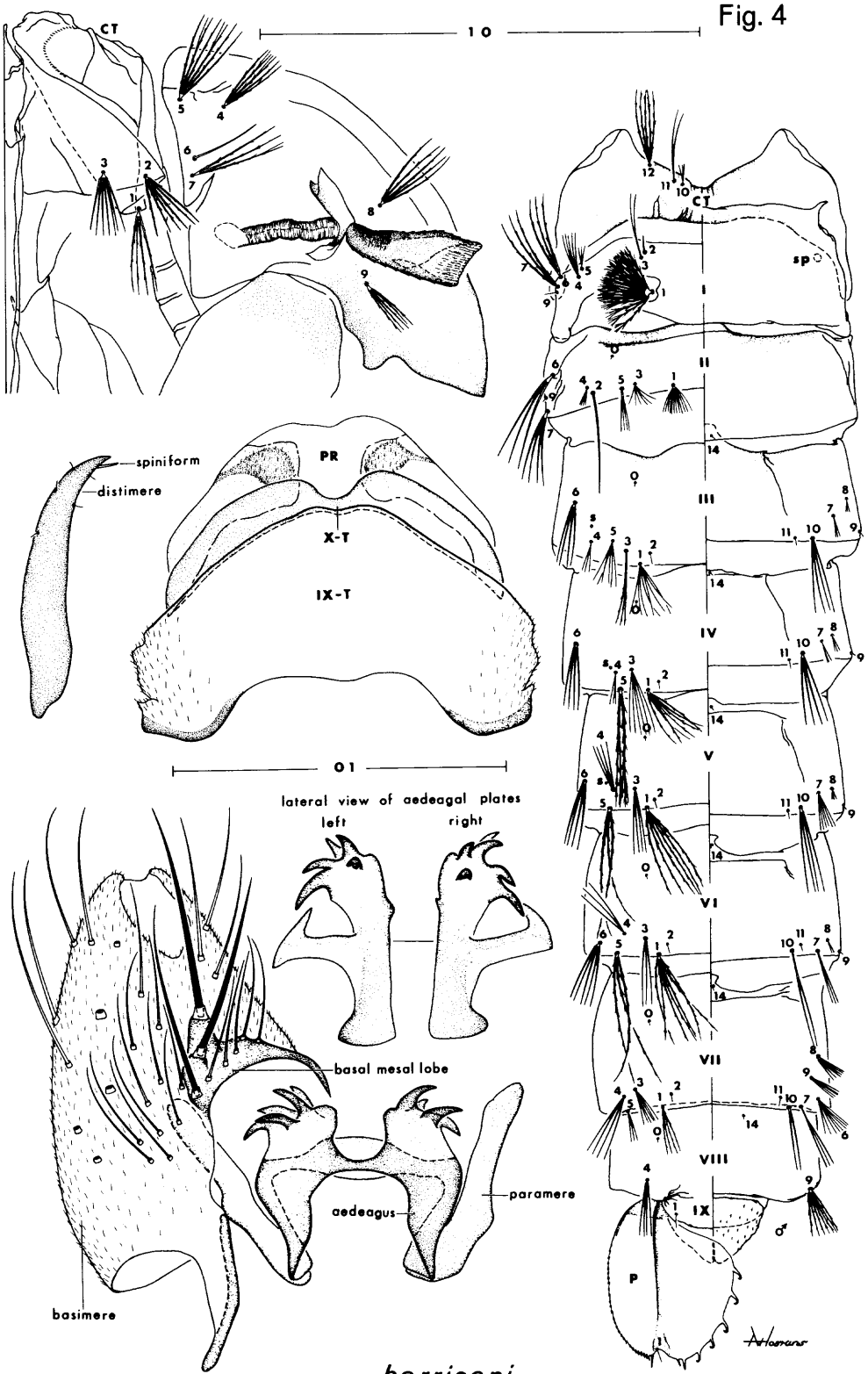
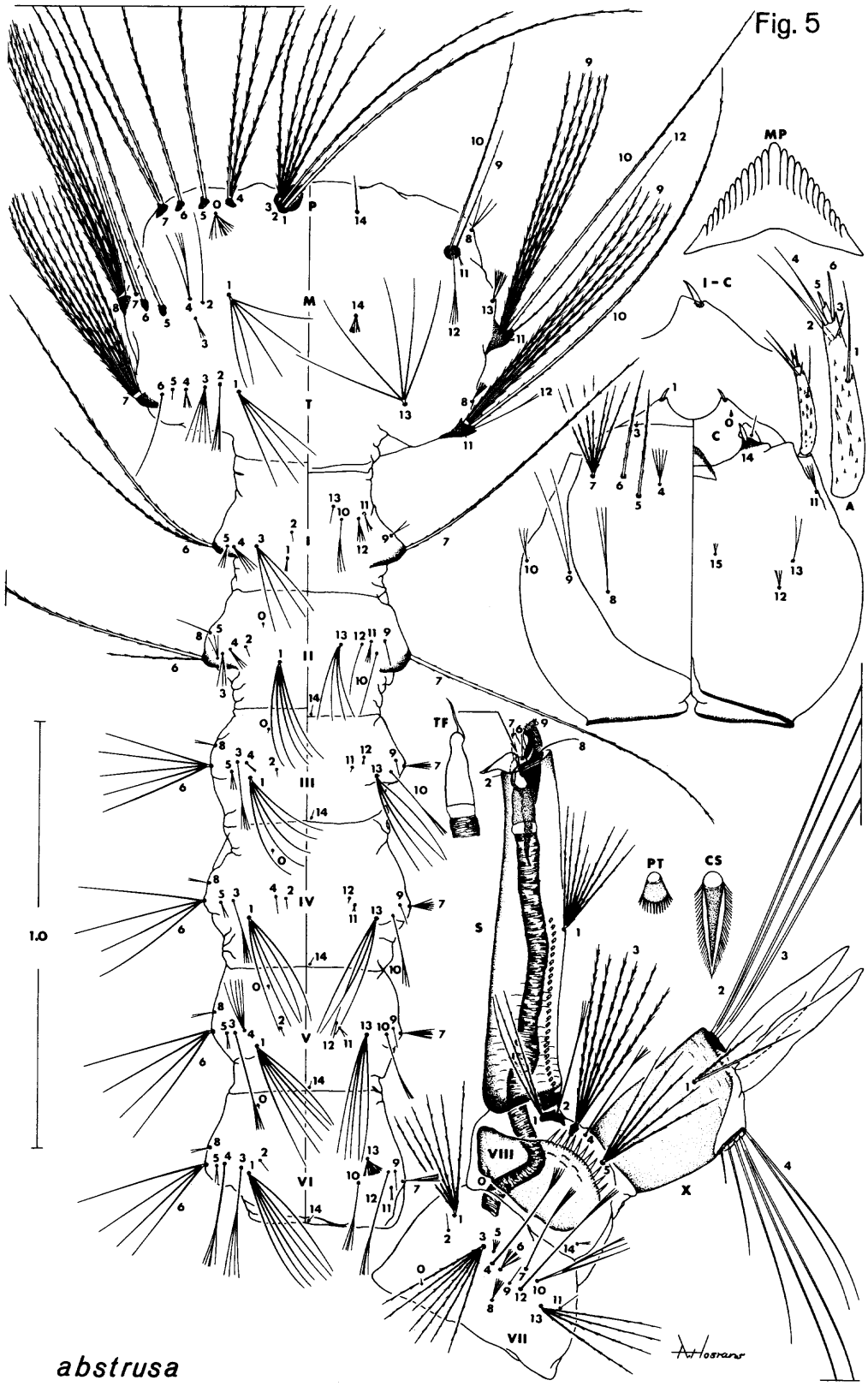


Fig. 4



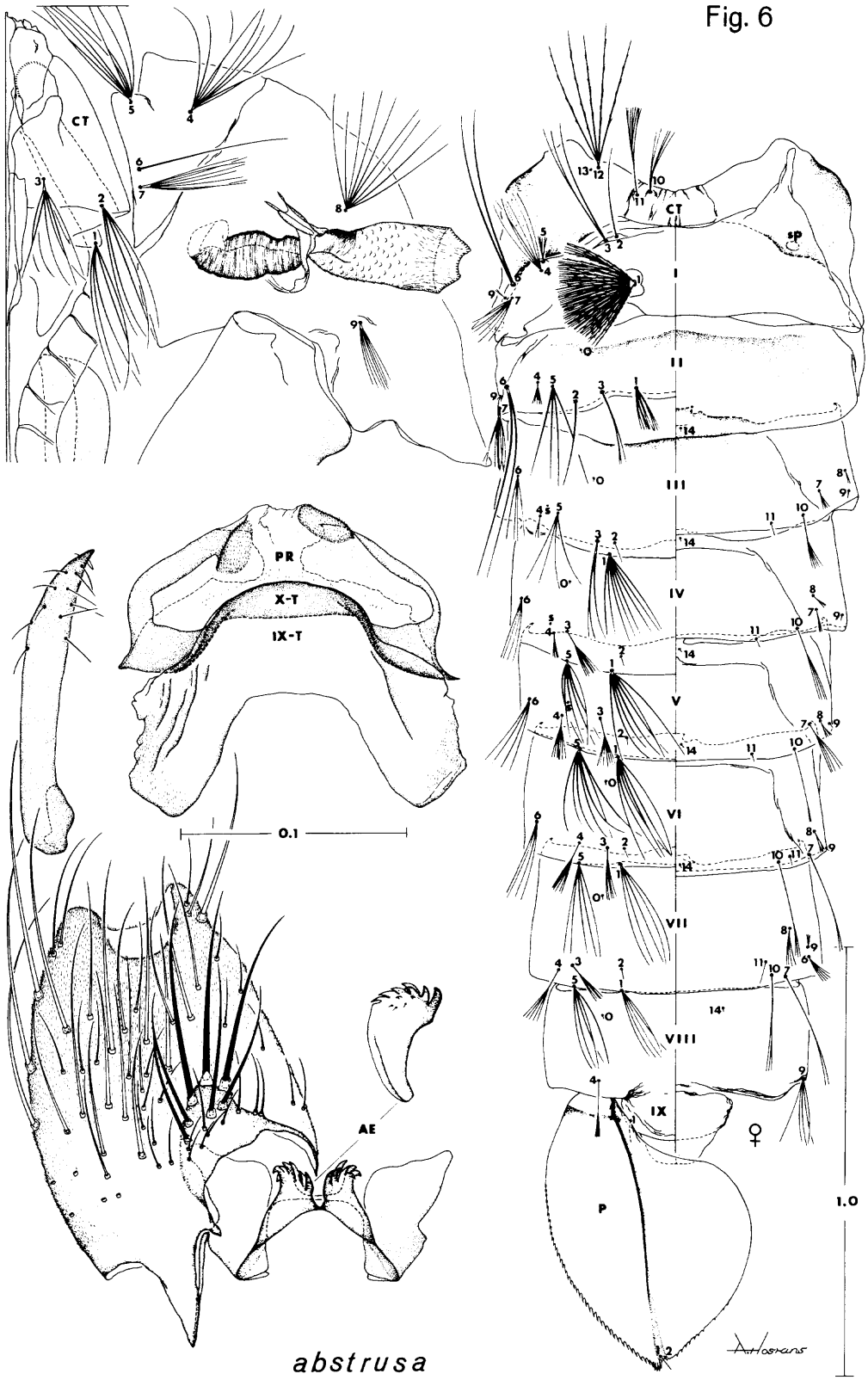
harrisoni

Fig. 5



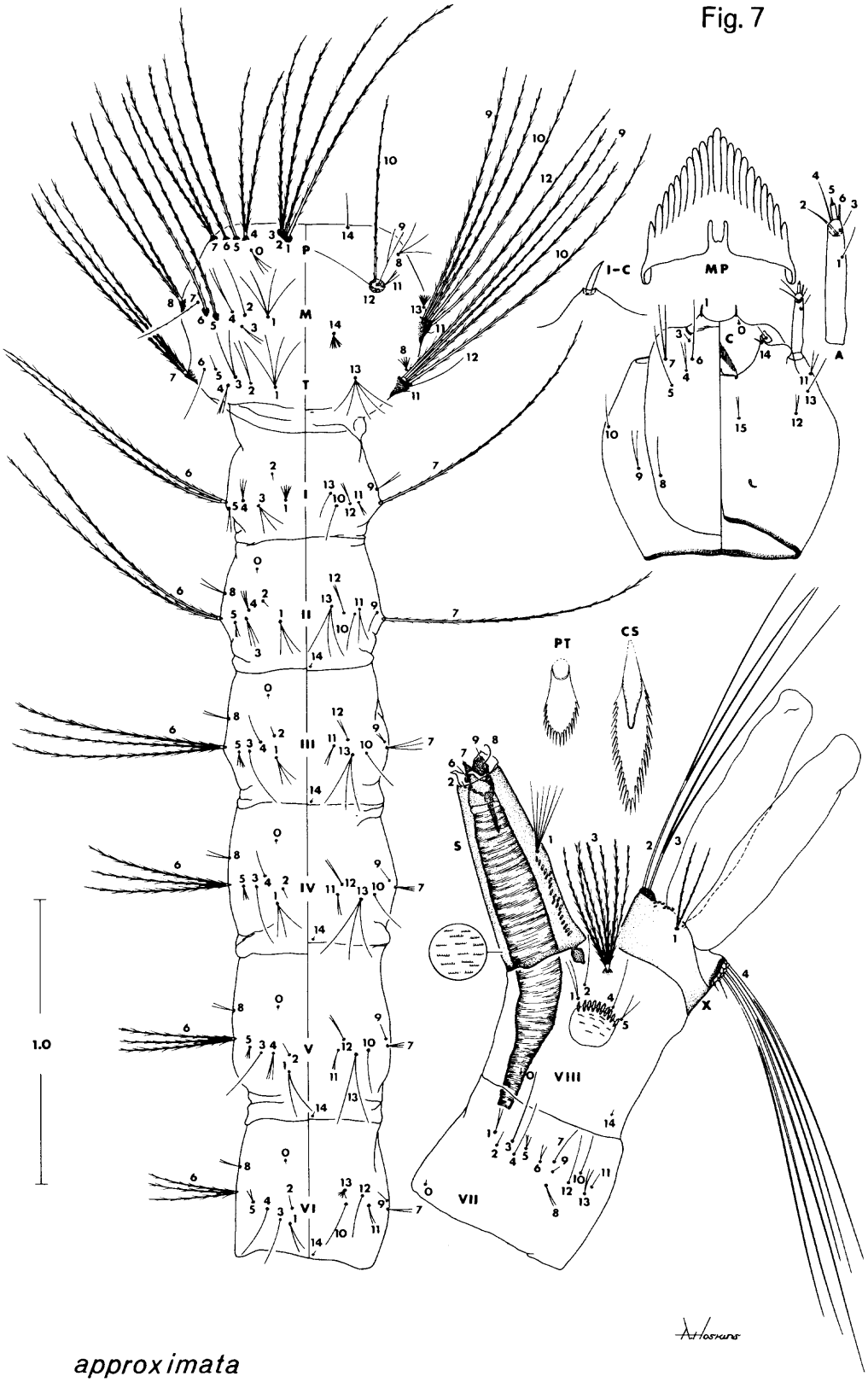
abstrusa

Fig. 6



abstrusa

Fig. 7



approximata

Fig. 8

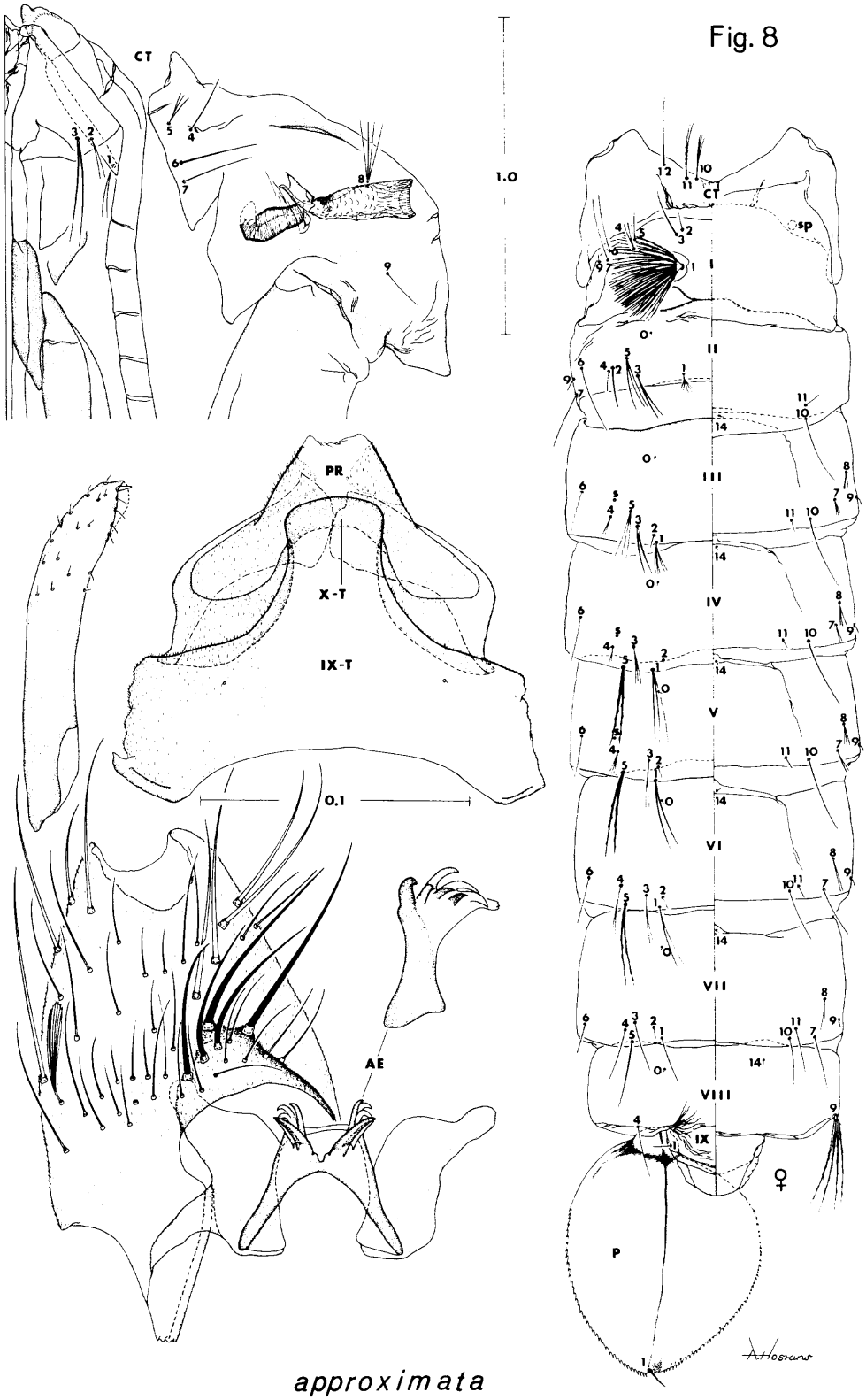
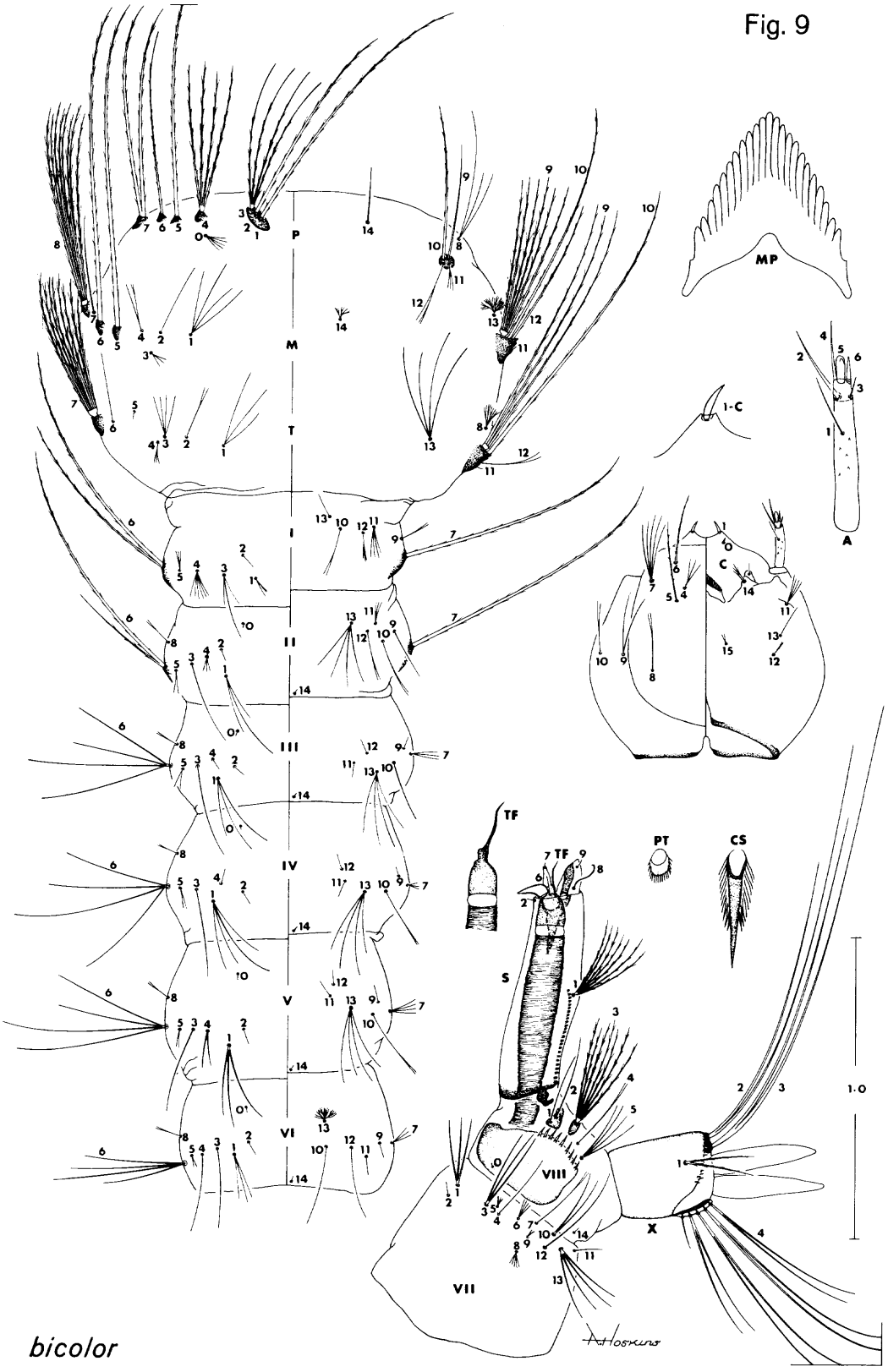


Fig. 9



bicolor

Fig. 10

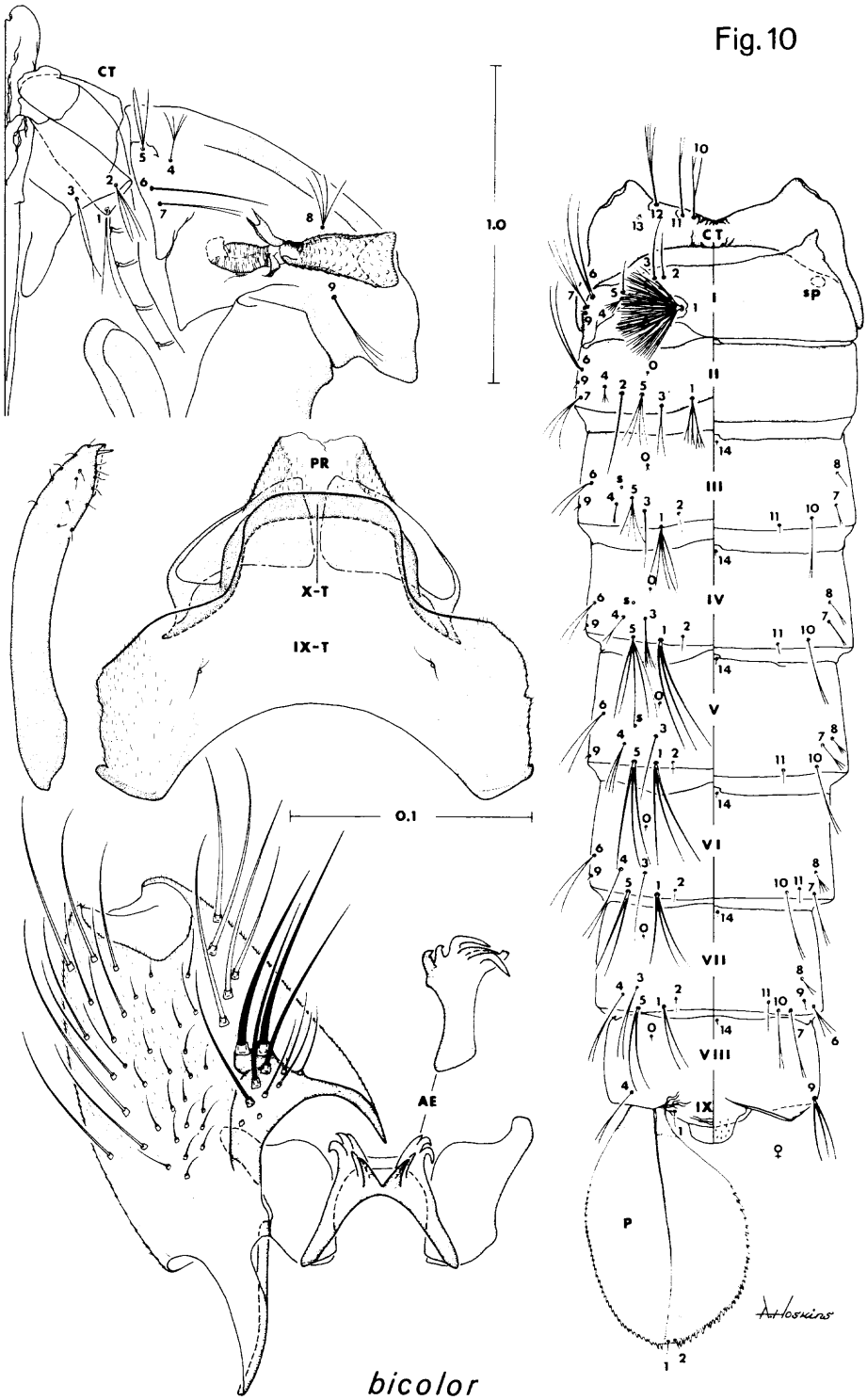
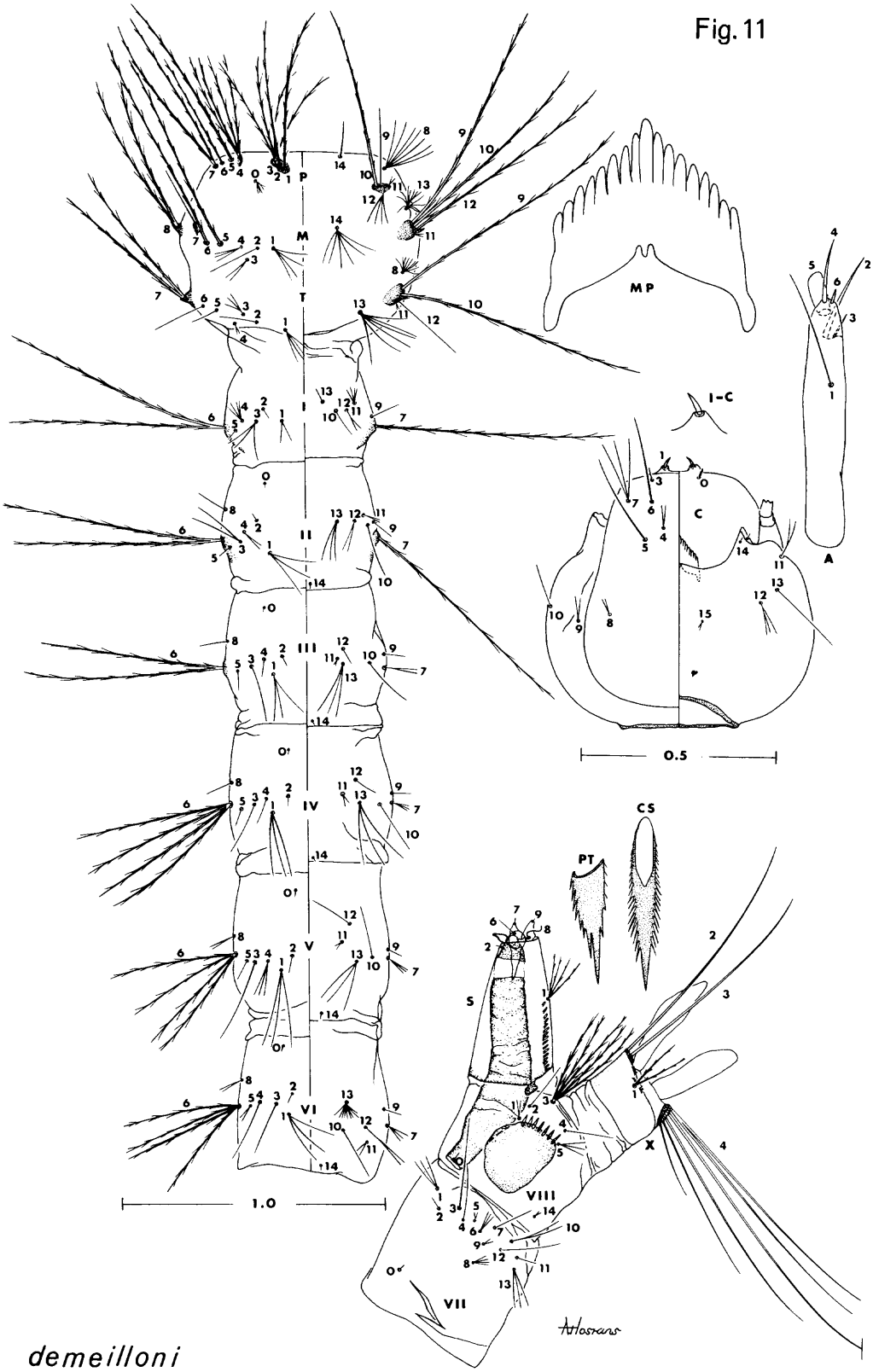
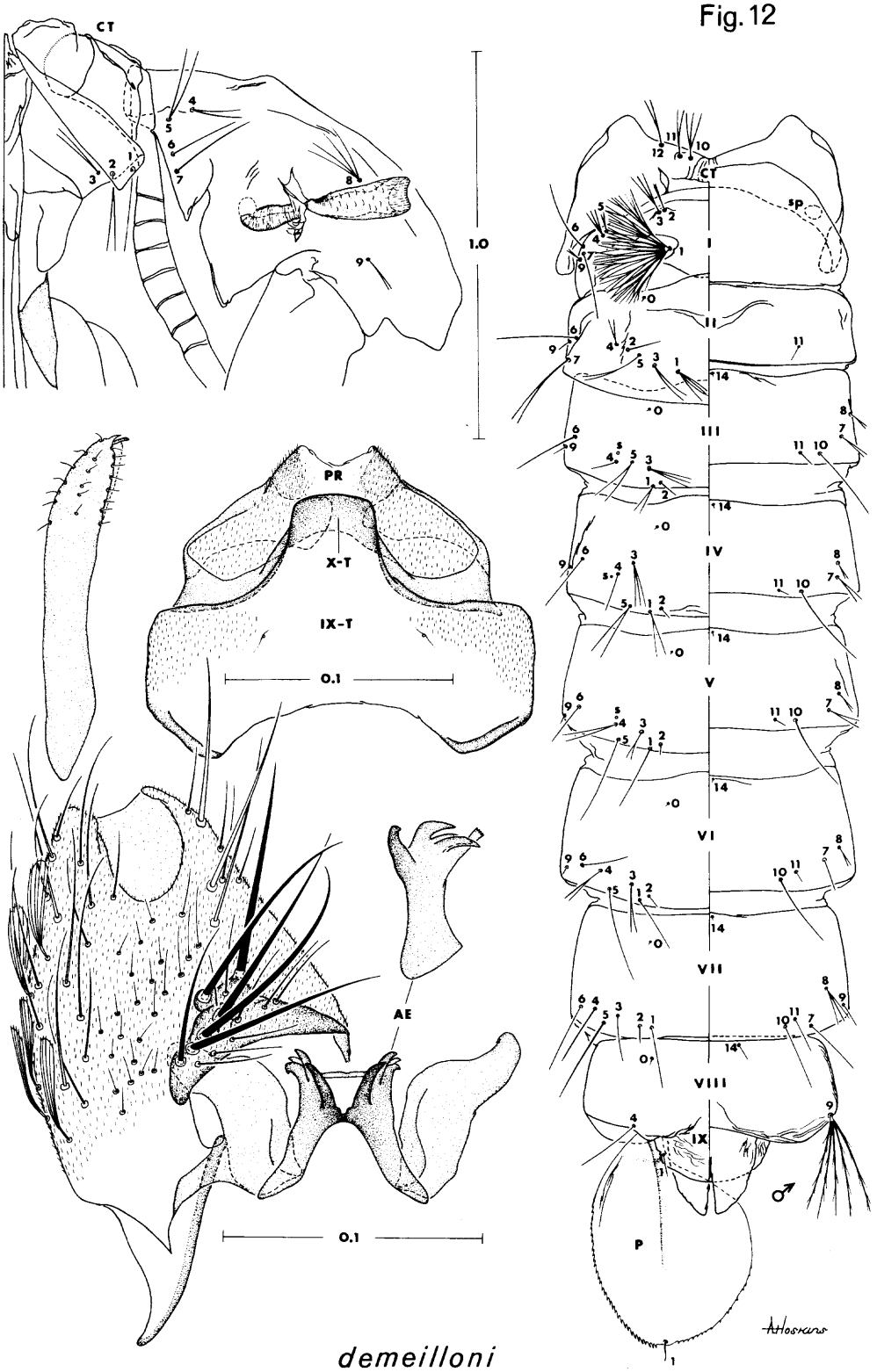


Fig. 11



demeilloni

Fig. 12


CT
1.0
PR
X-T
IX-T
0.1
AE
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SP
I
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IV
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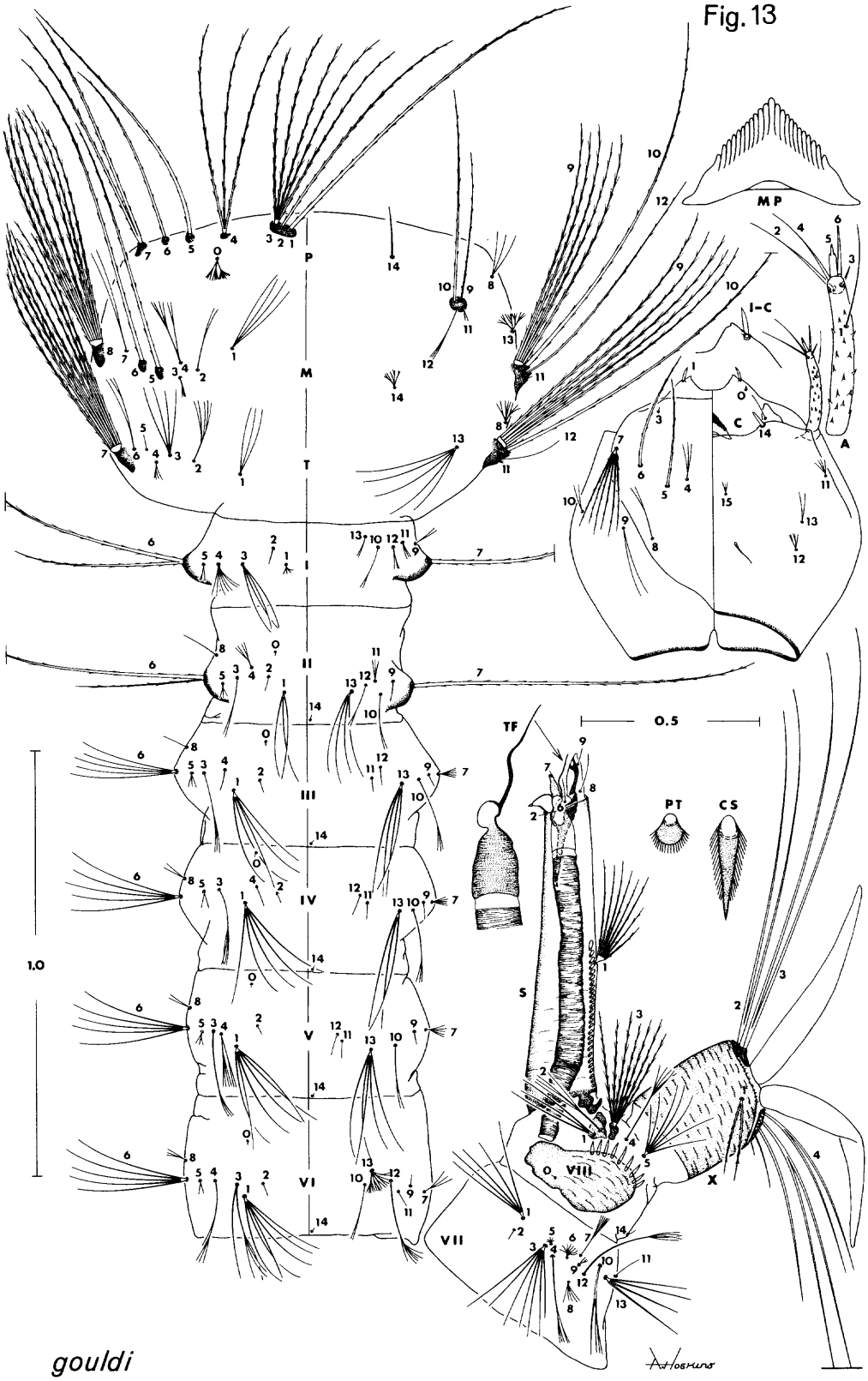
VI
VII
VIII
IX
P
♂
demeilloni

Fig. 13

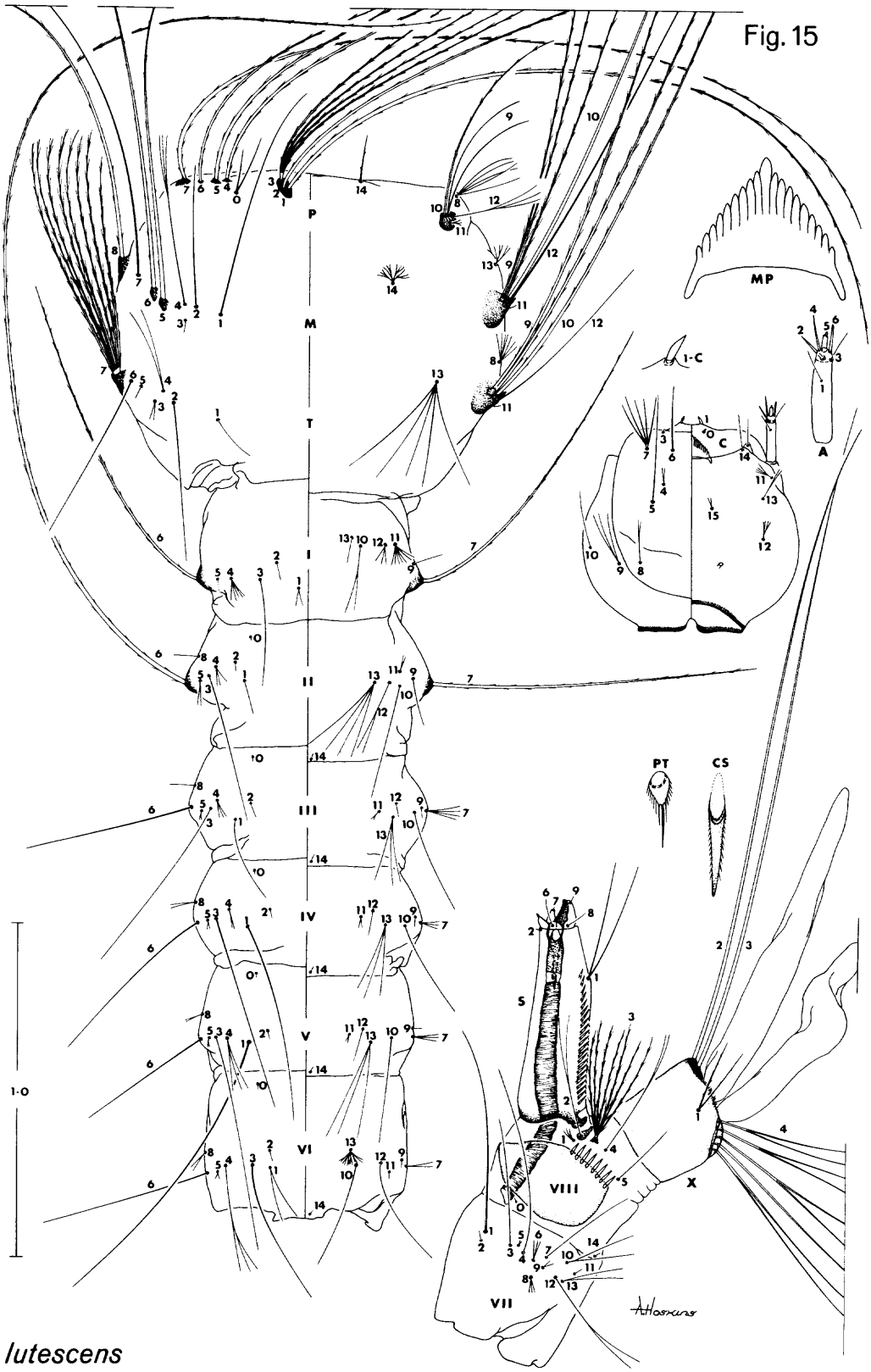


gouldi

Fig. 14

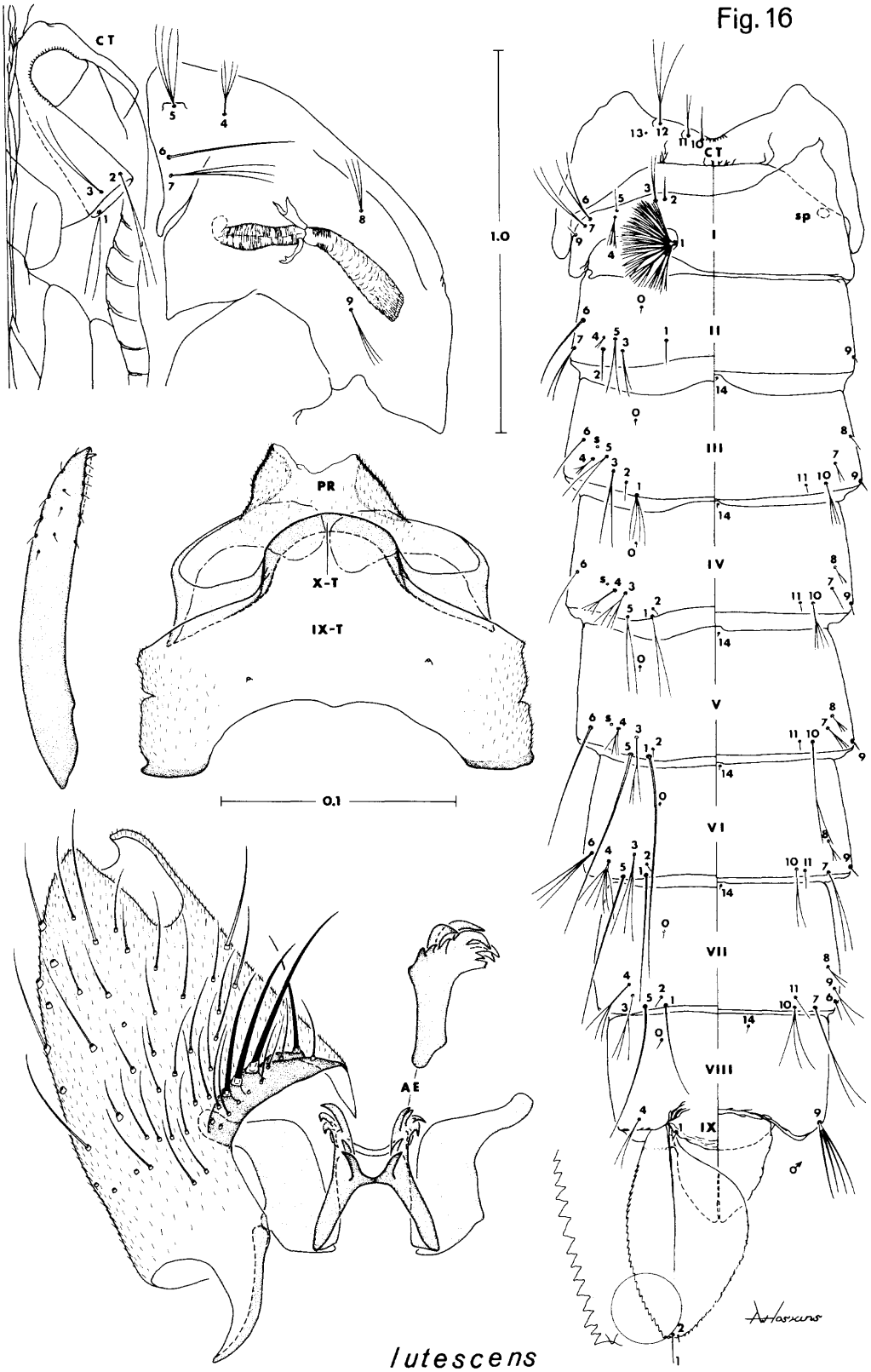
gouldi

Fig. 15



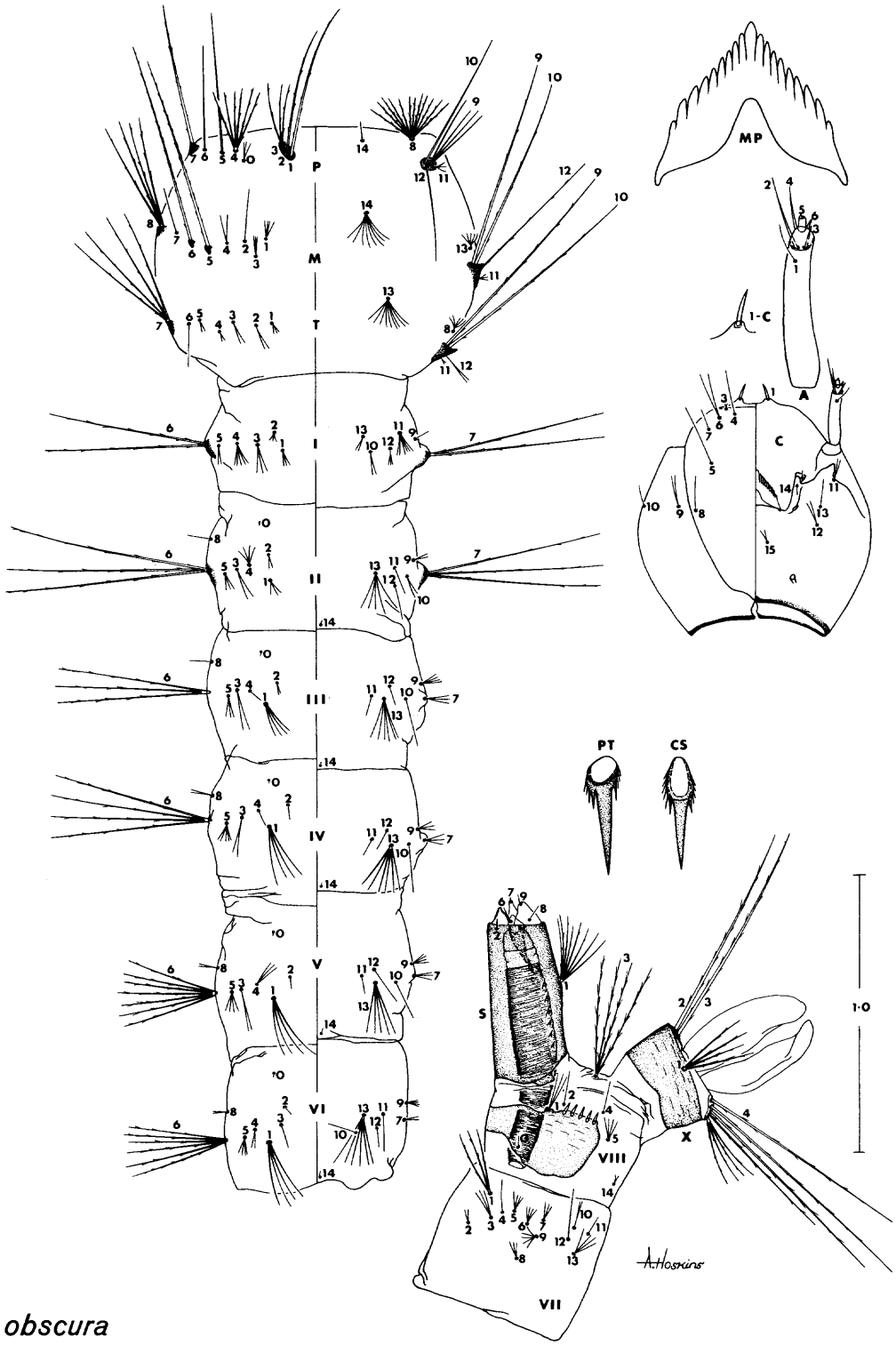
lutescens

Fig. 16



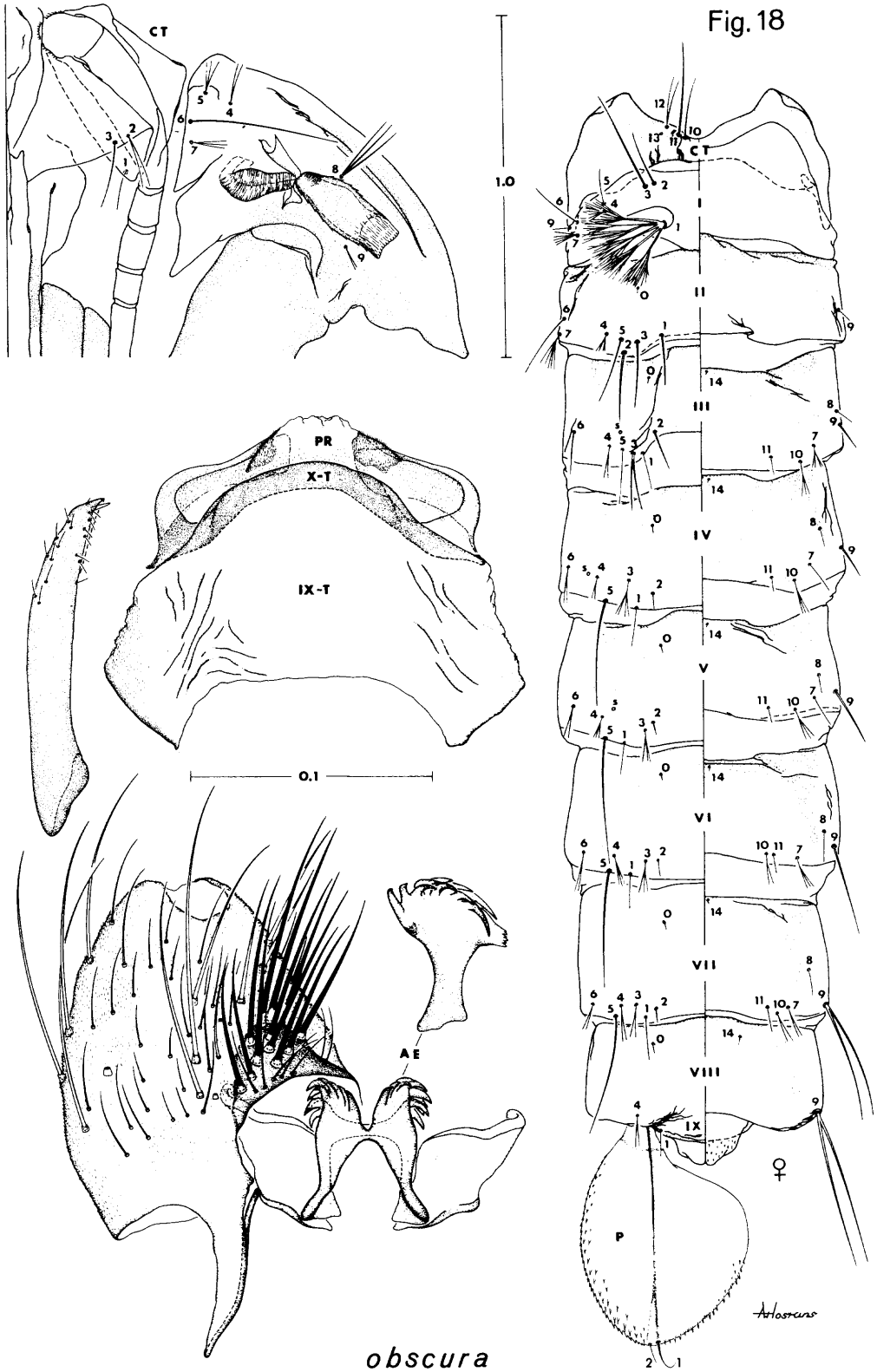
lutescens

Fig. 17



obscura

Fig. 18


CT
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obscura
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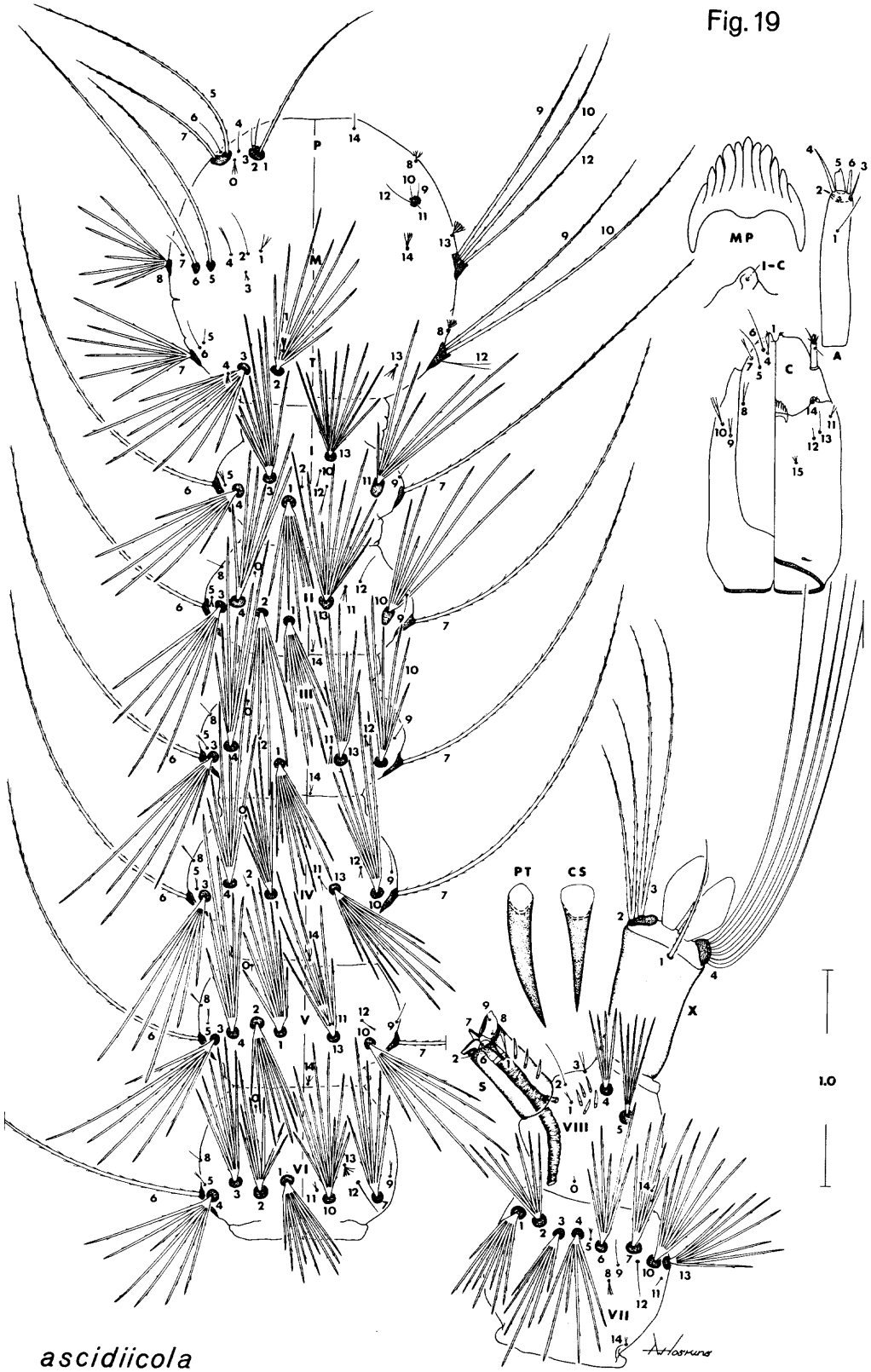
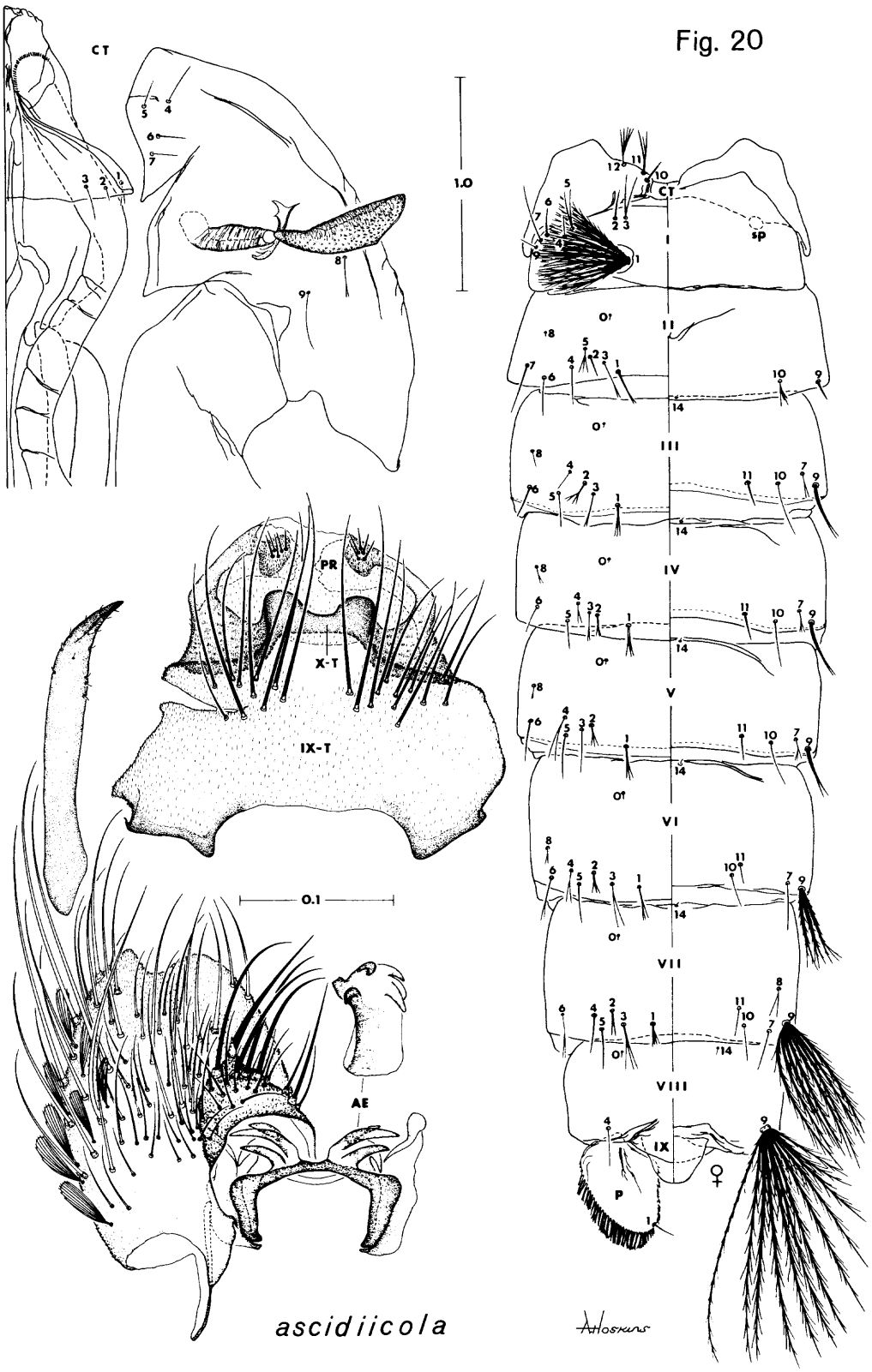
IX
P
♀
Atlostacus

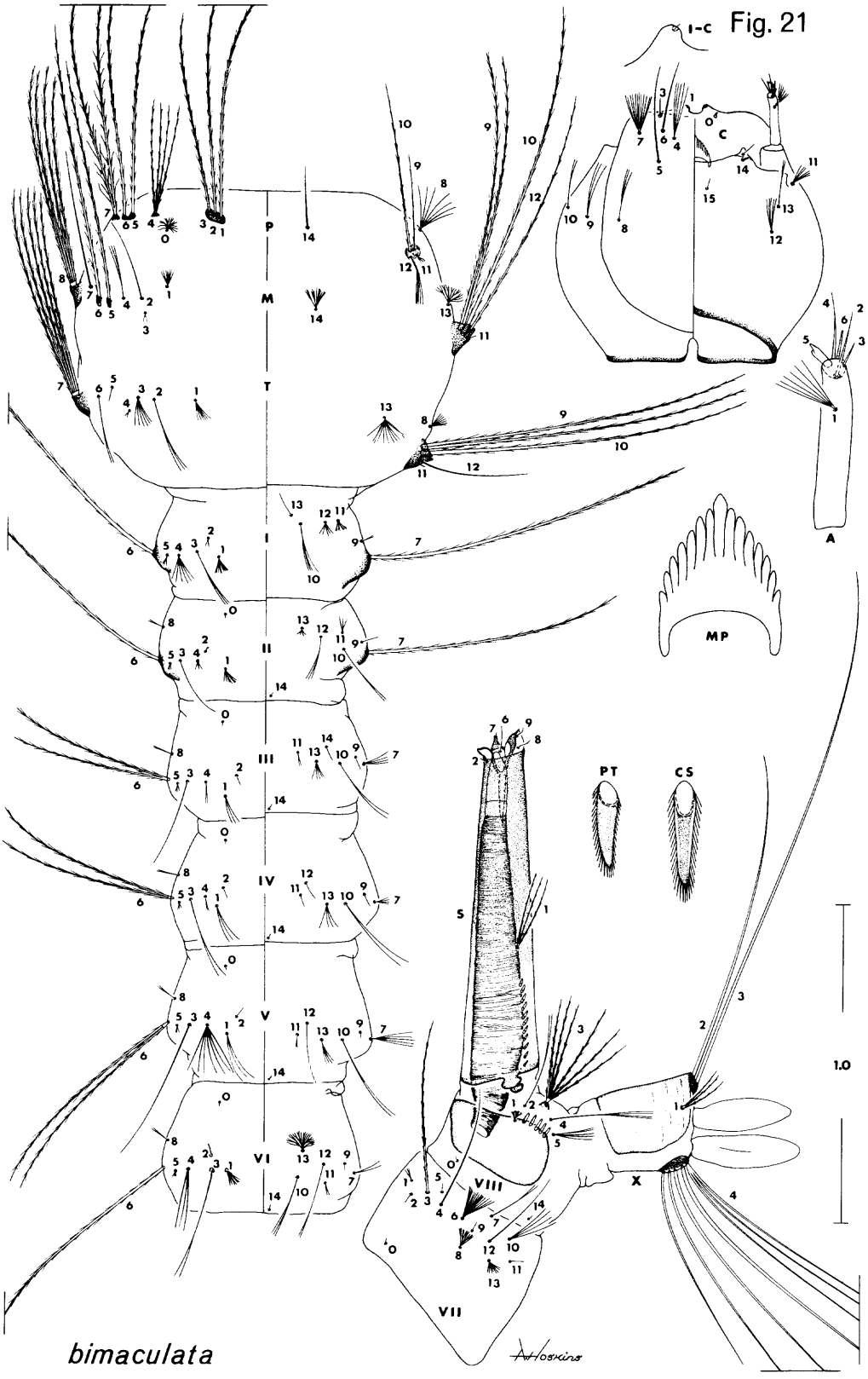
Fig. 19



ascidiicola

Fig. 20




1-c
Fig. 21
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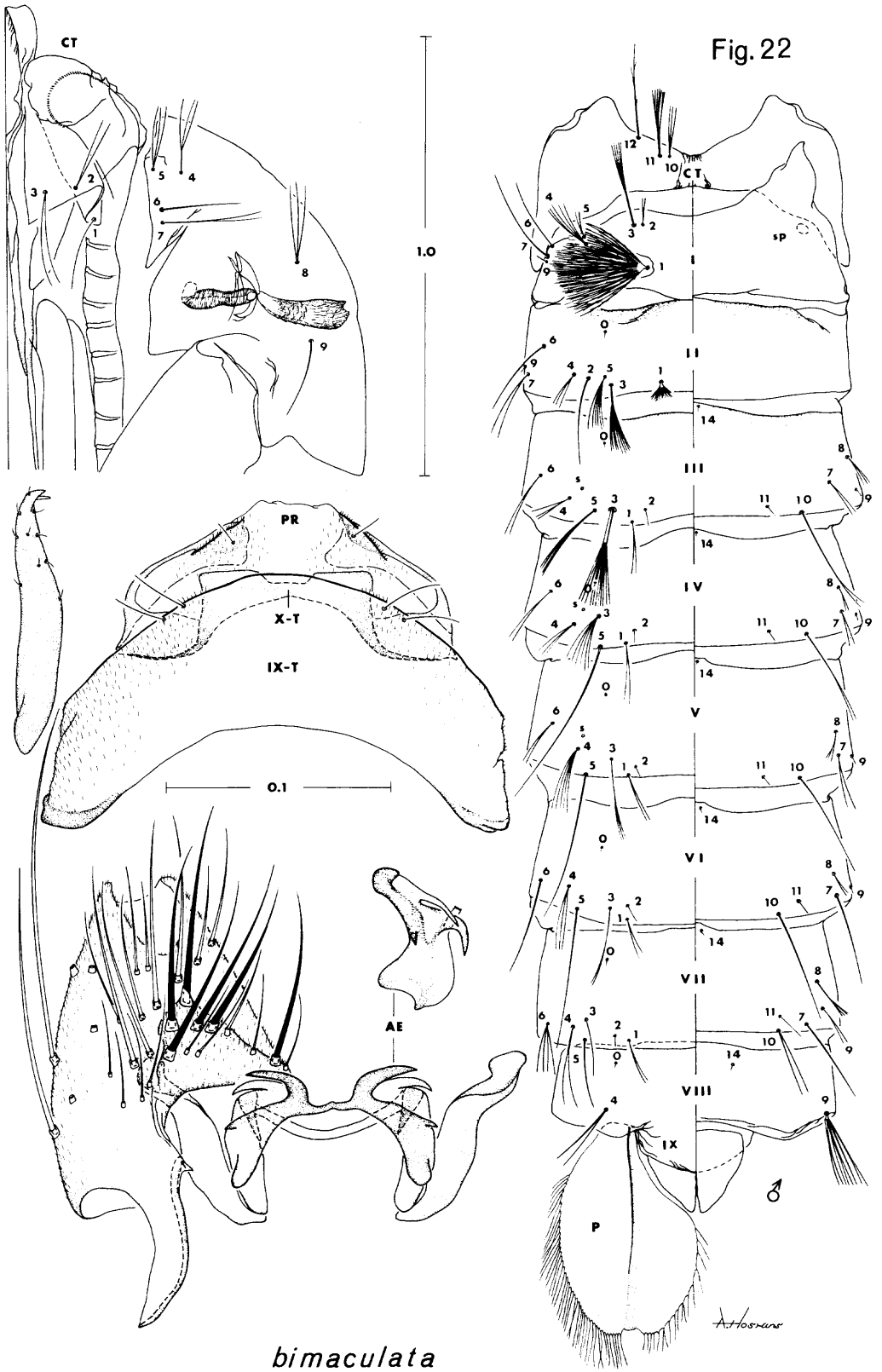
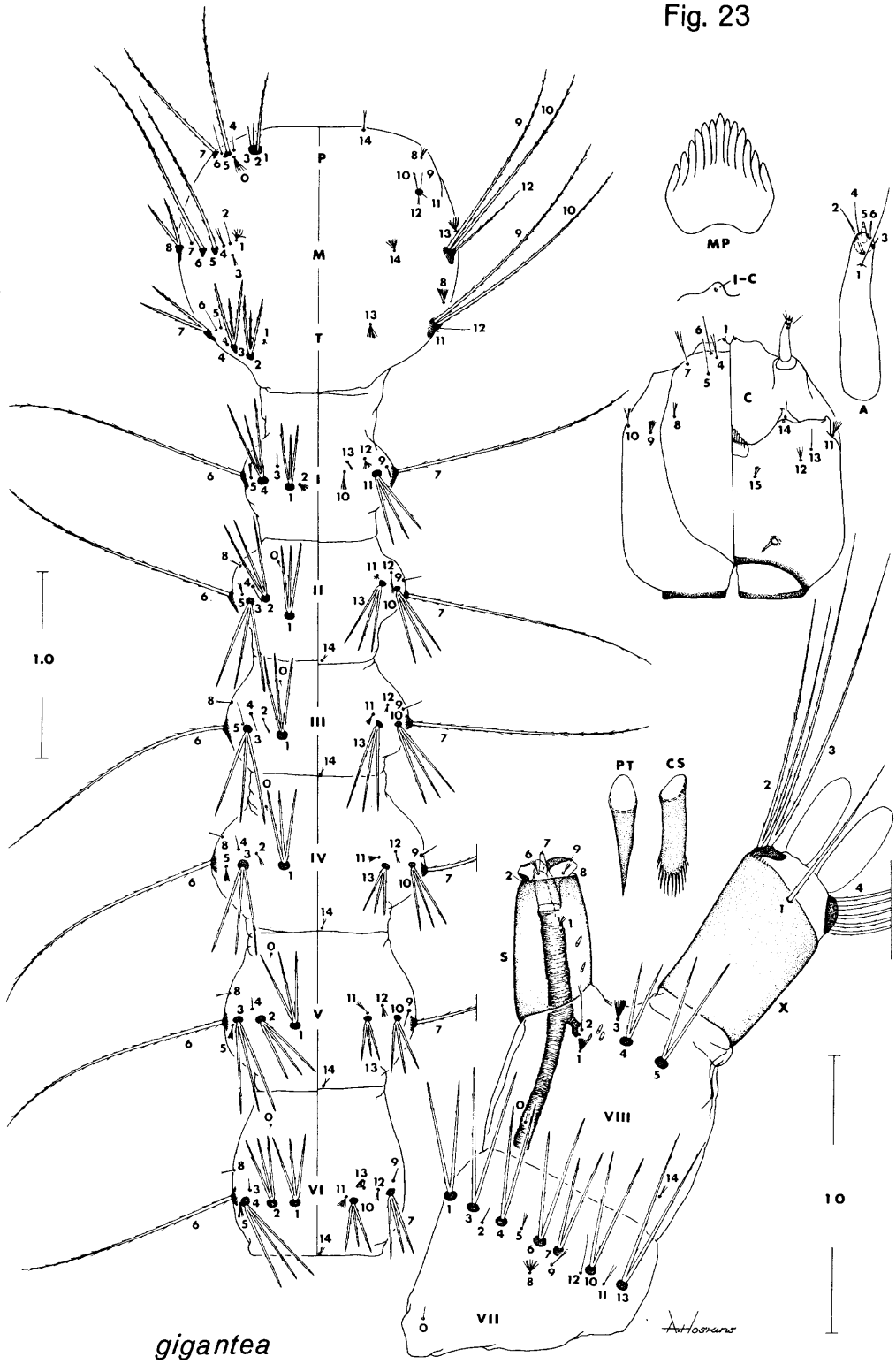
X
1.0
bimaculata

Fig. 22



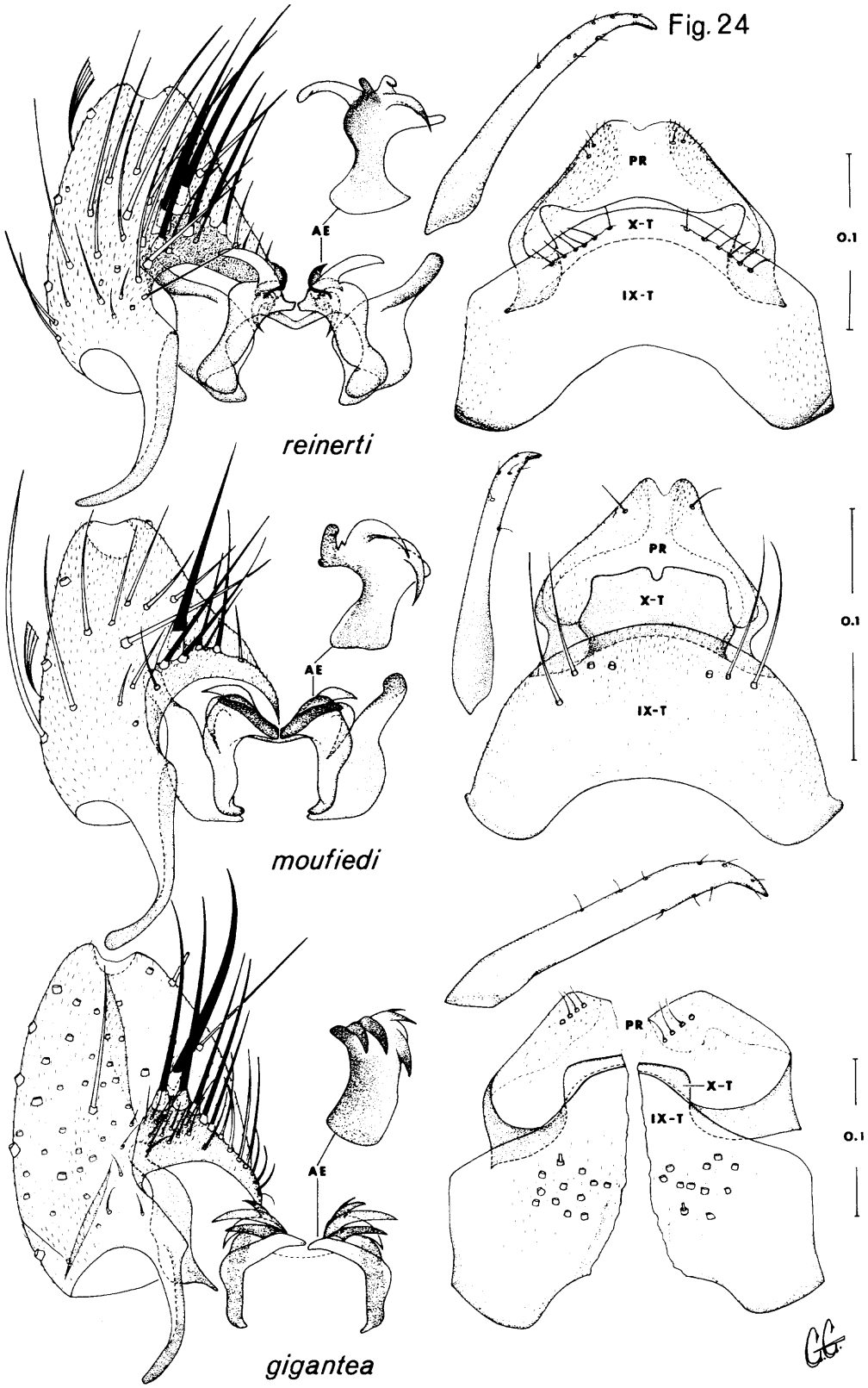
bimaculata

Fig. 23



gigantea

Fig. 24


AE
PR
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reinerti
AE
PR
X-T
IX-T
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moufiedi
AE
PR
X-T
IX-T
0.1
gigantea

Fig. 25

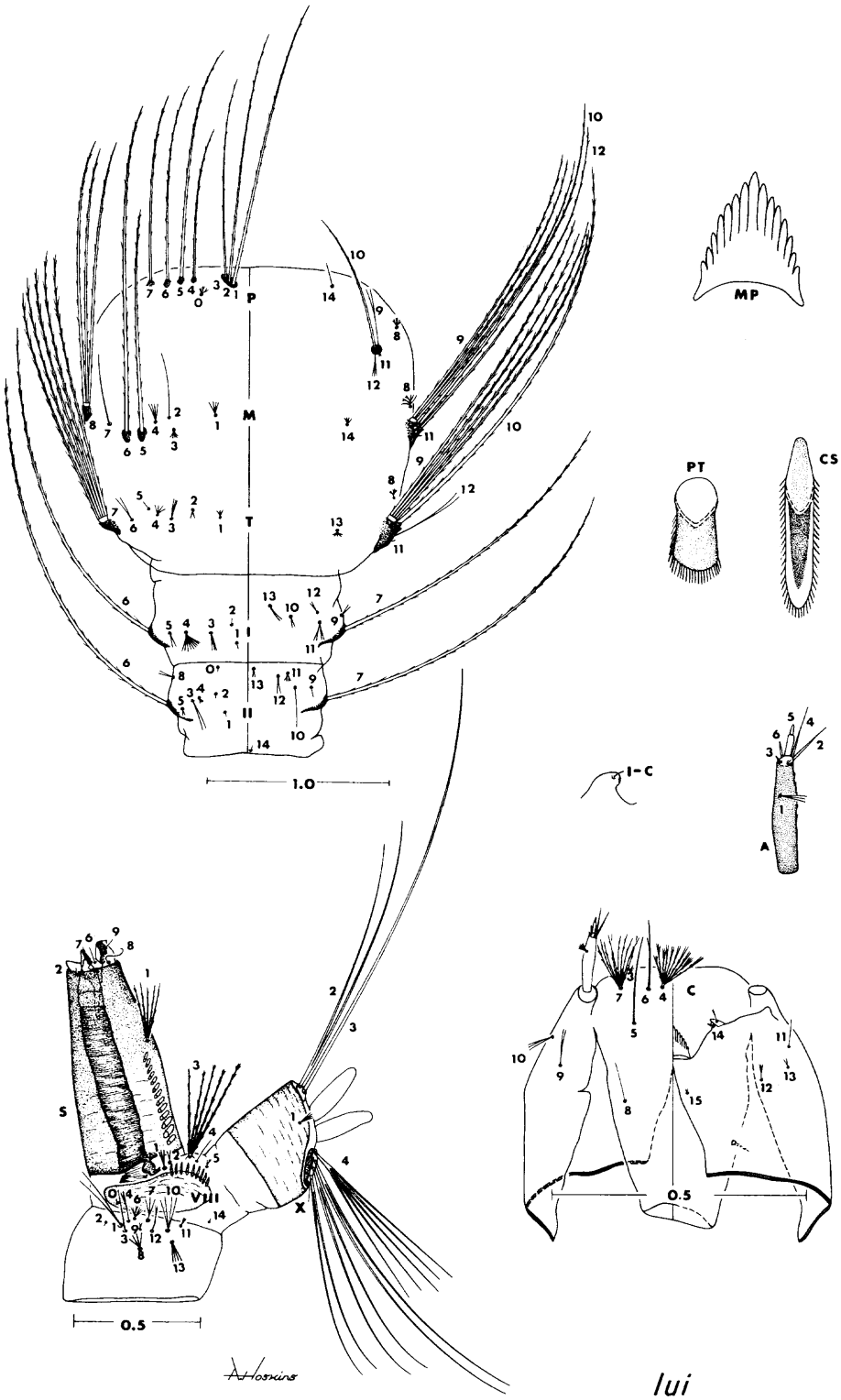
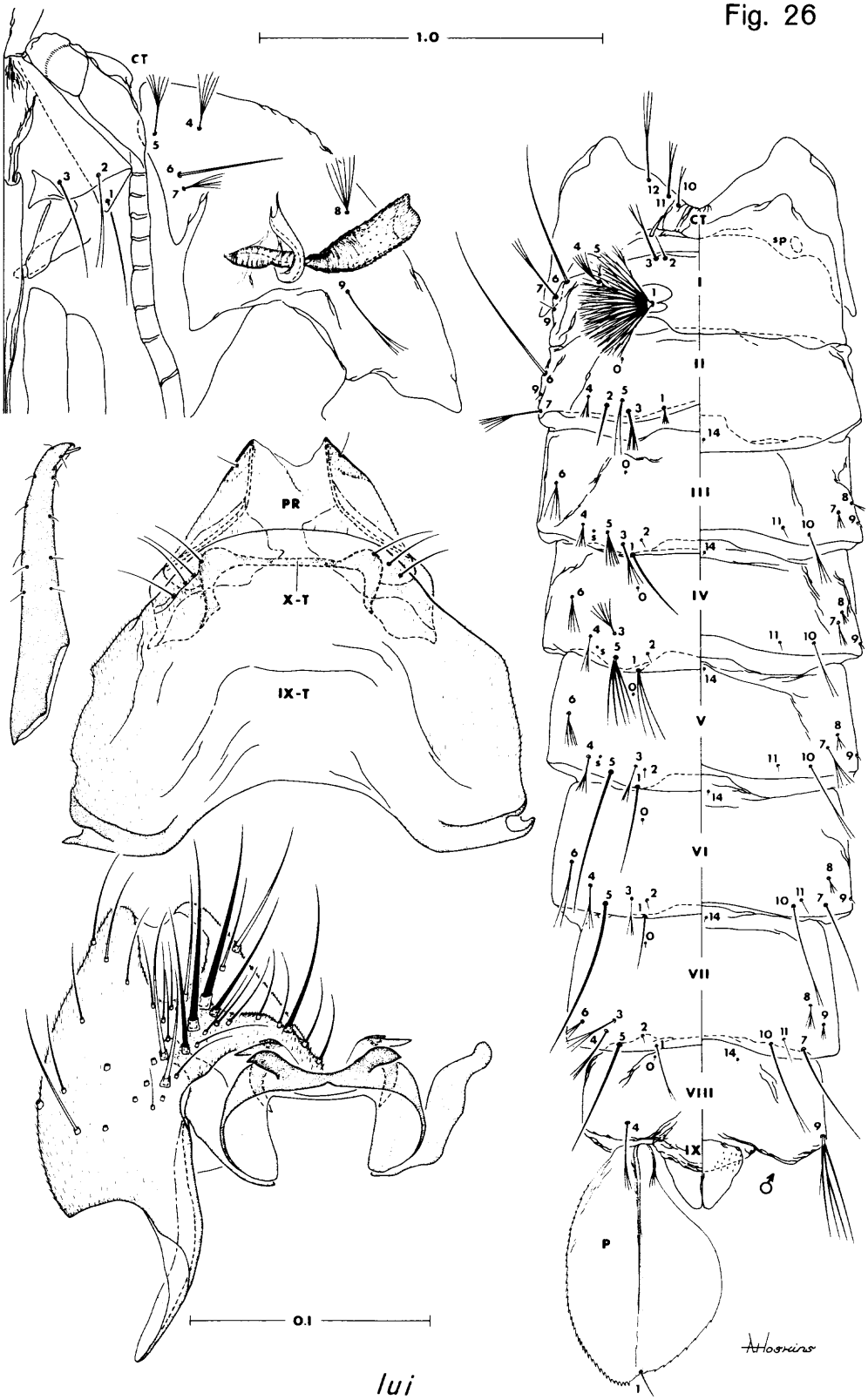
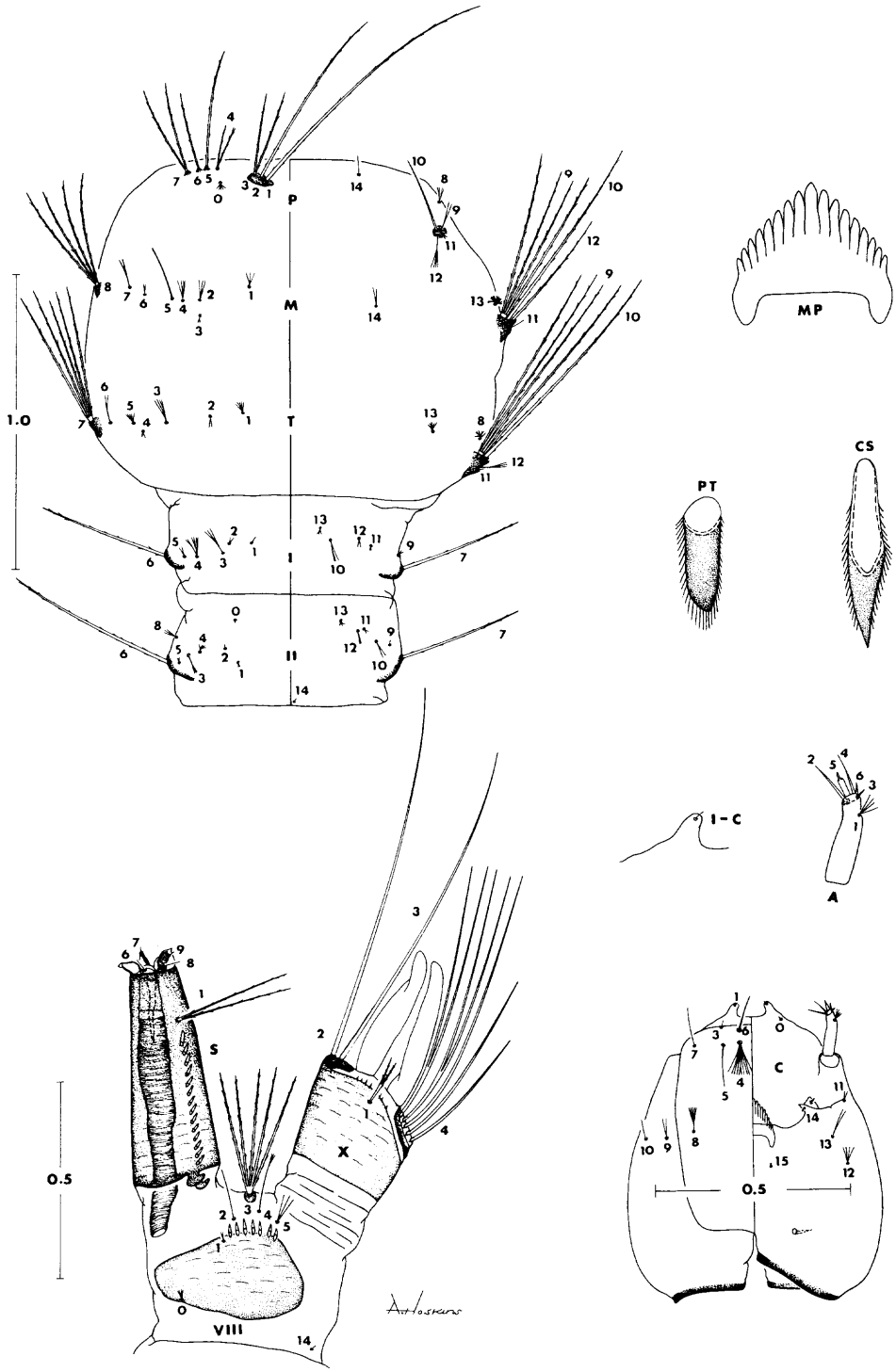


Fig. 26



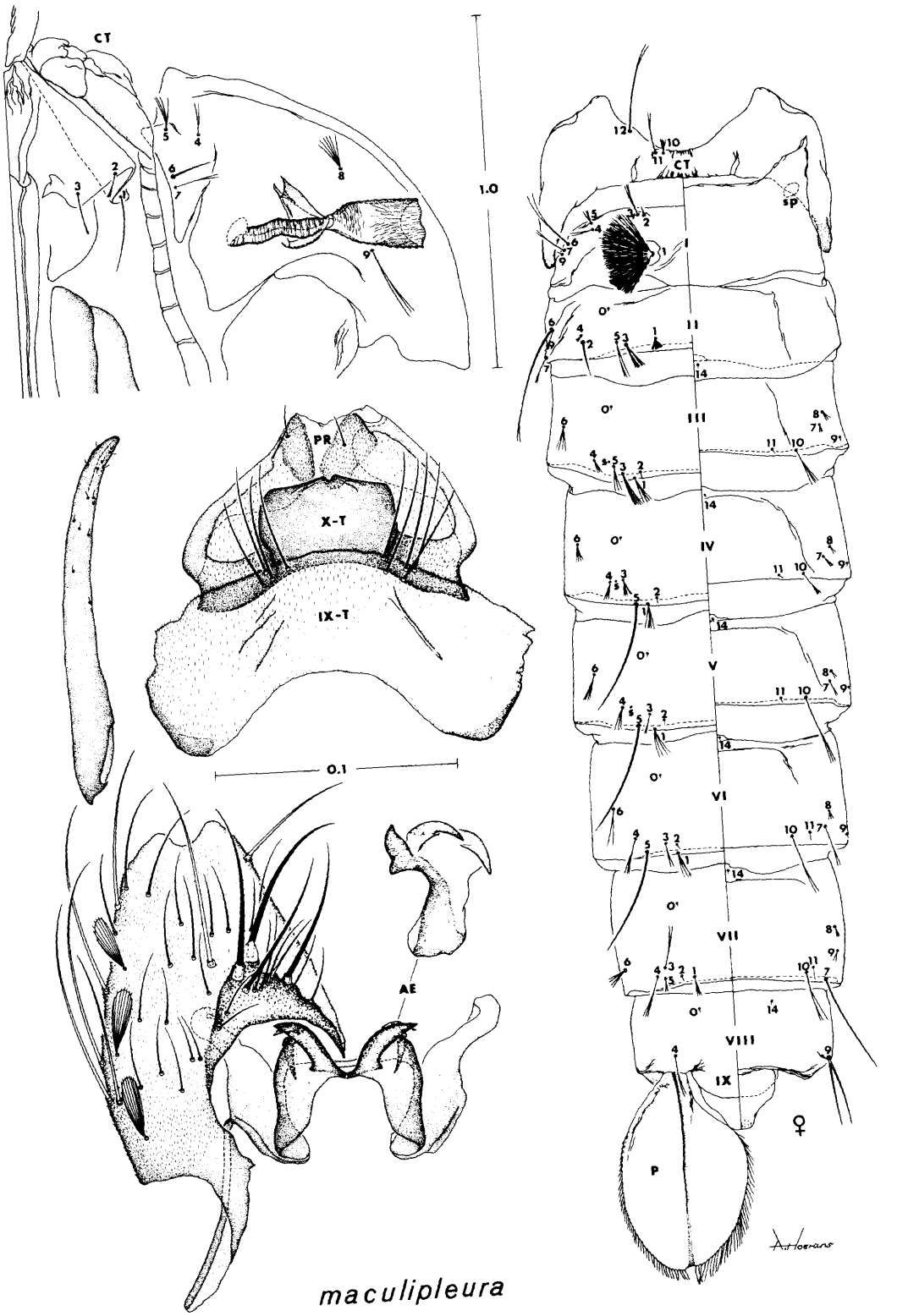
lui

Fig. 27



maculipleura

Fig. 28


CT
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IX-T
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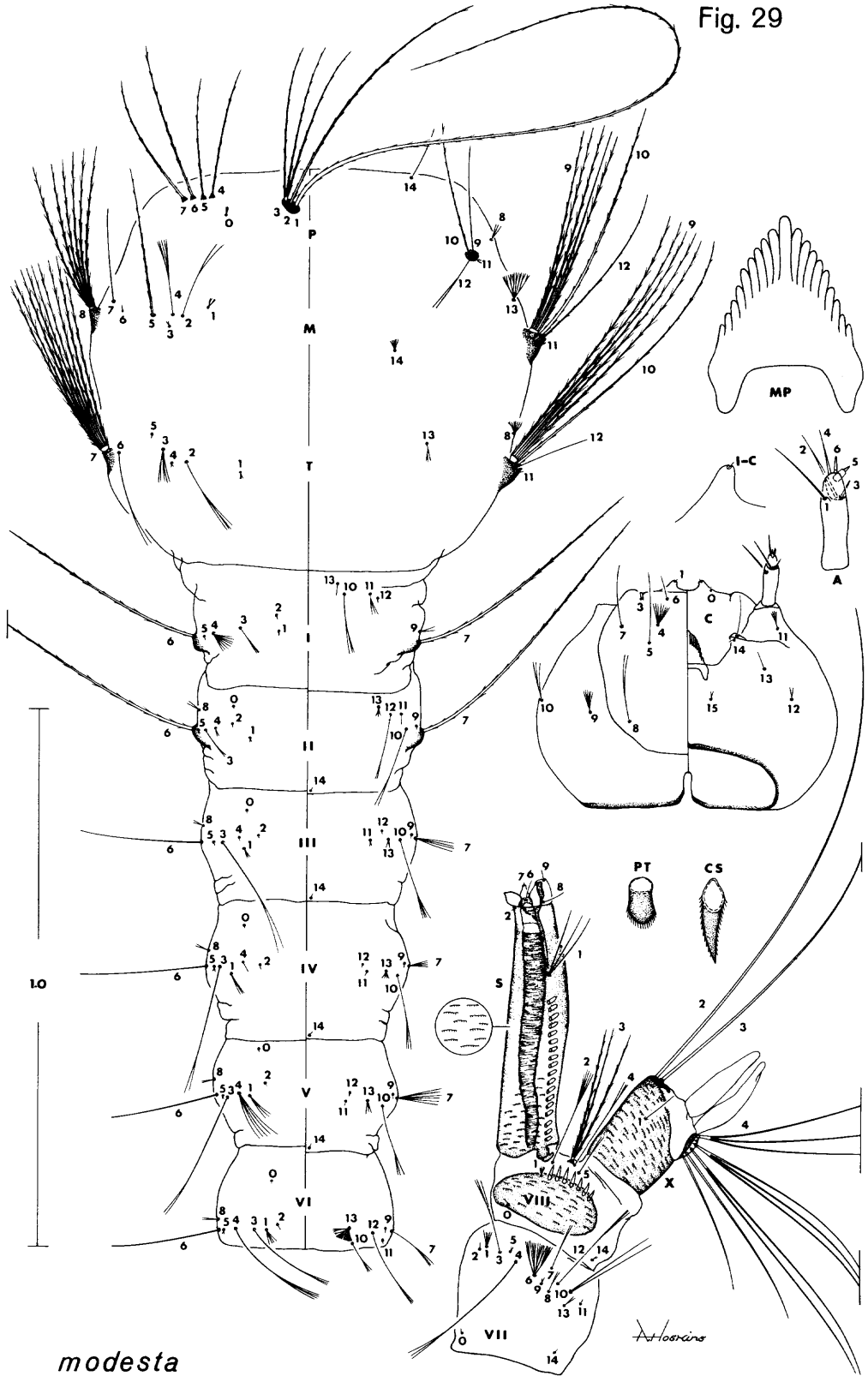
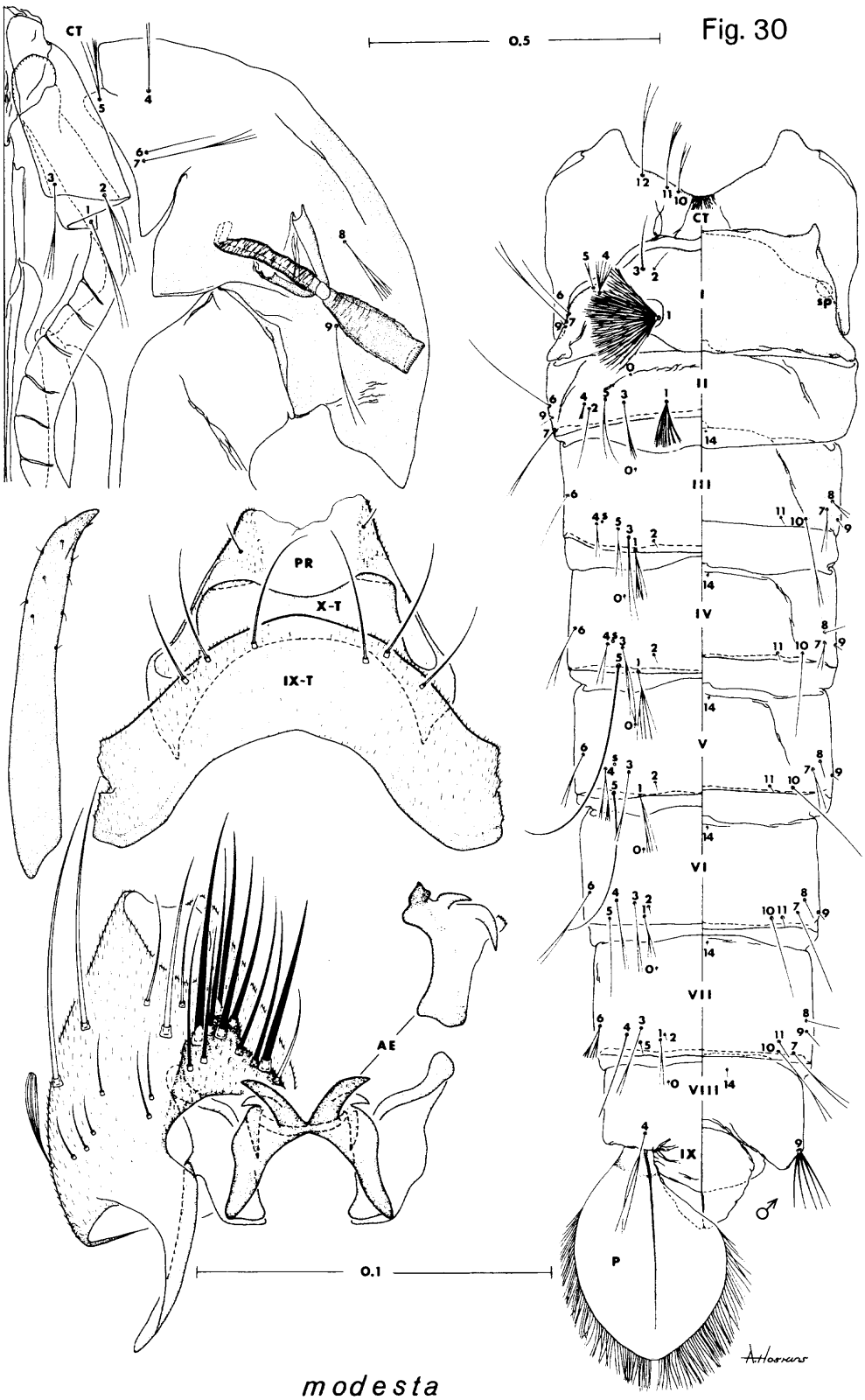
VIII
IX
P
♀
maculipleura

Fig. 29



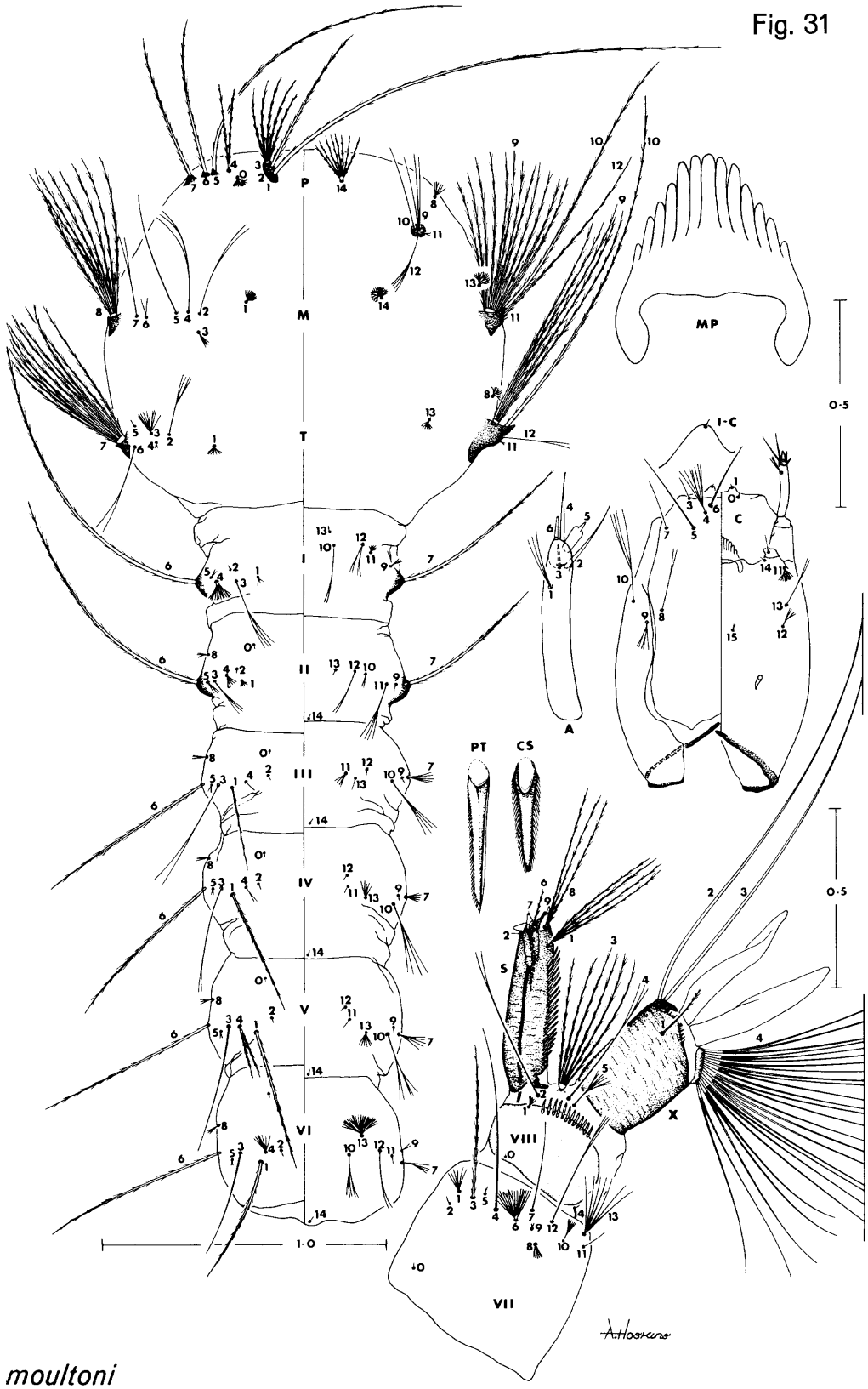
modesta

Fig. 30



modesta

Fig. 31



moultoni

Fig. 32

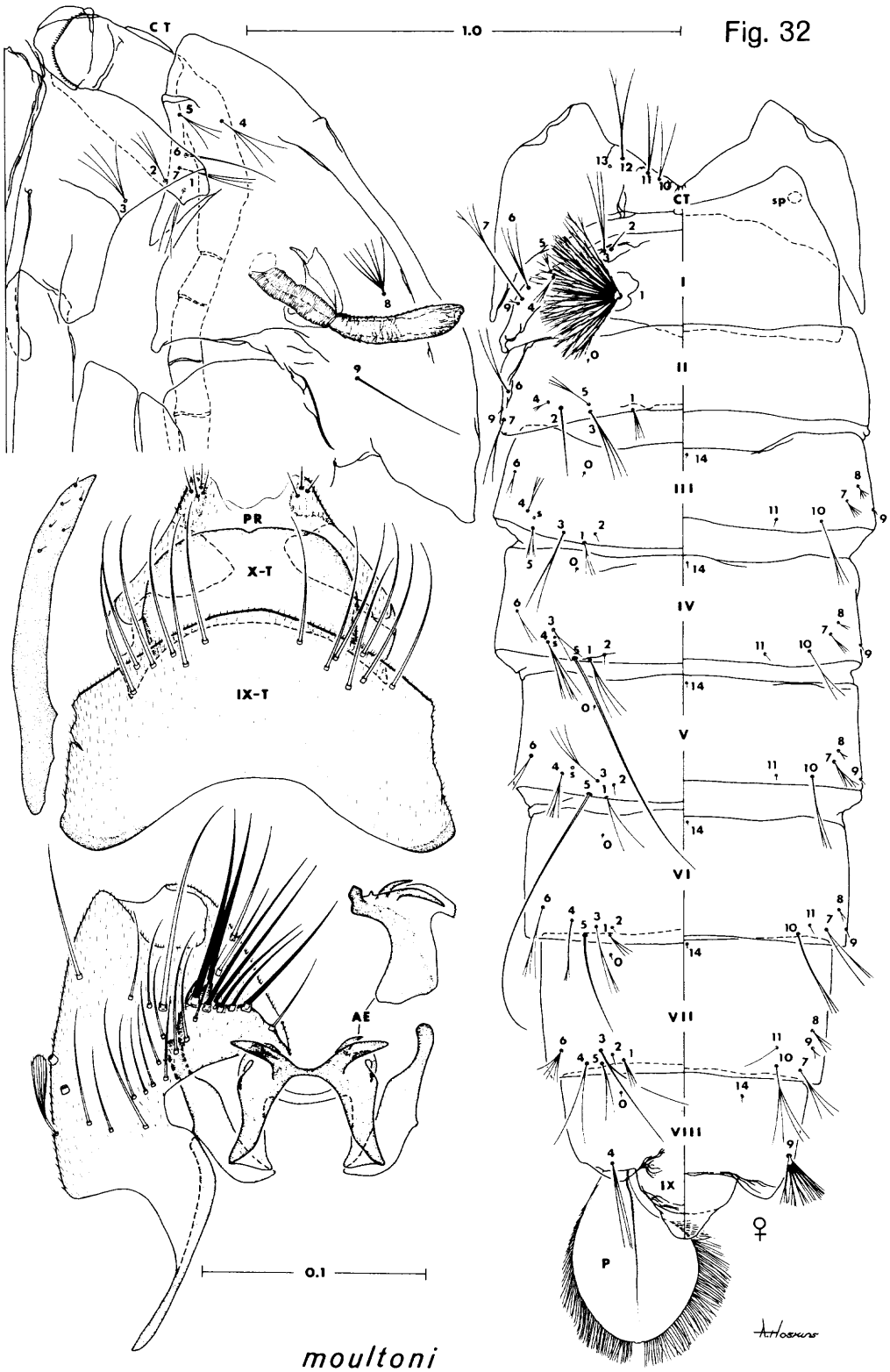
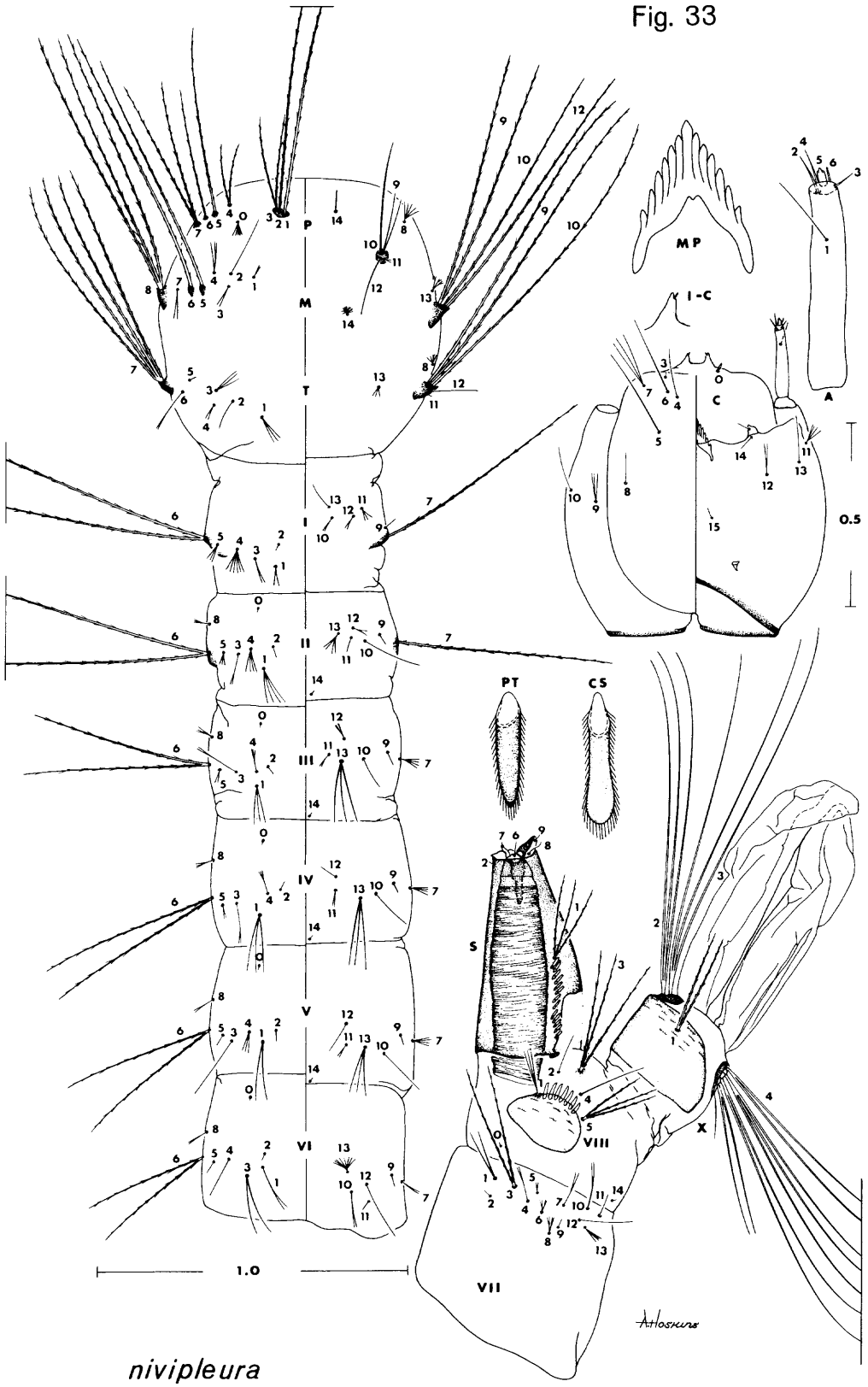
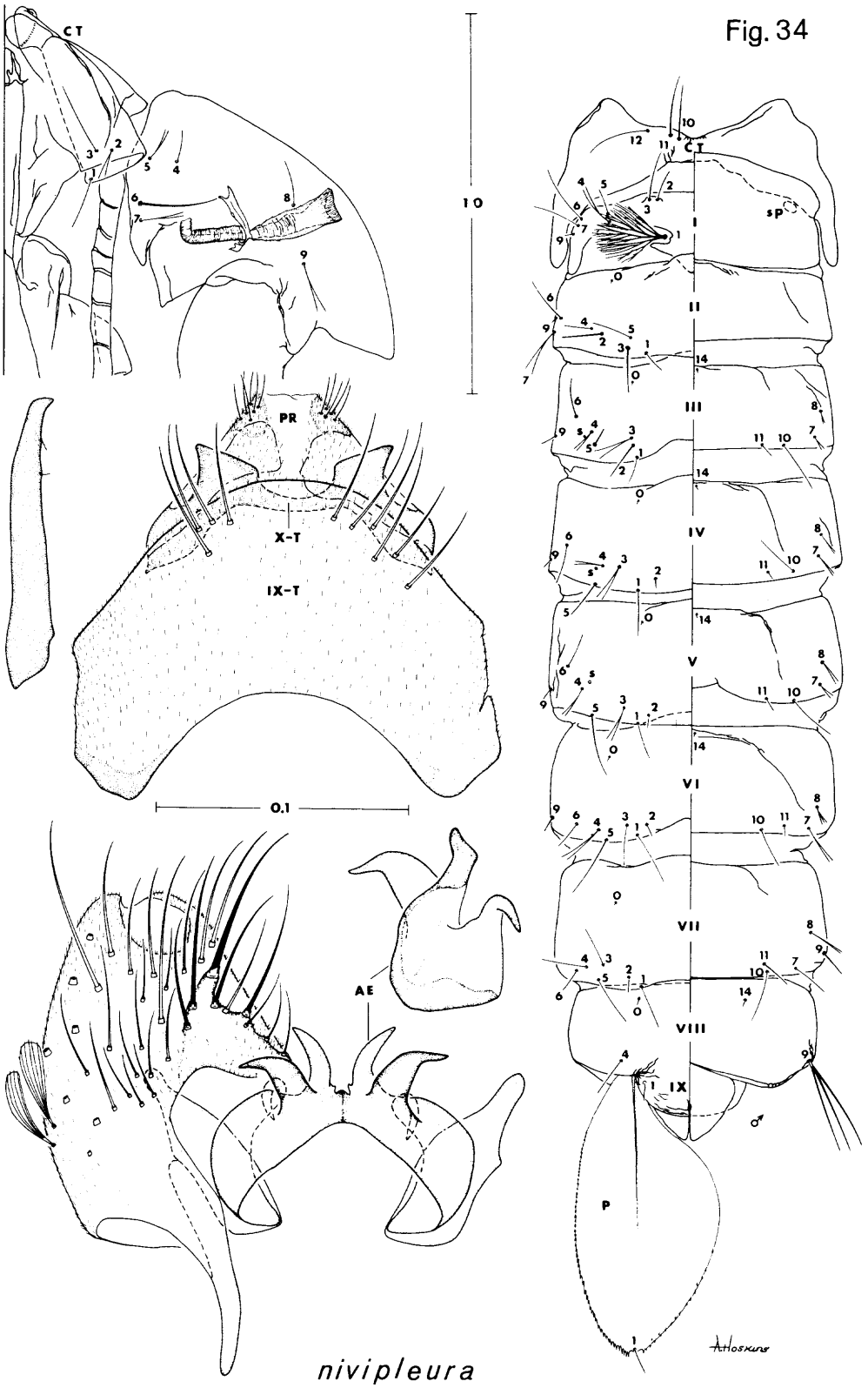


Fig. 33



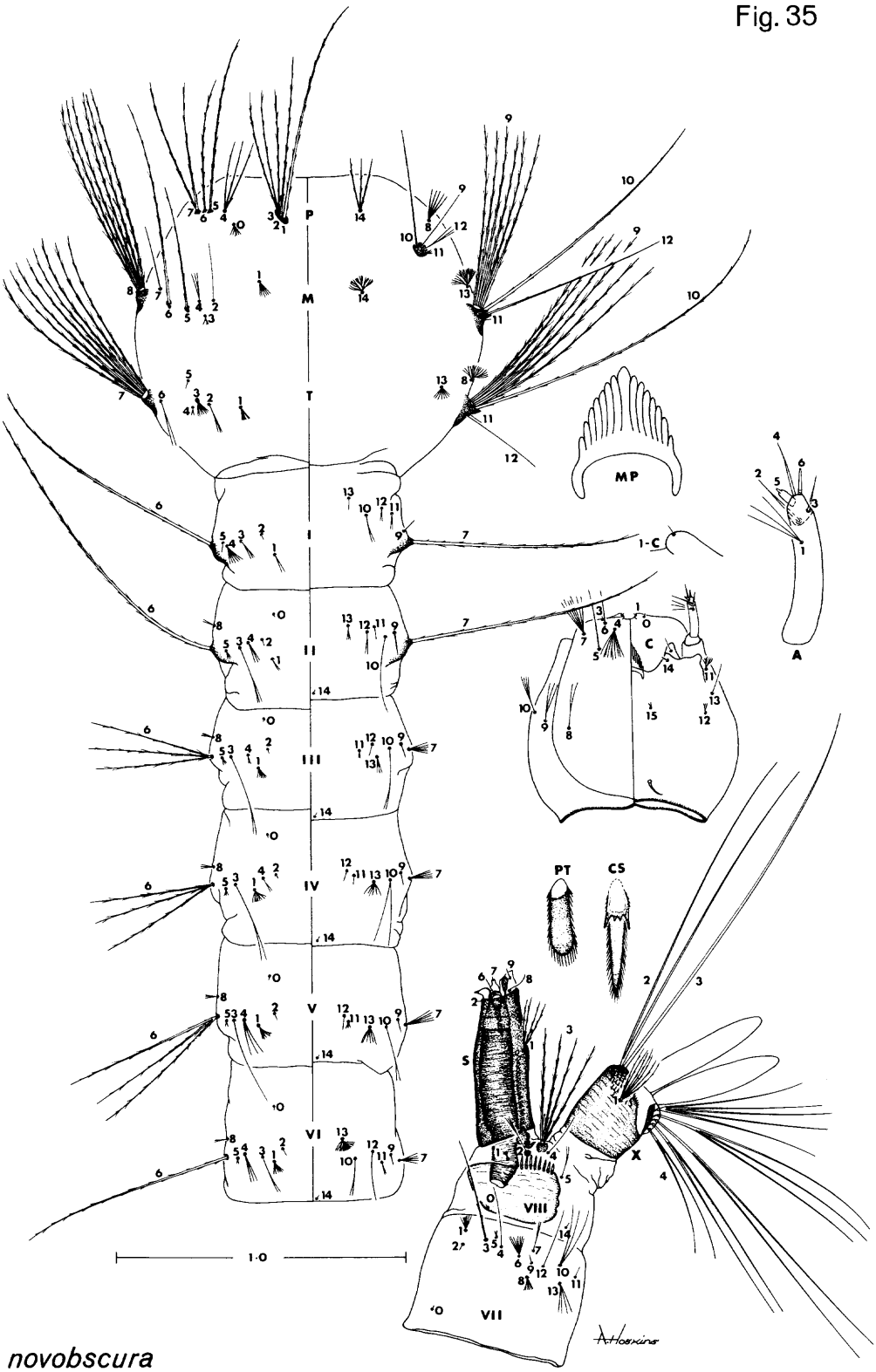
nivipleura

Fig. 34



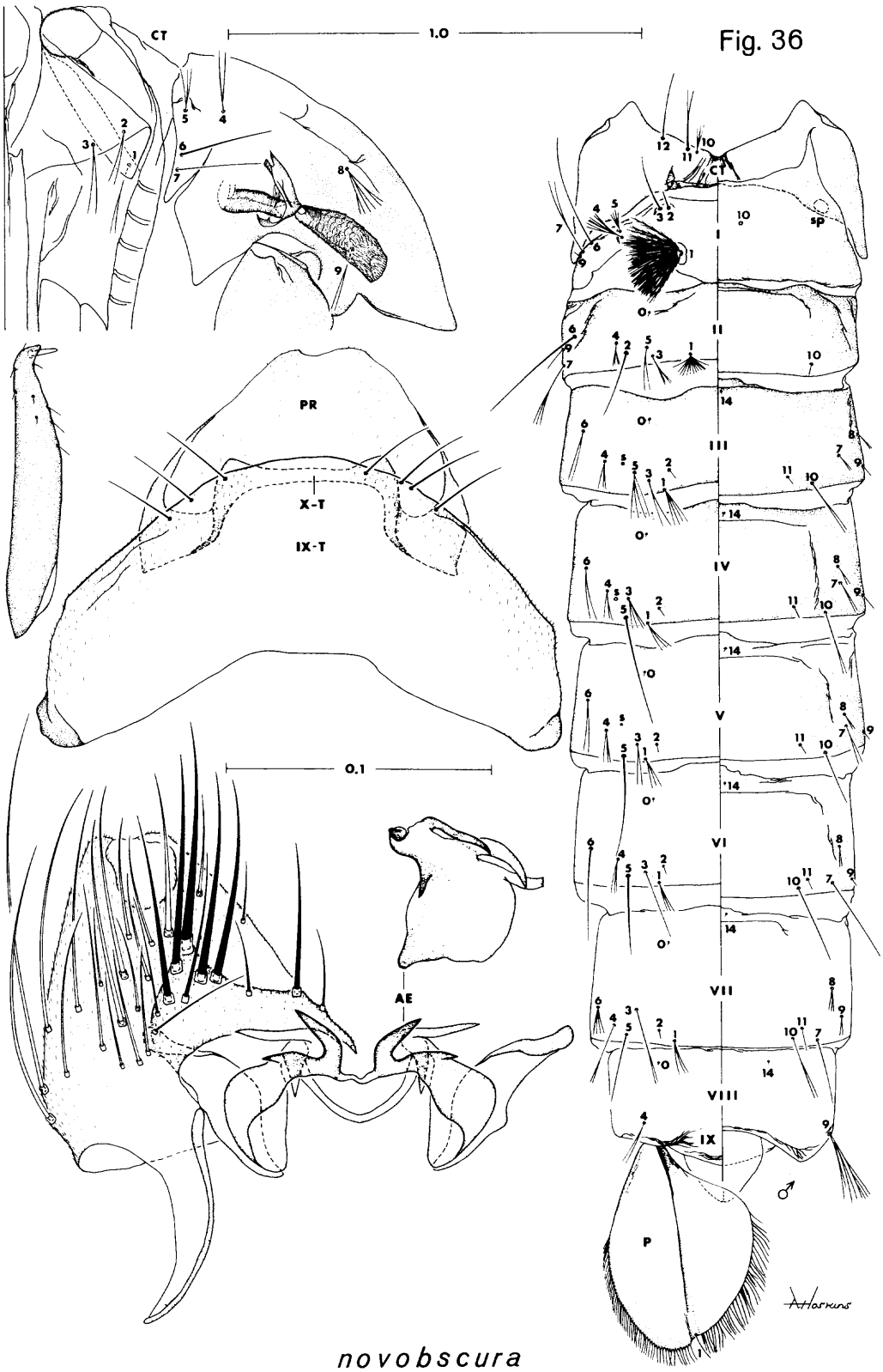
nivipleura

Fig. 35



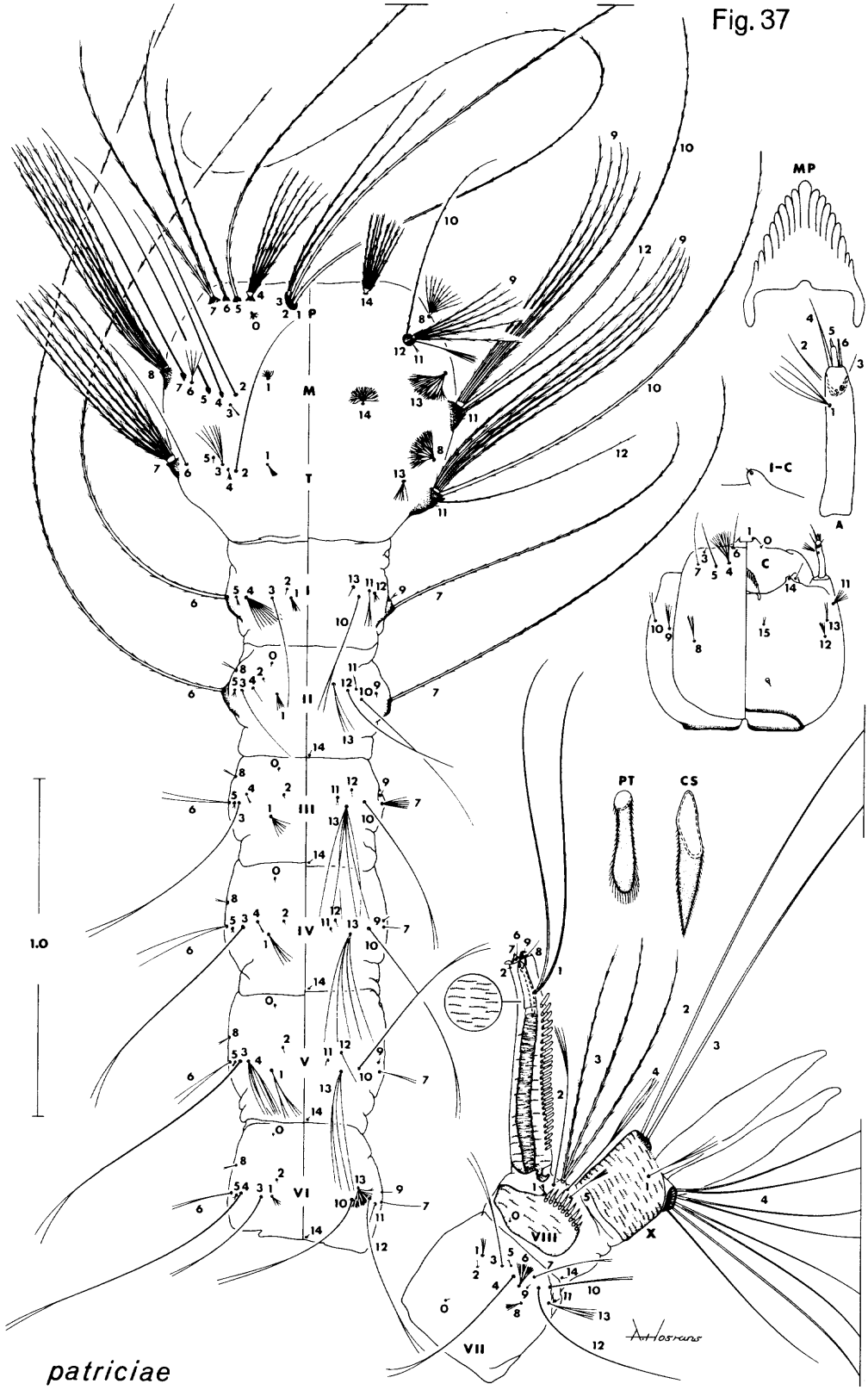
novobscura

Fig. 36



novobscura

Fig. 37



patriciae

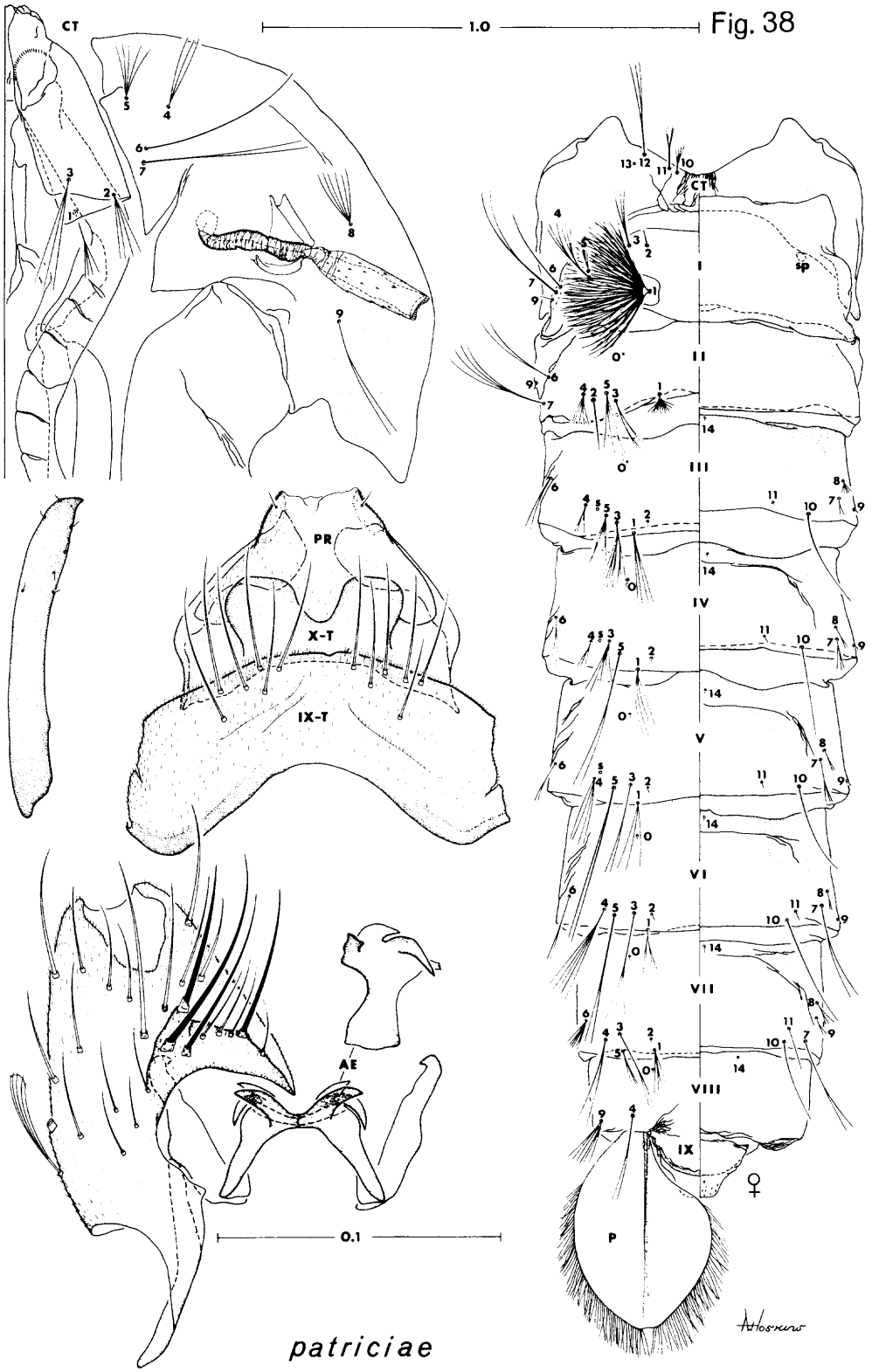
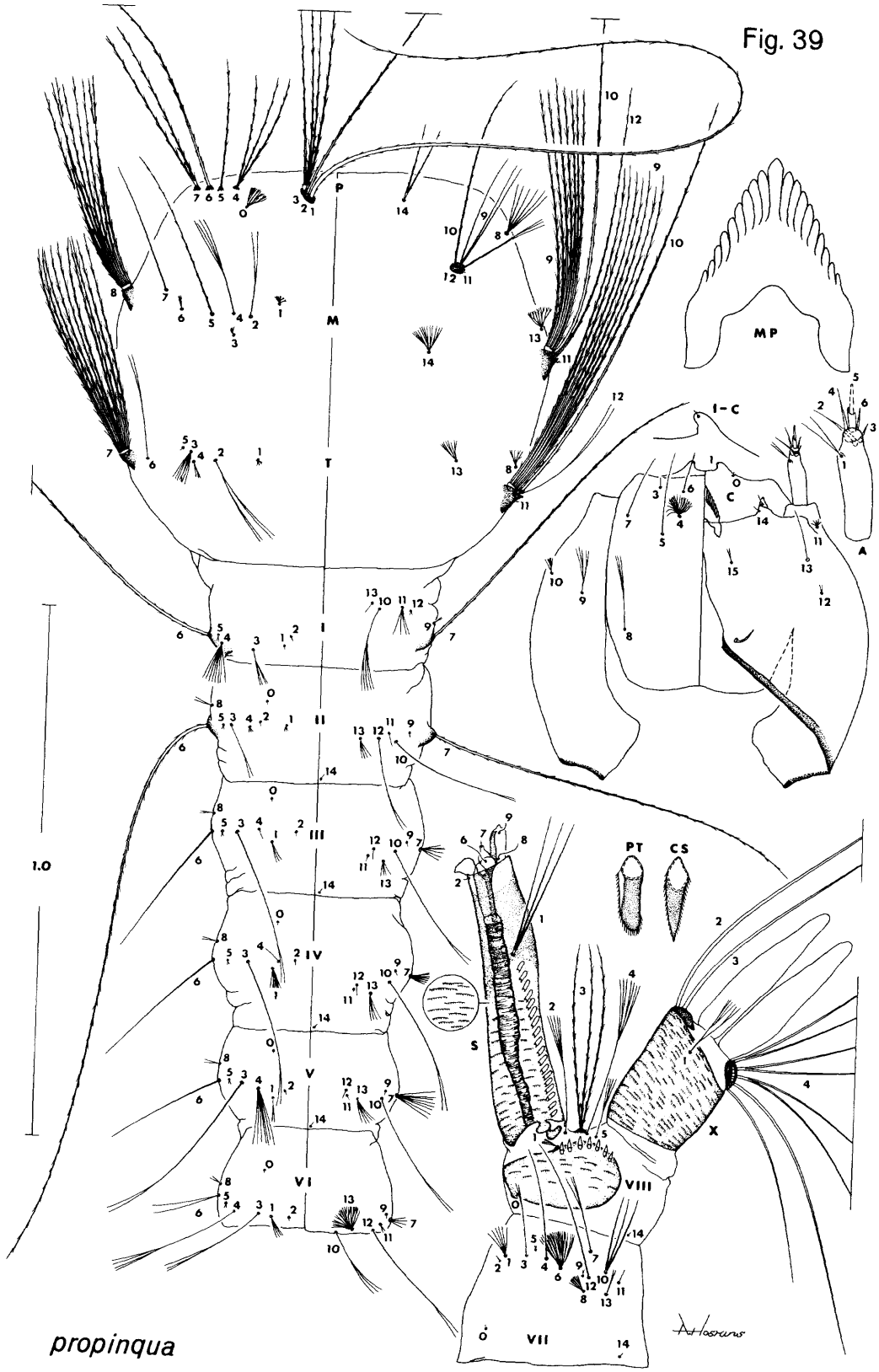


Fig. 38

Fig. 39



propinqua

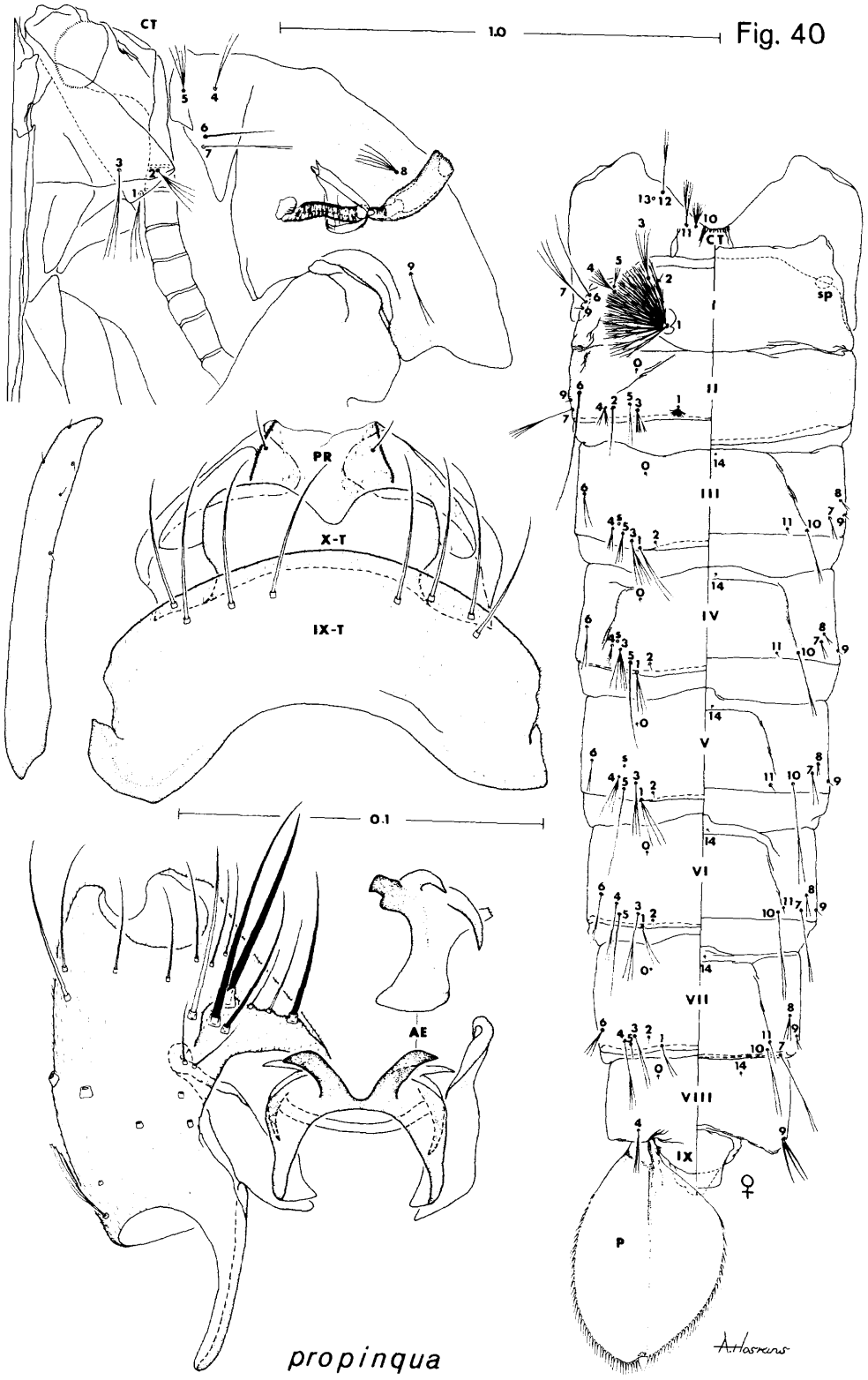


Fig. 40
1.0
CT
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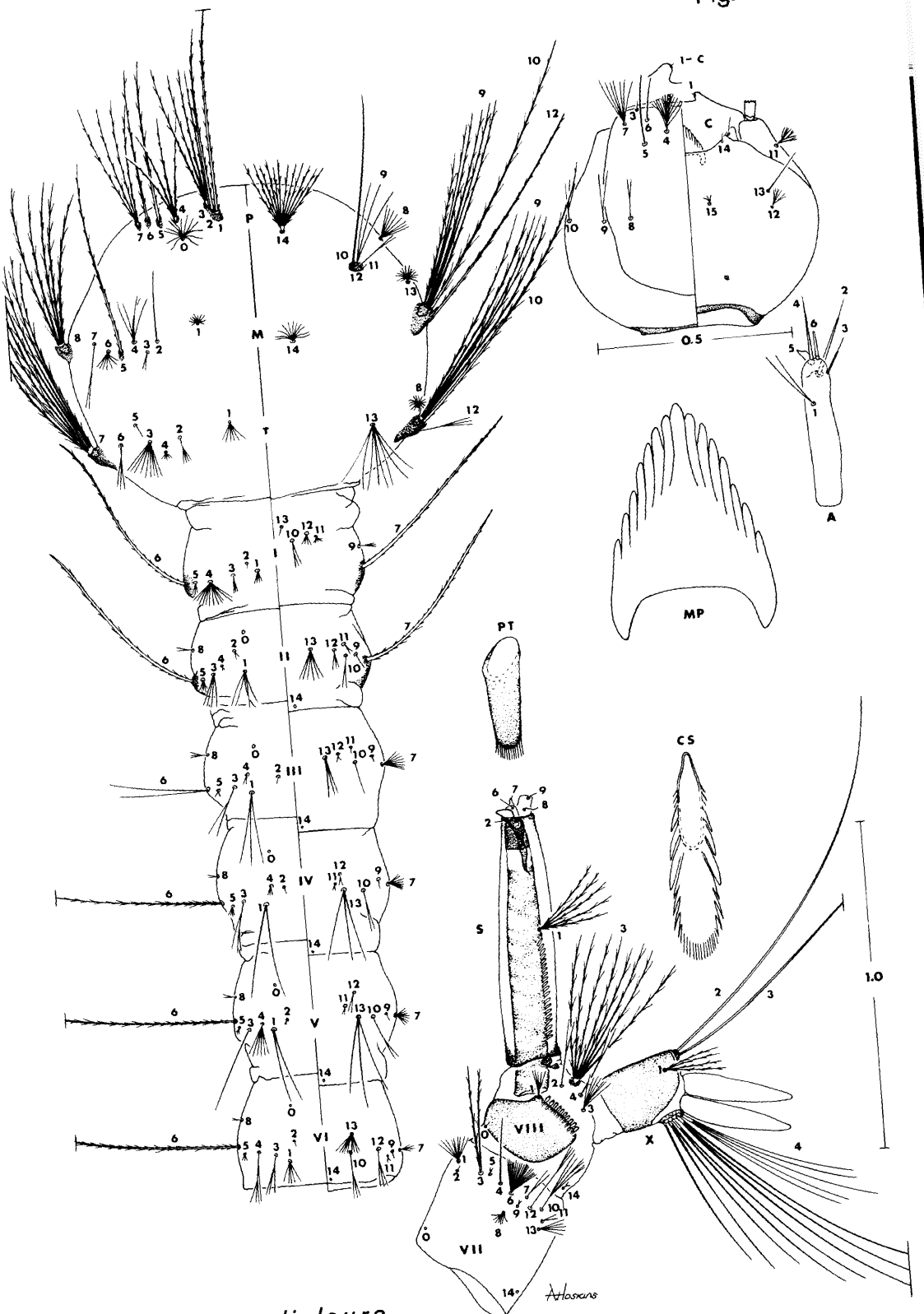
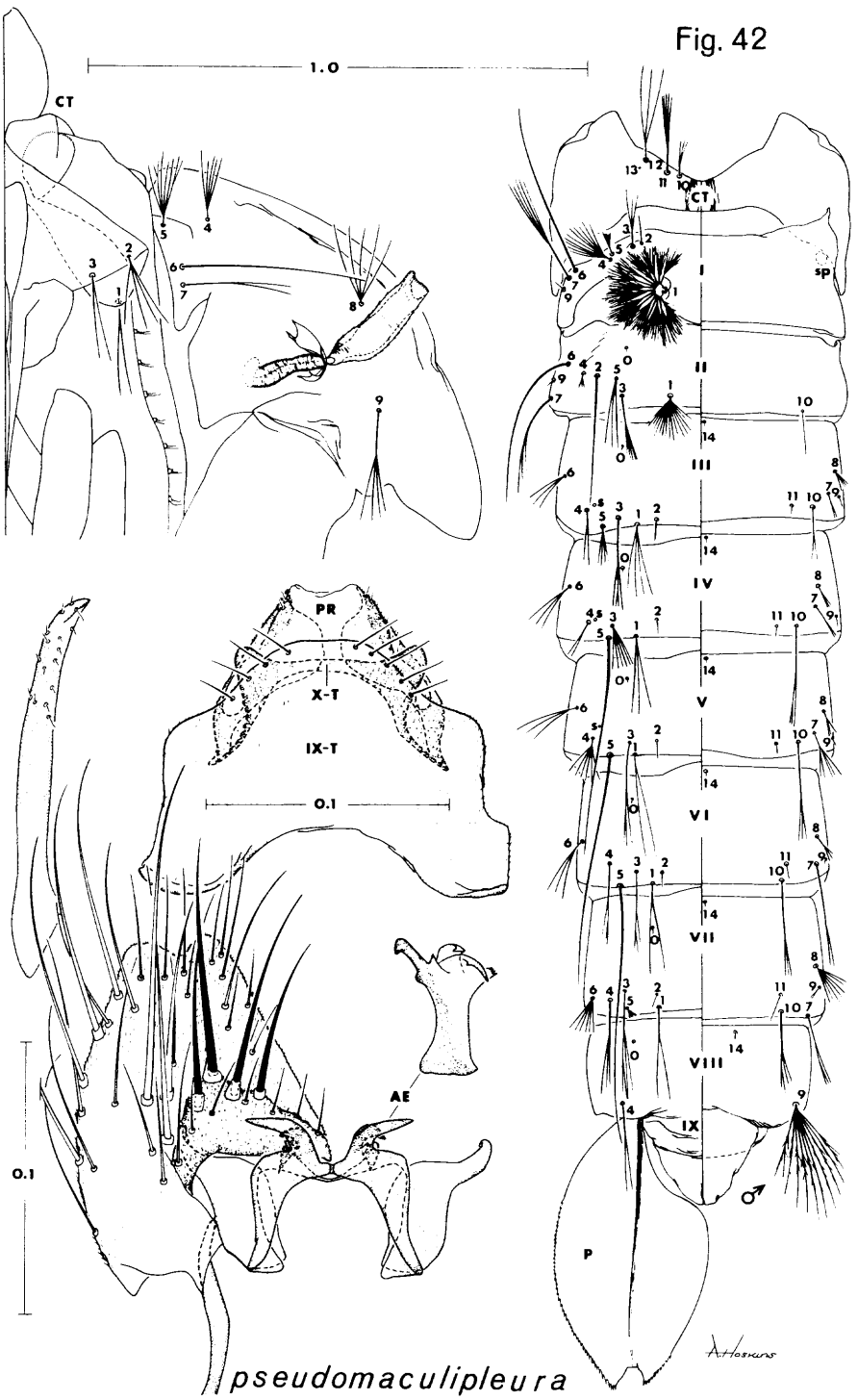
IX
P
♀
propinqua

Fig. 41



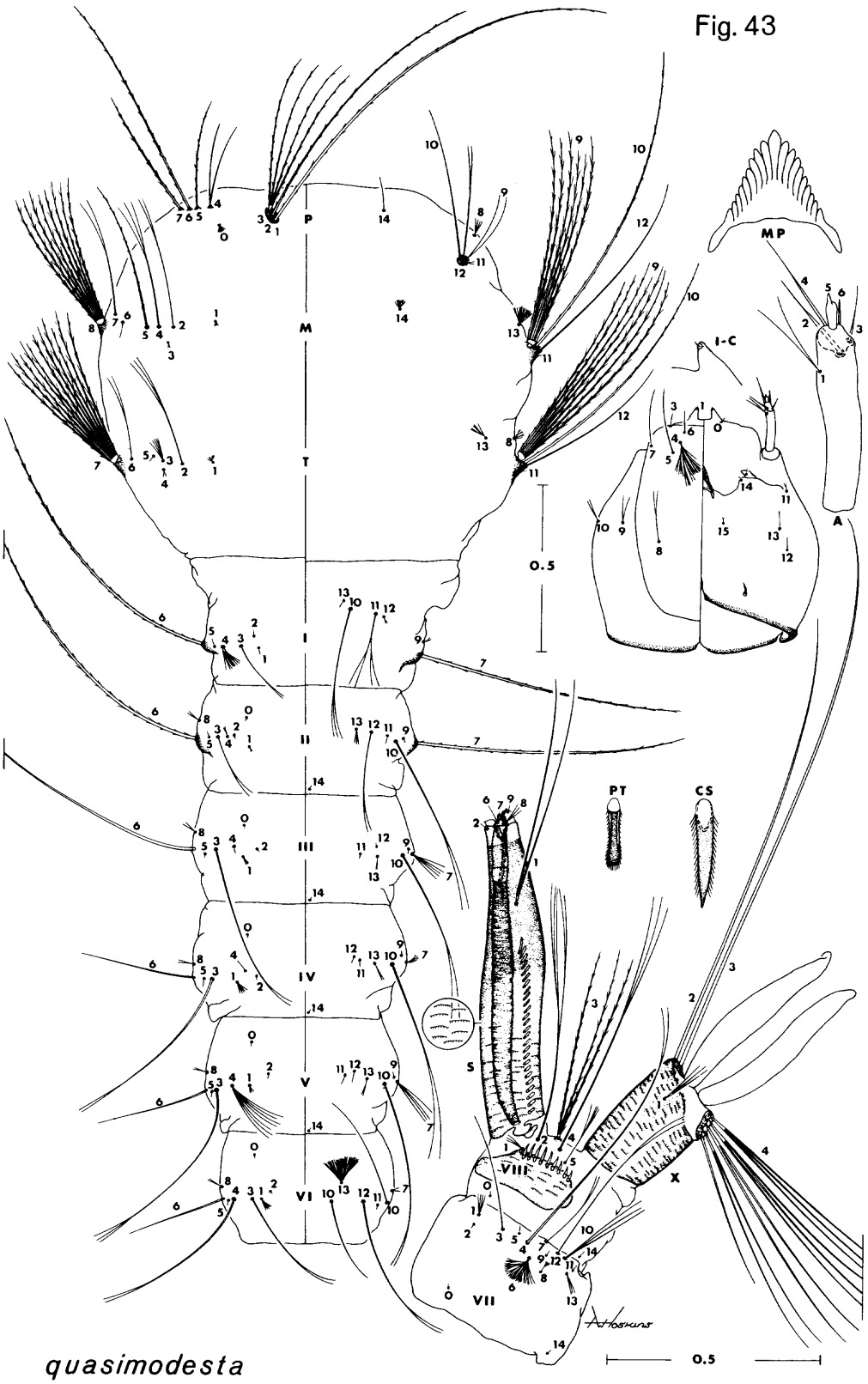
pseudomaculipleura

Fig. 42



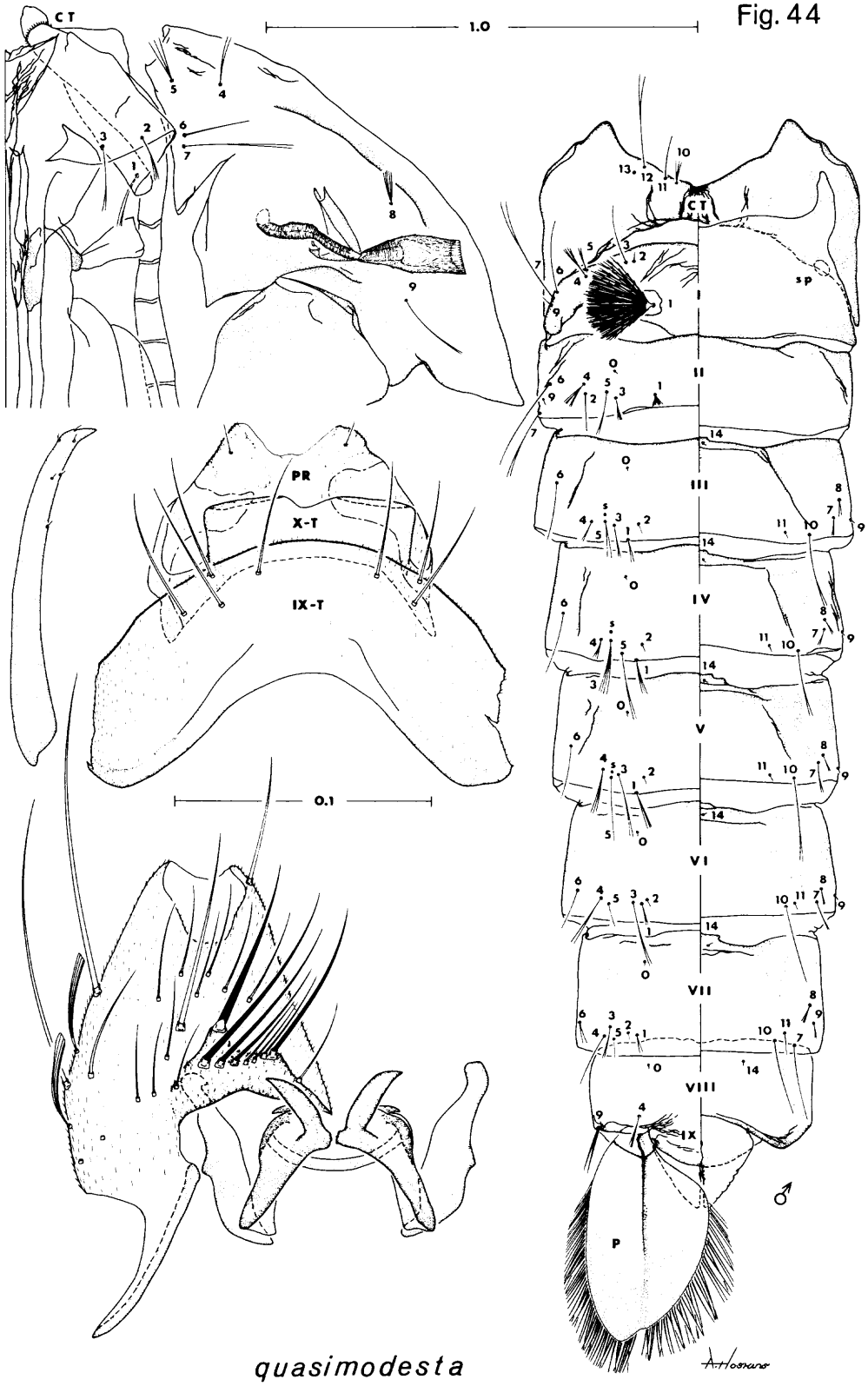
pseudomaculipleura

Fig. 43



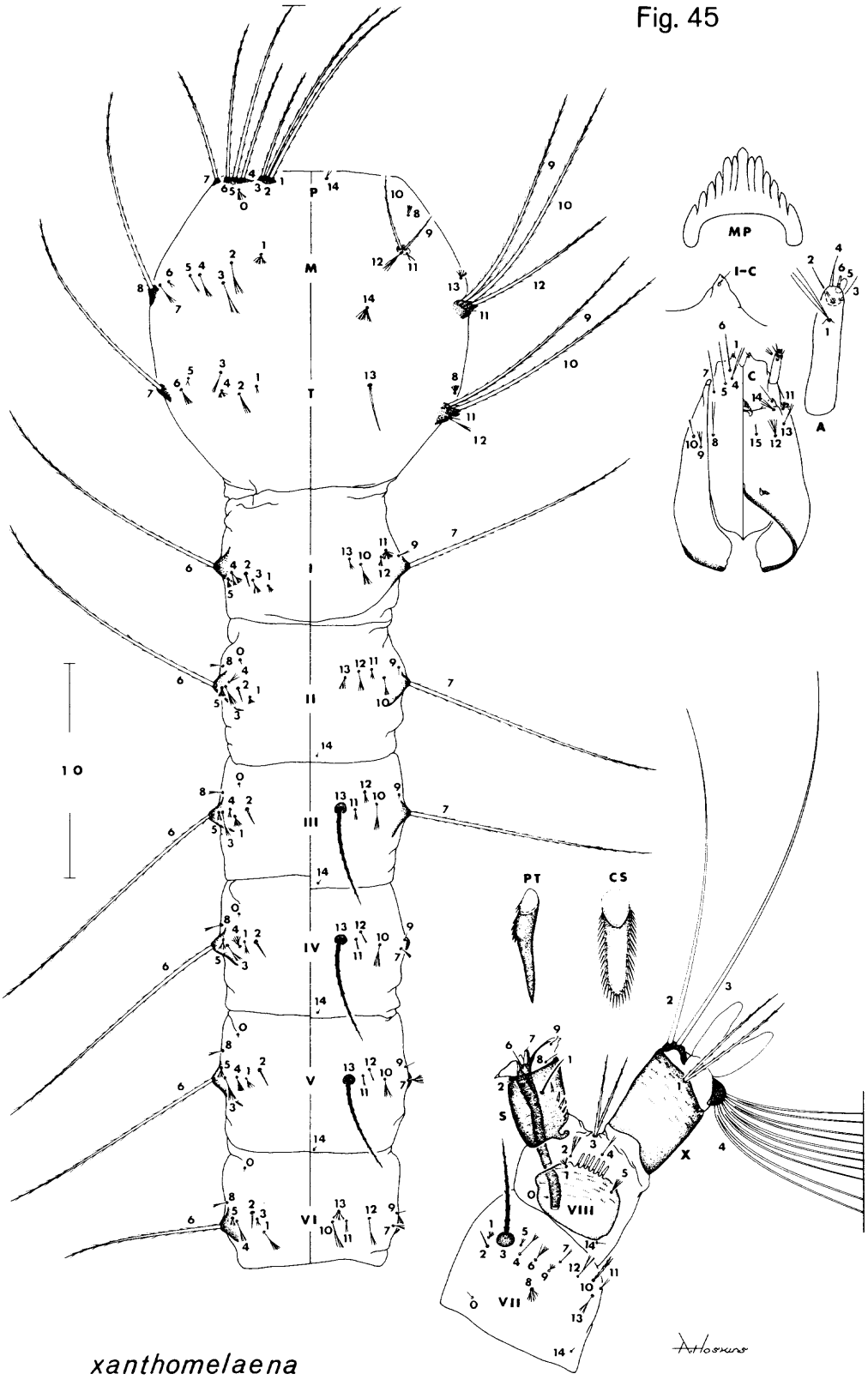
quasimodesta

Fig. 44



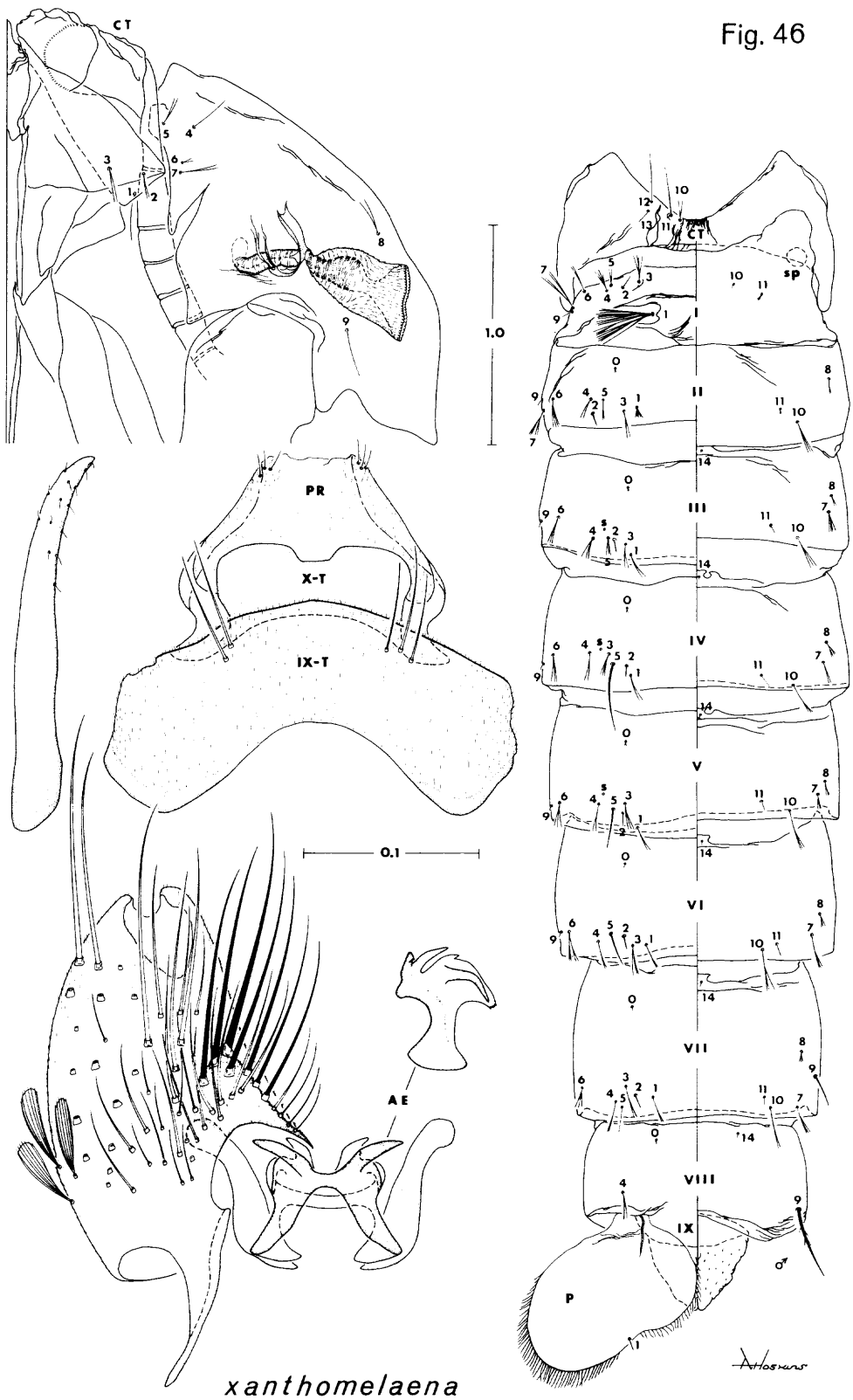
quasimodesta

Fig. 45



xanthomelaena

Fig. 46


CT
PR
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1.0
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I
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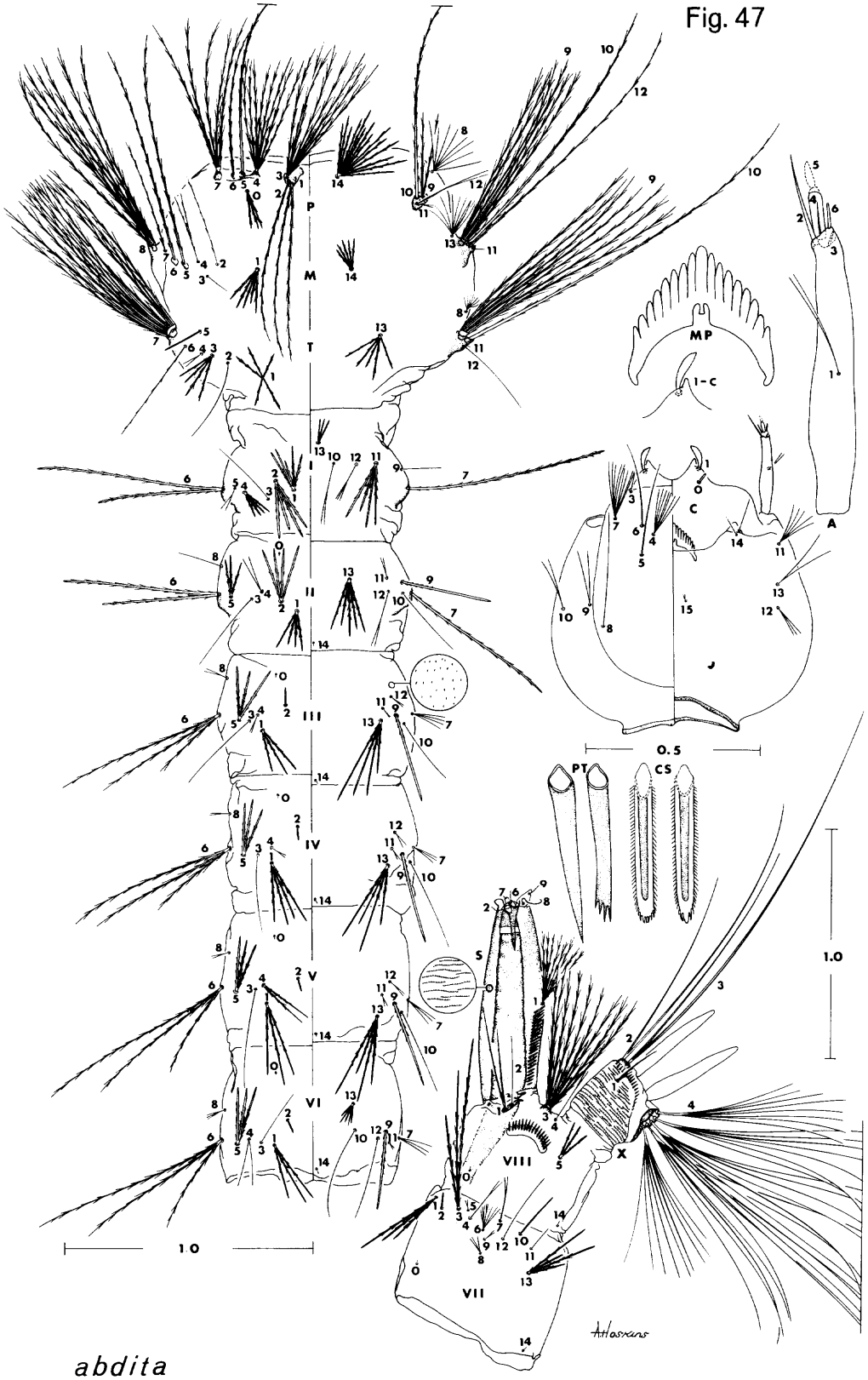
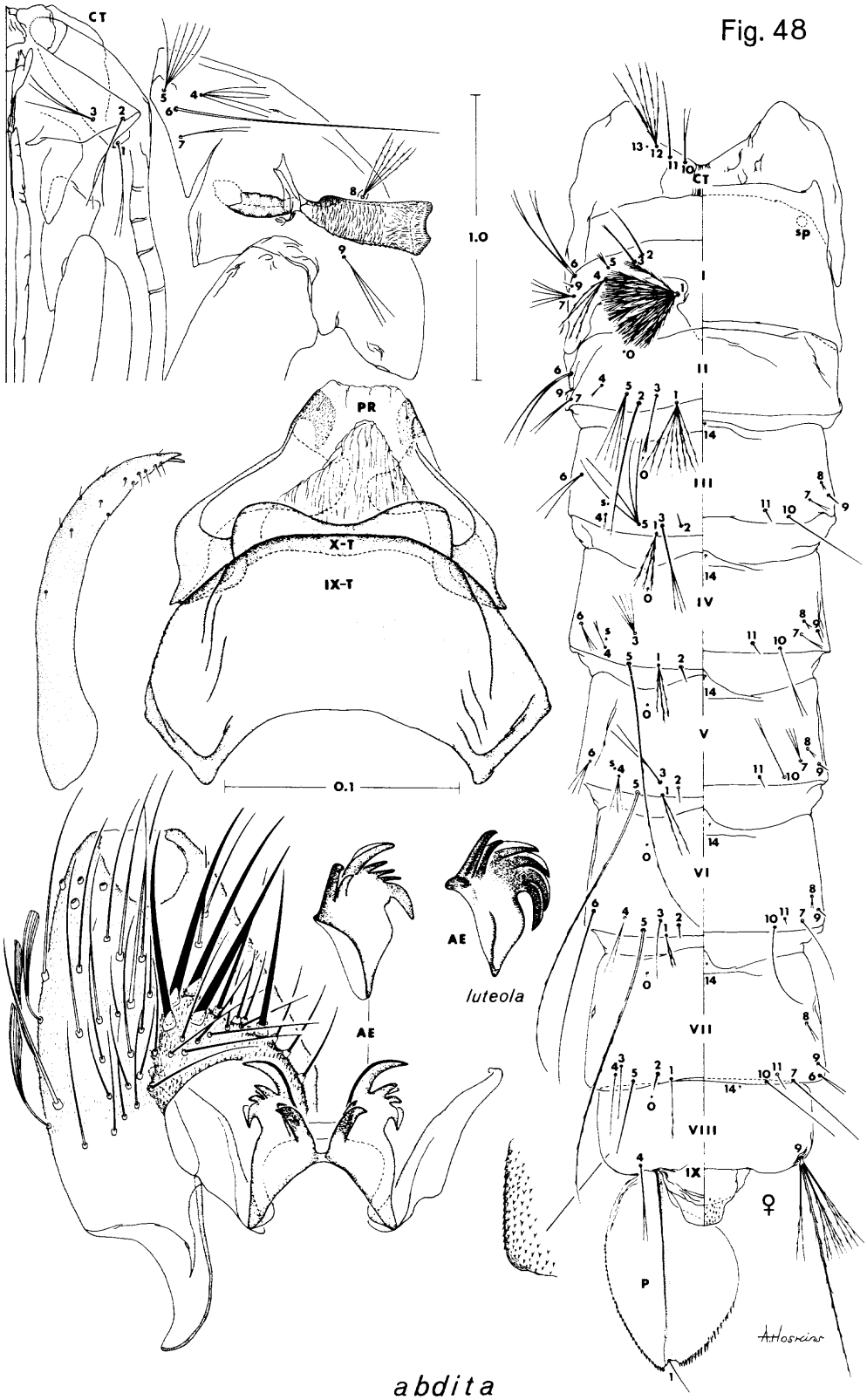
♂
xanthomelaena

Fig. 47



abdita

Fig. 48


CT
1.0
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X-T
IX-T
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AE
luteola
abdita
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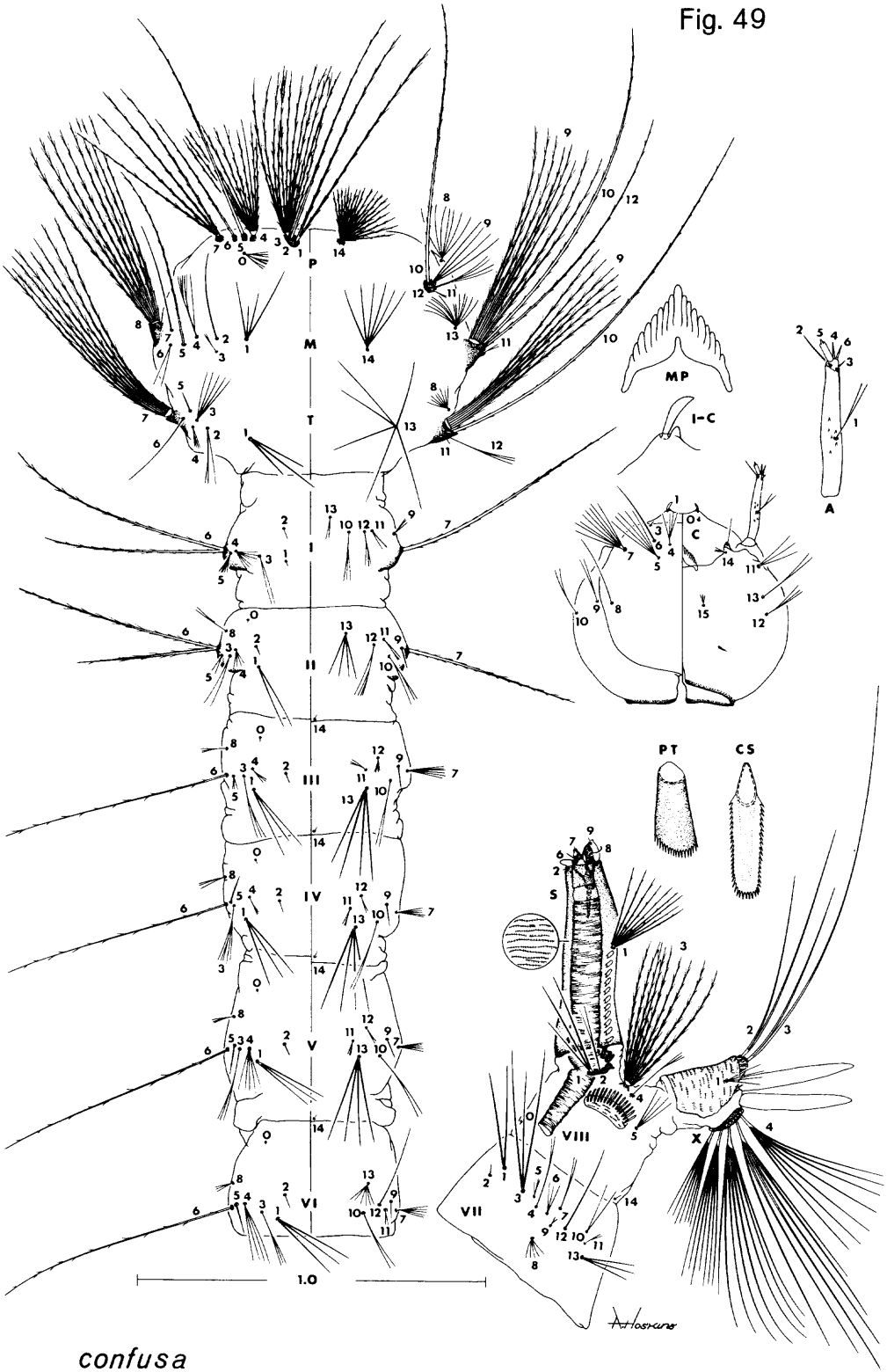
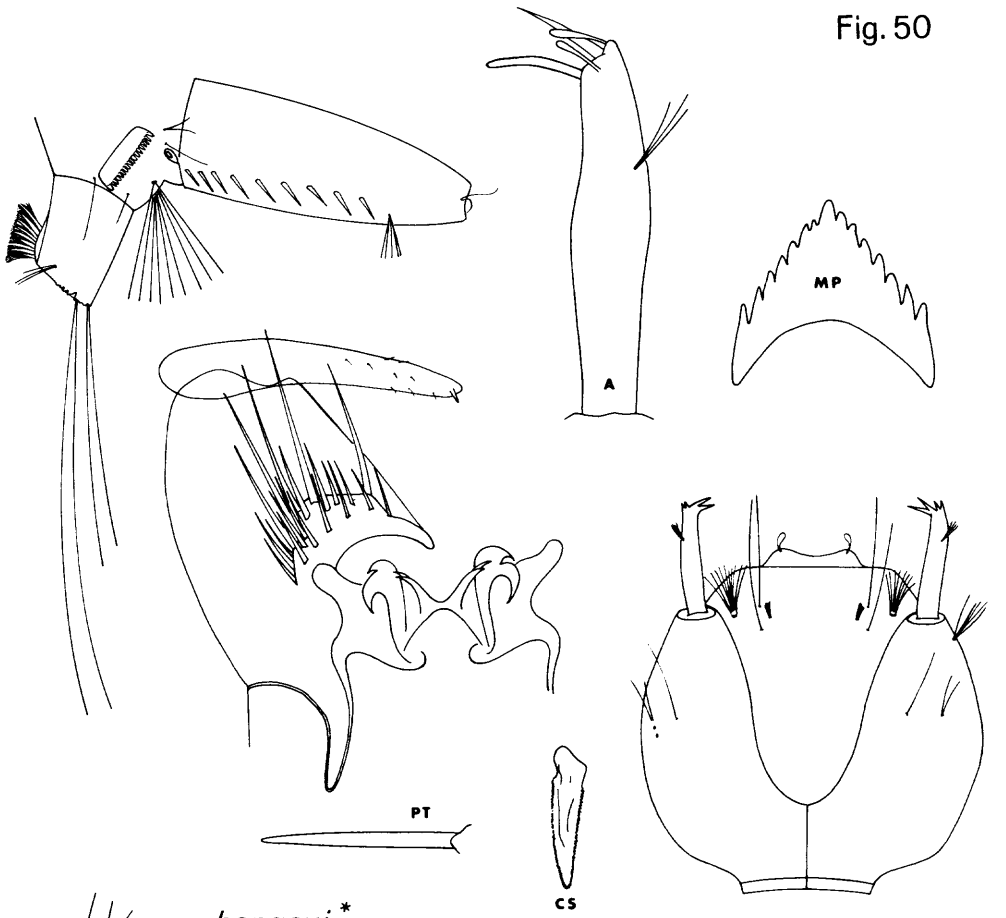
Fig. 49



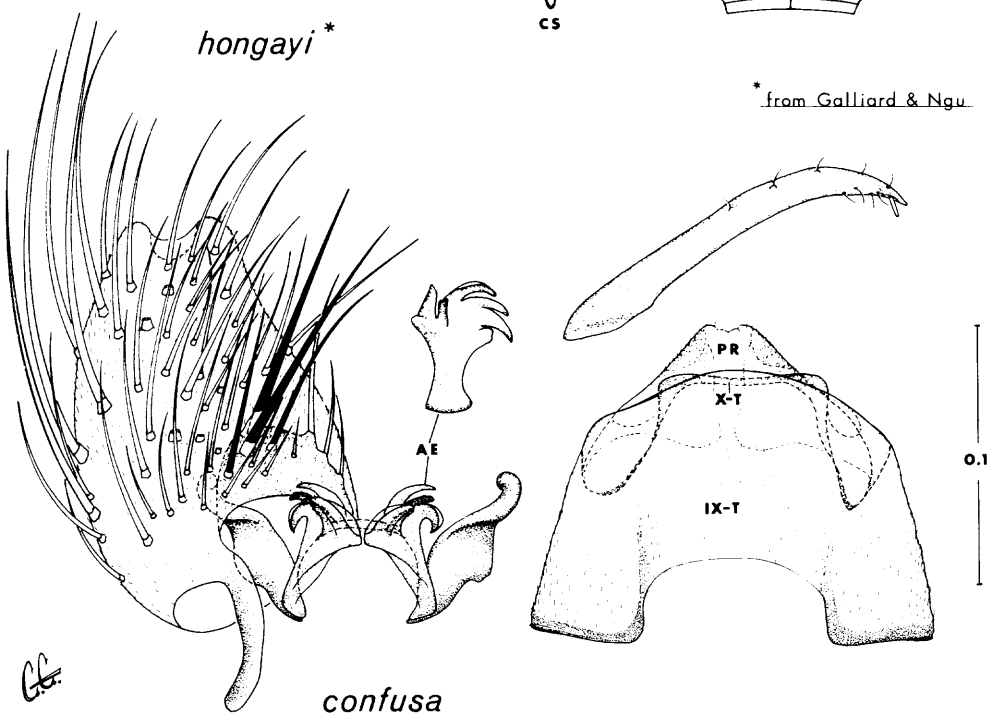
confusa

Fig. 50



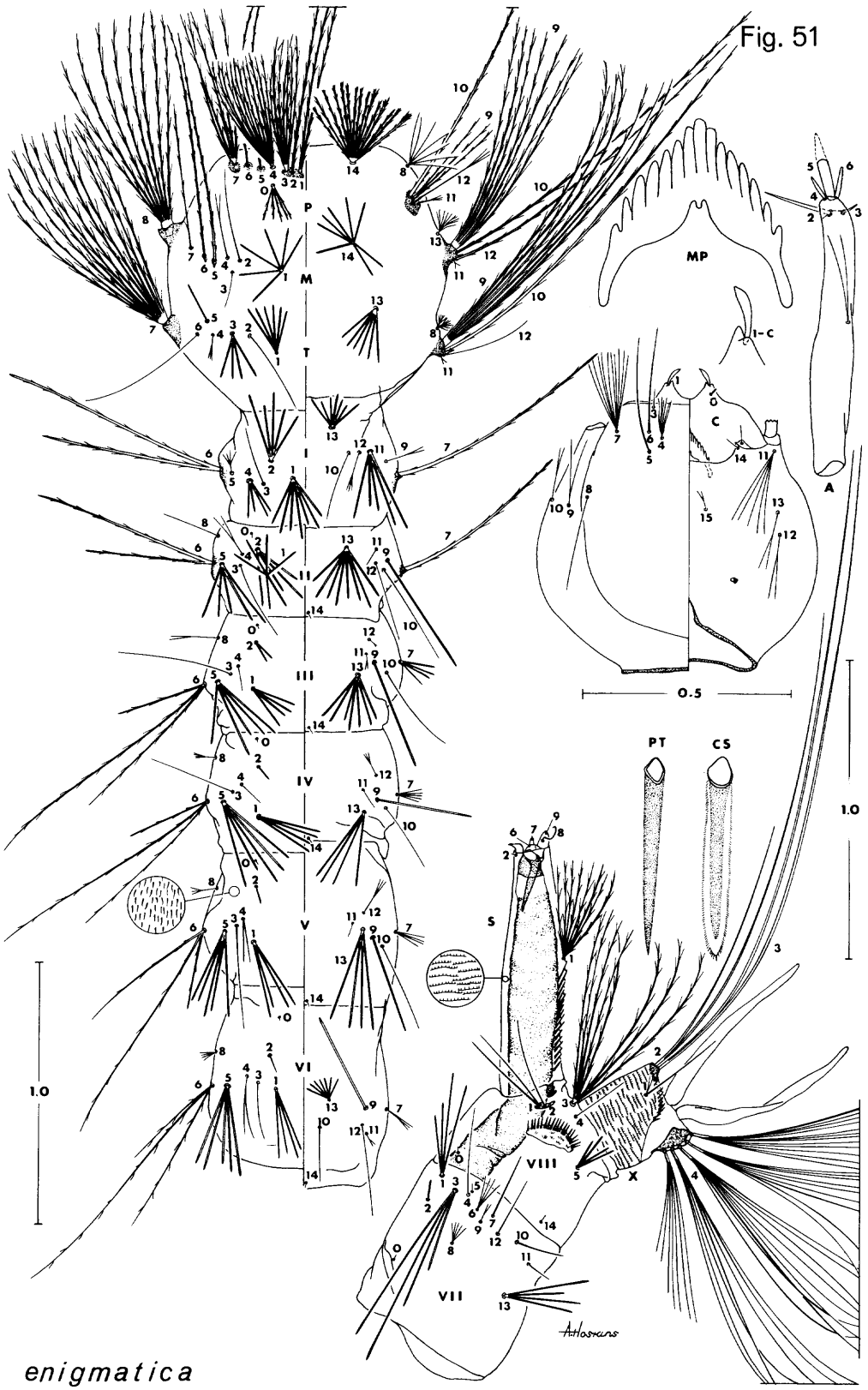
hongayi *

* from Galliard & Ngu



confusa

Fig. 51



enigmatica

Fig. 52

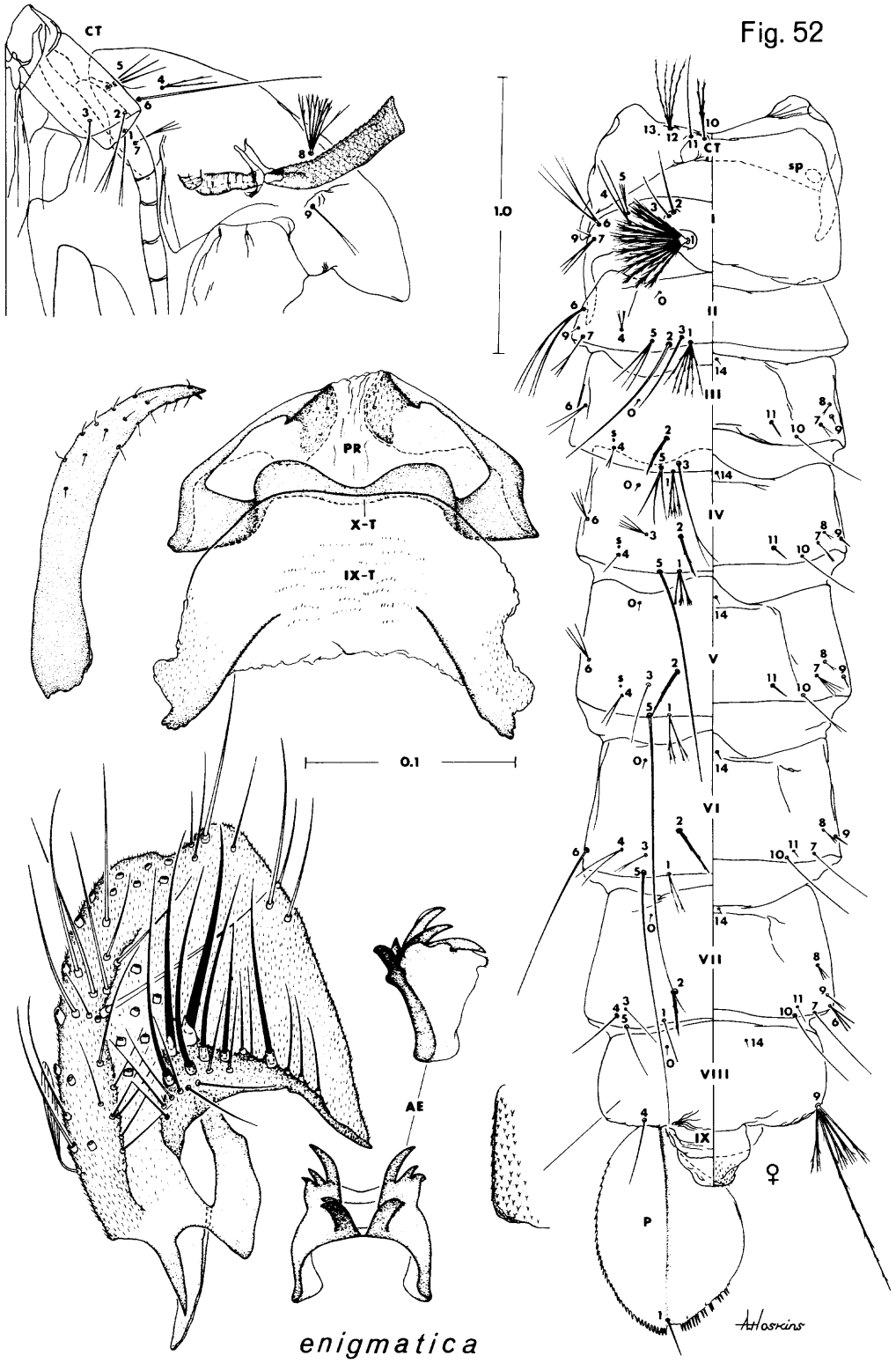
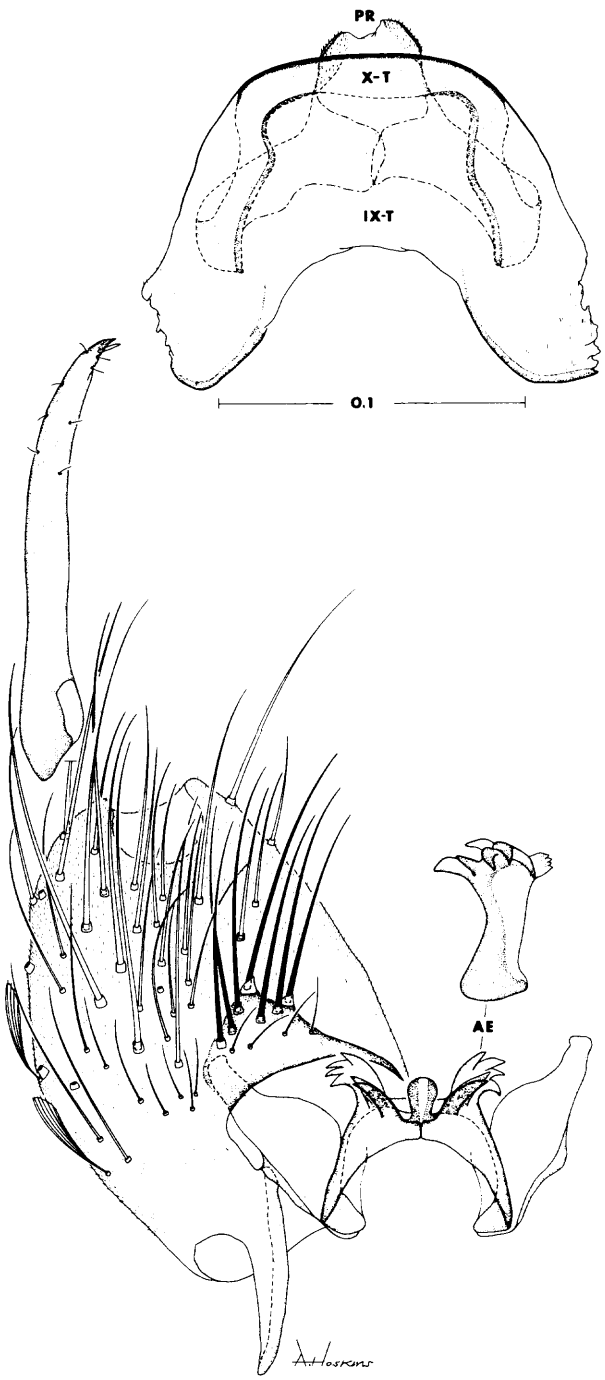
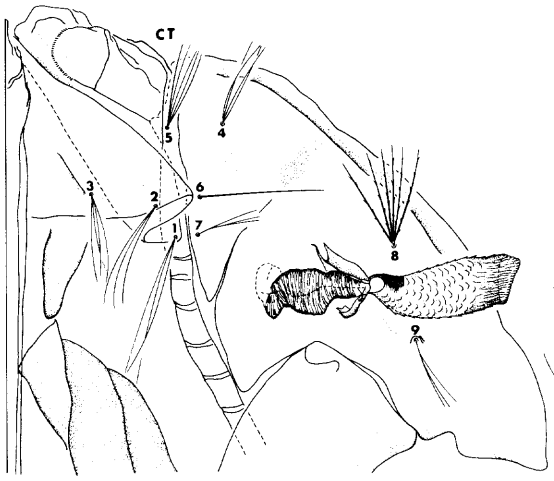


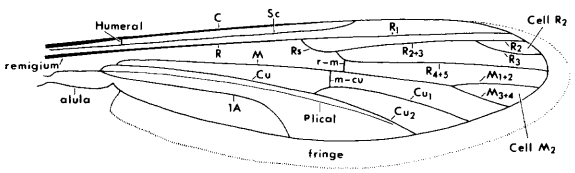
Fig. 53



hirsutifemora

Fig. 54

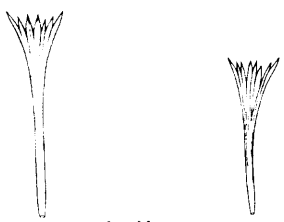




wing (general)

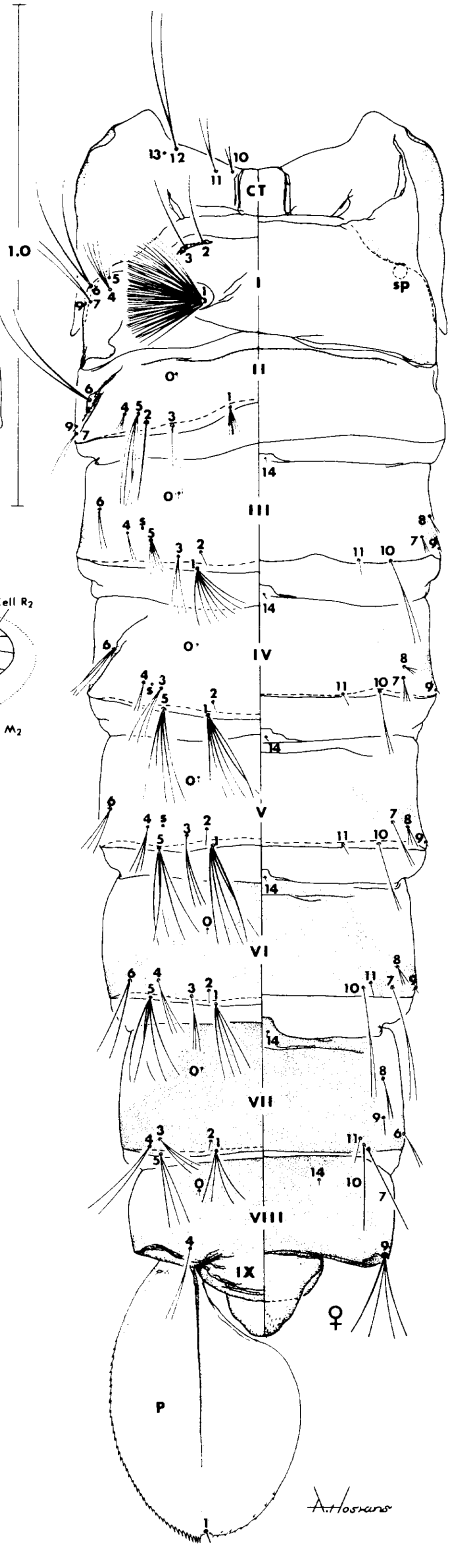
0.1

sumethi ♀



abdita ♂

erect head scales



hirsutifemora

Fig. 55

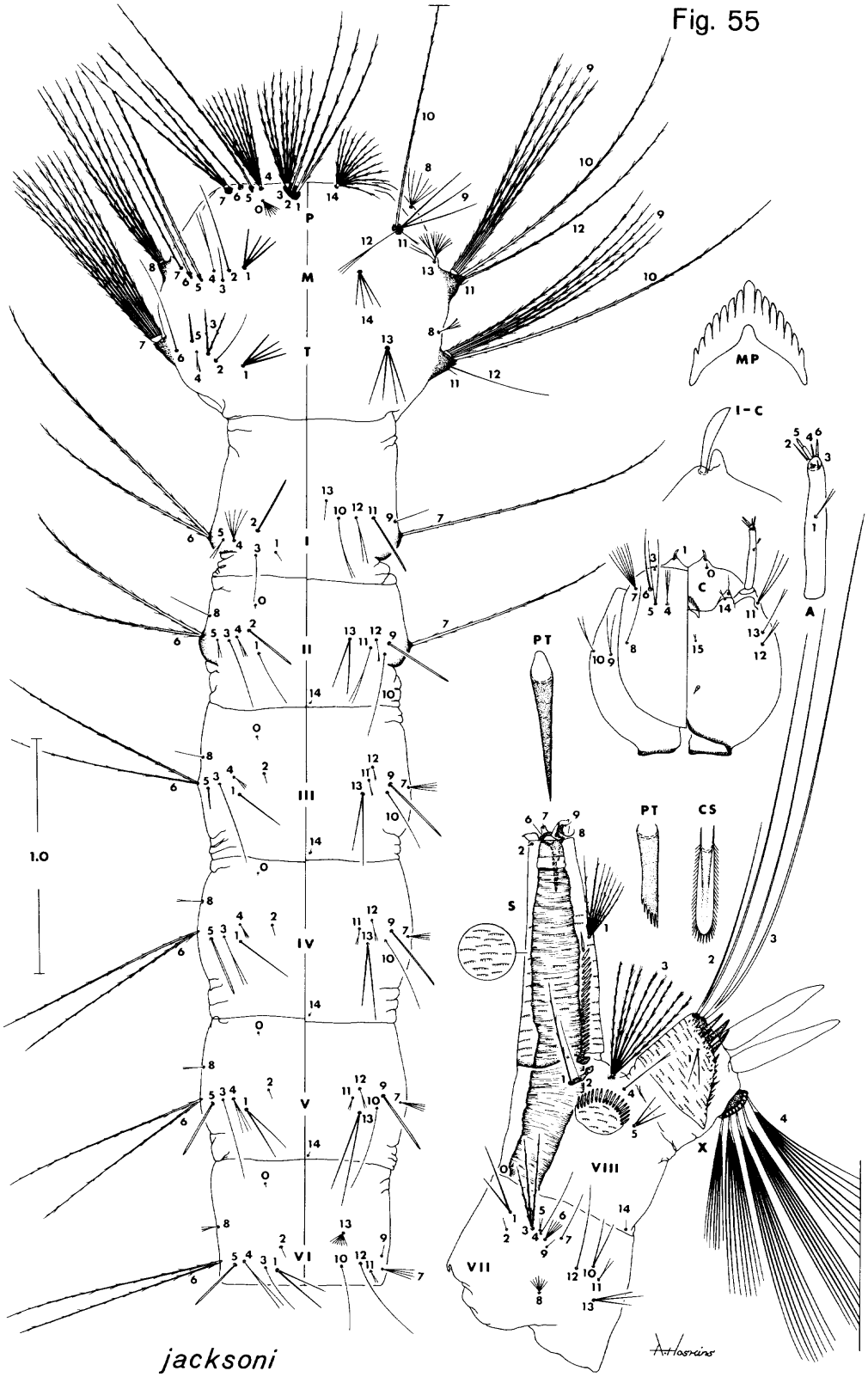
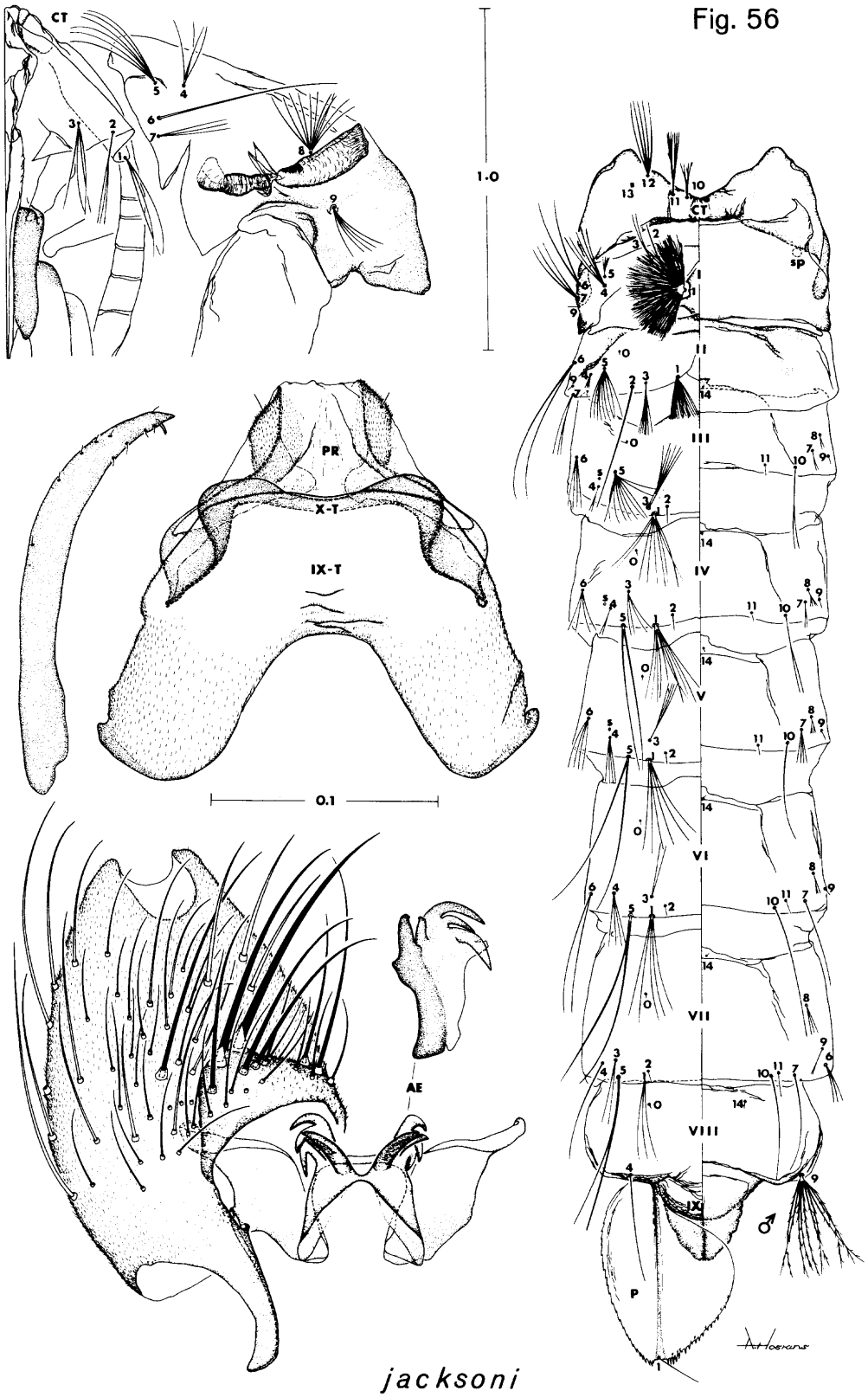
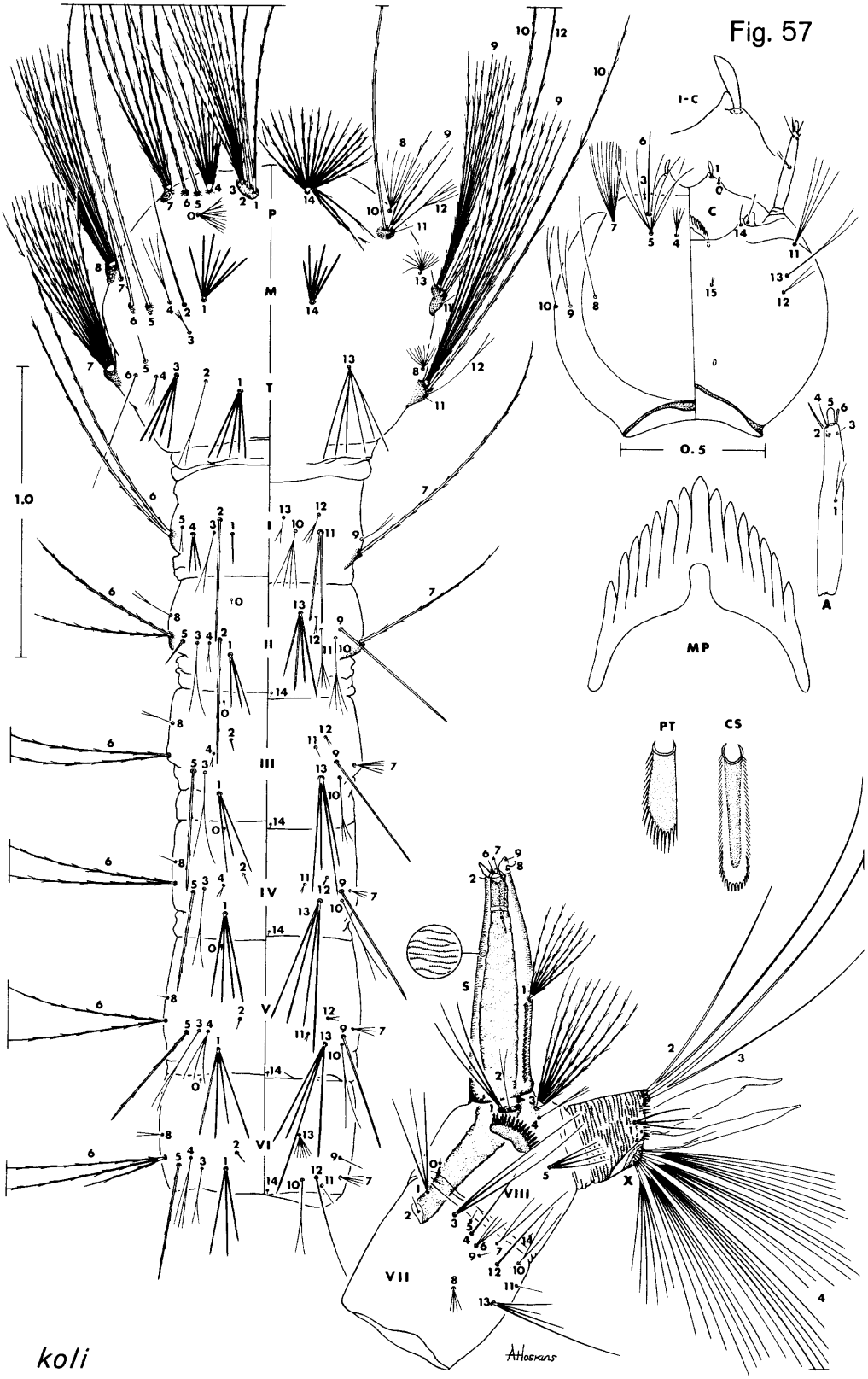


Fig. 56



jacksoni

Fig. 57



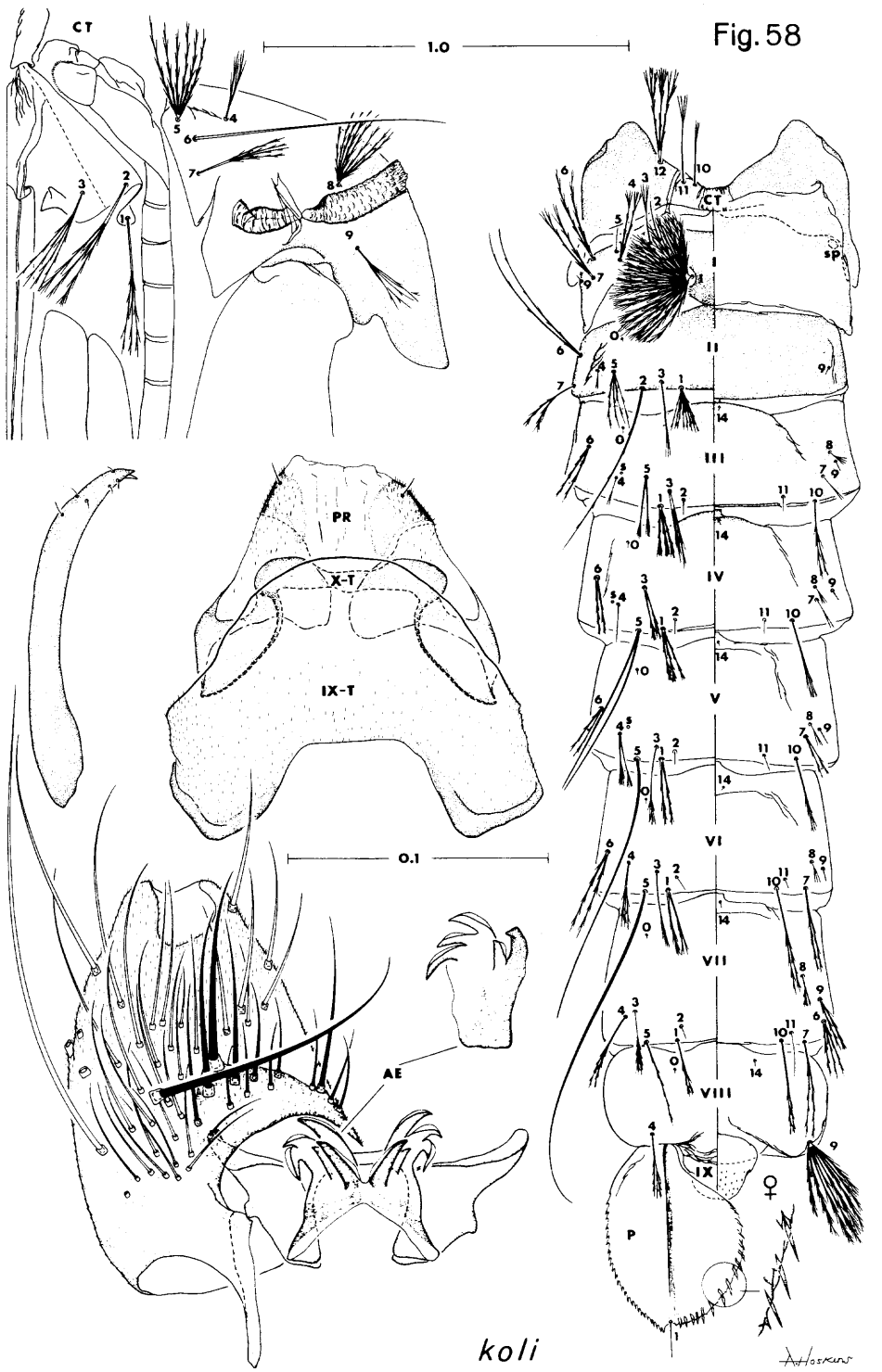


Fig. 58
CT
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VII
VIII
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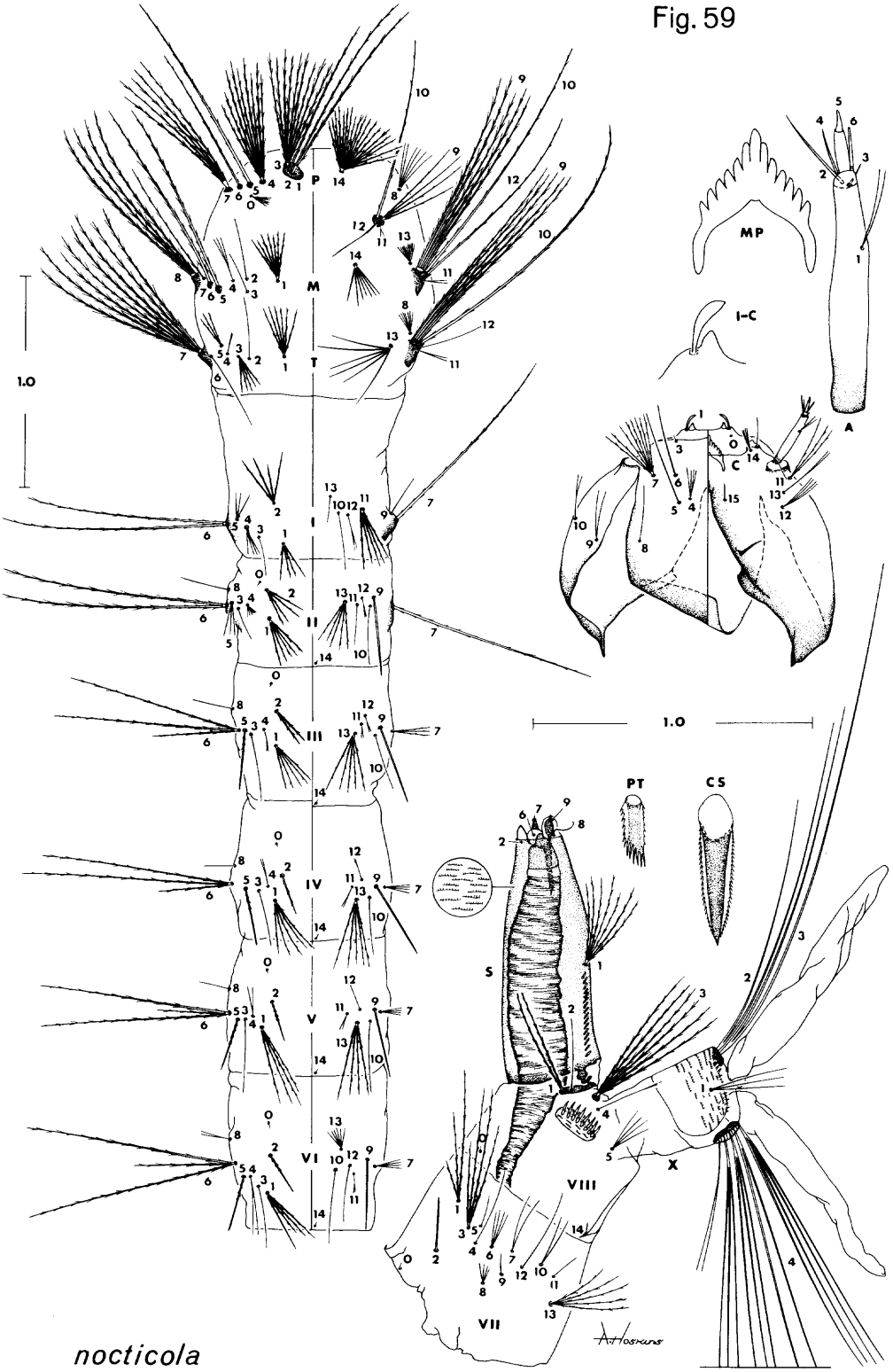
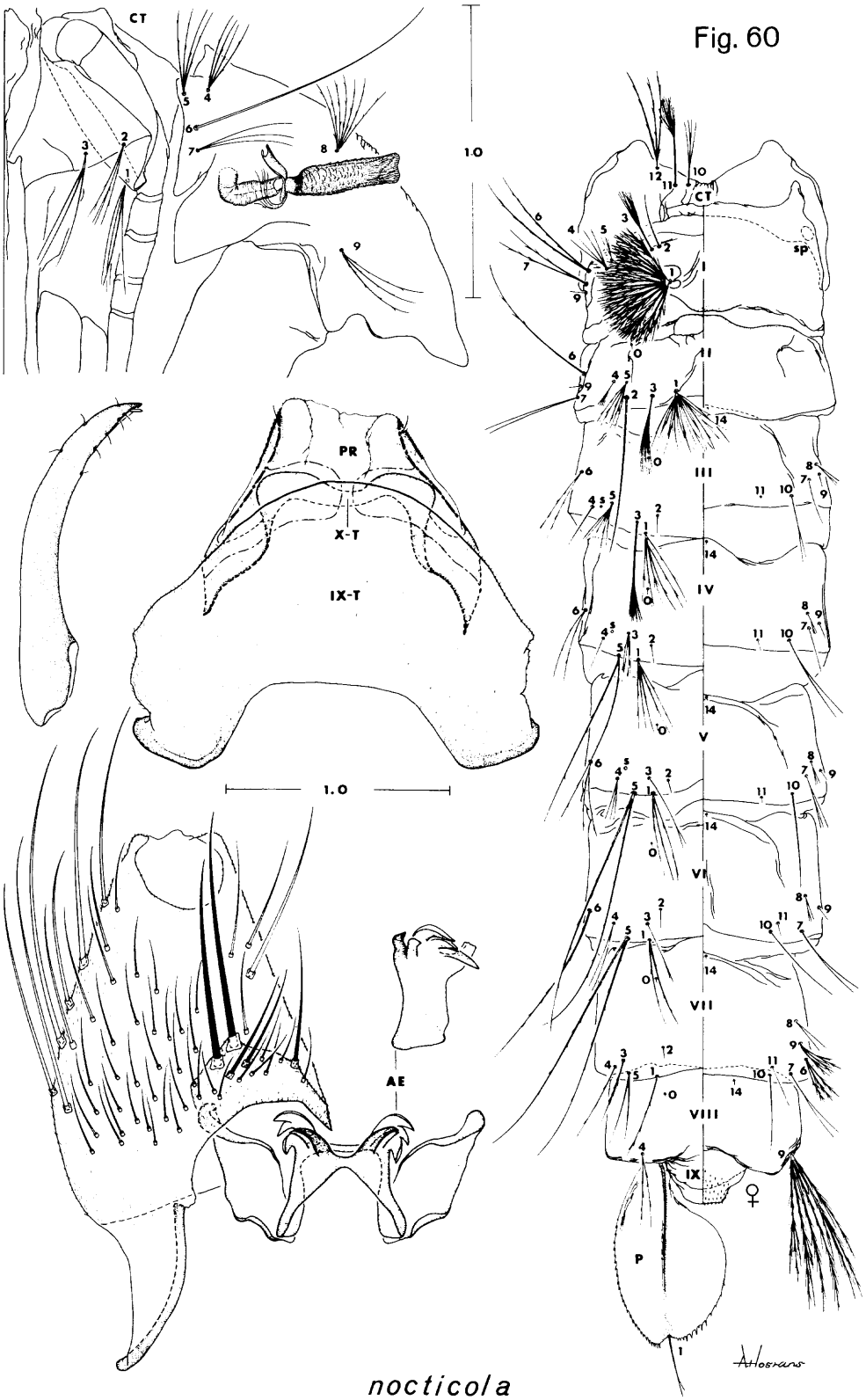
P
♀
koli

Fig. 59



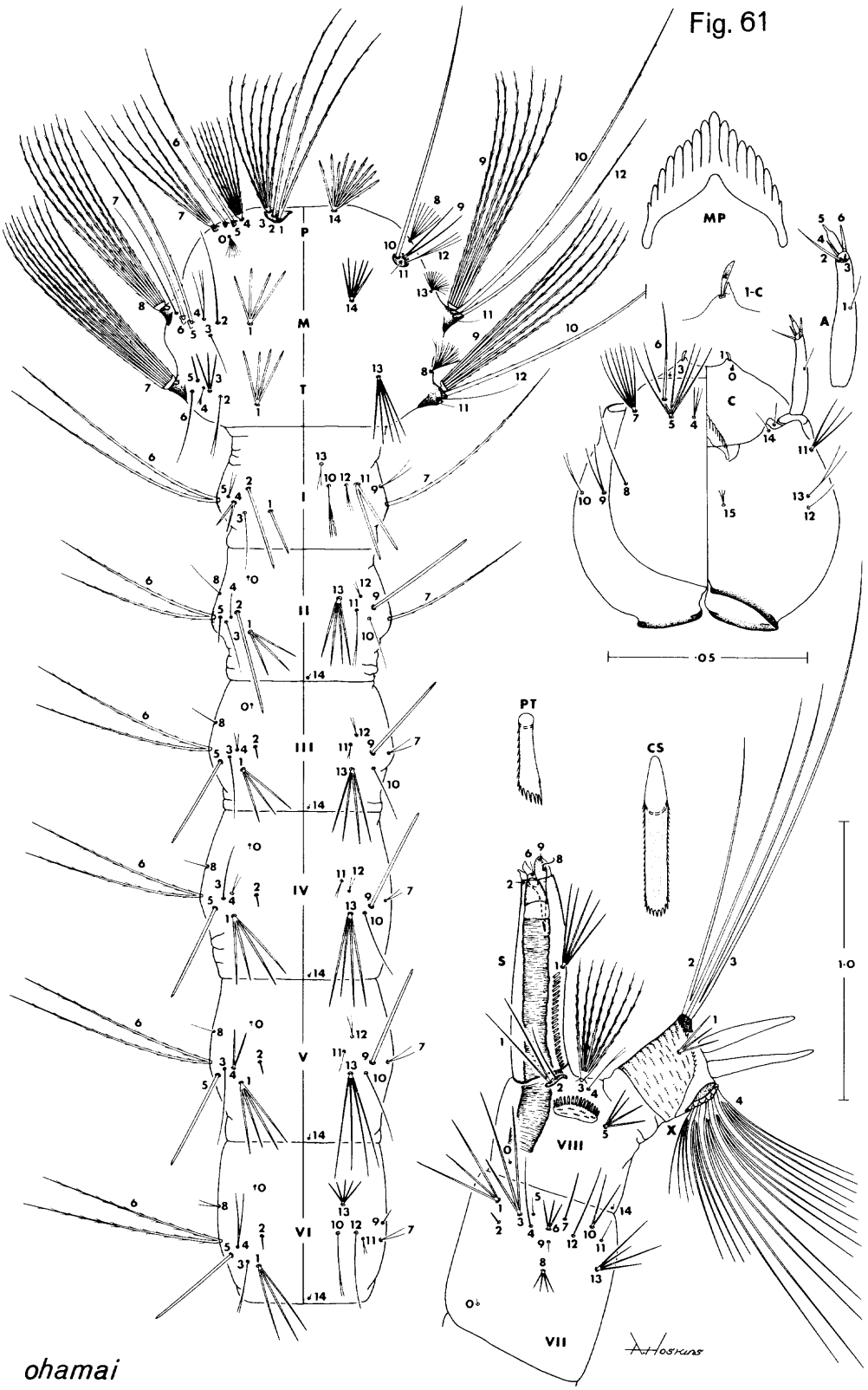
nocticola

Fig. 60



nocticola

Fig. 61



ohamai

Fig. 62

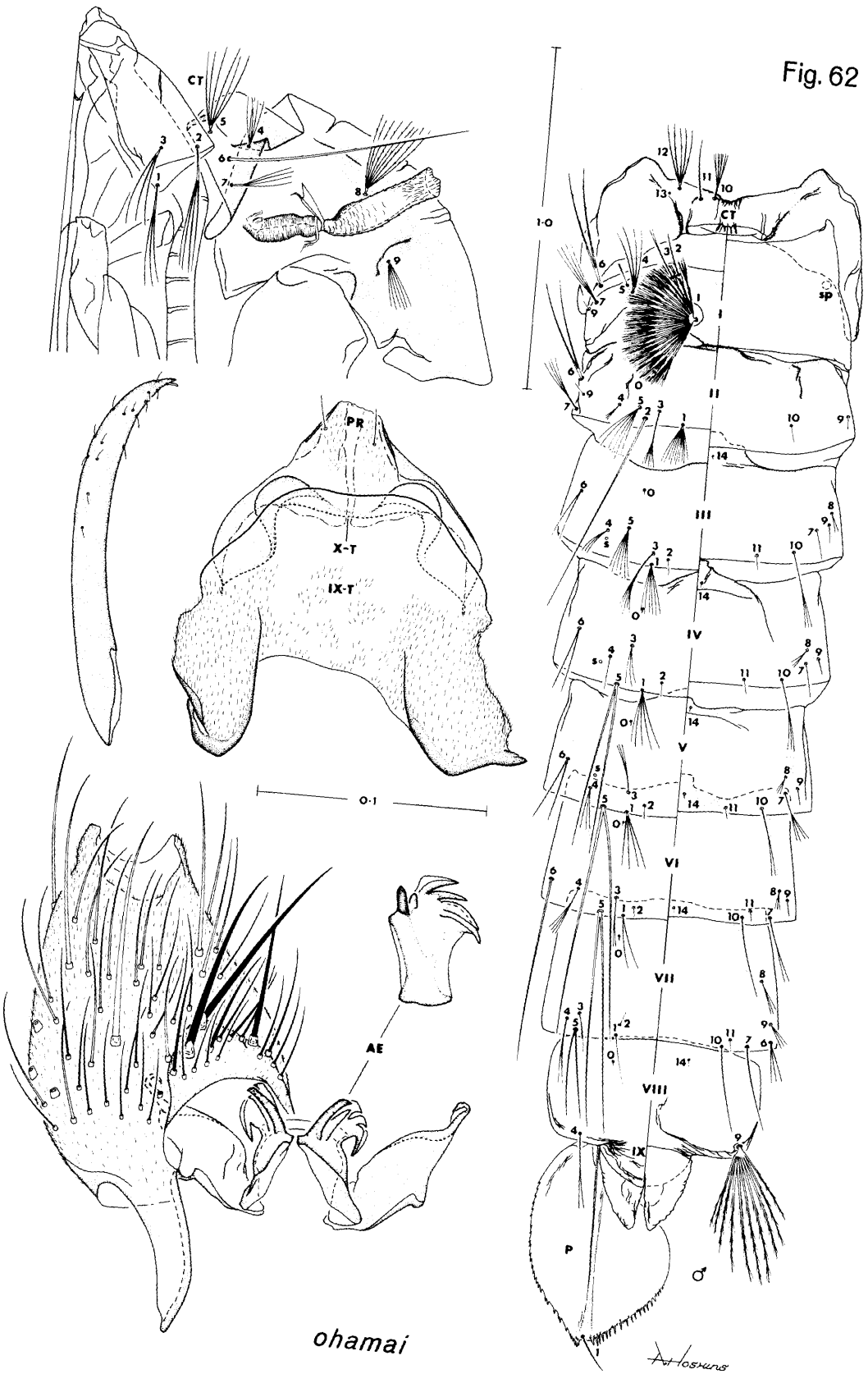
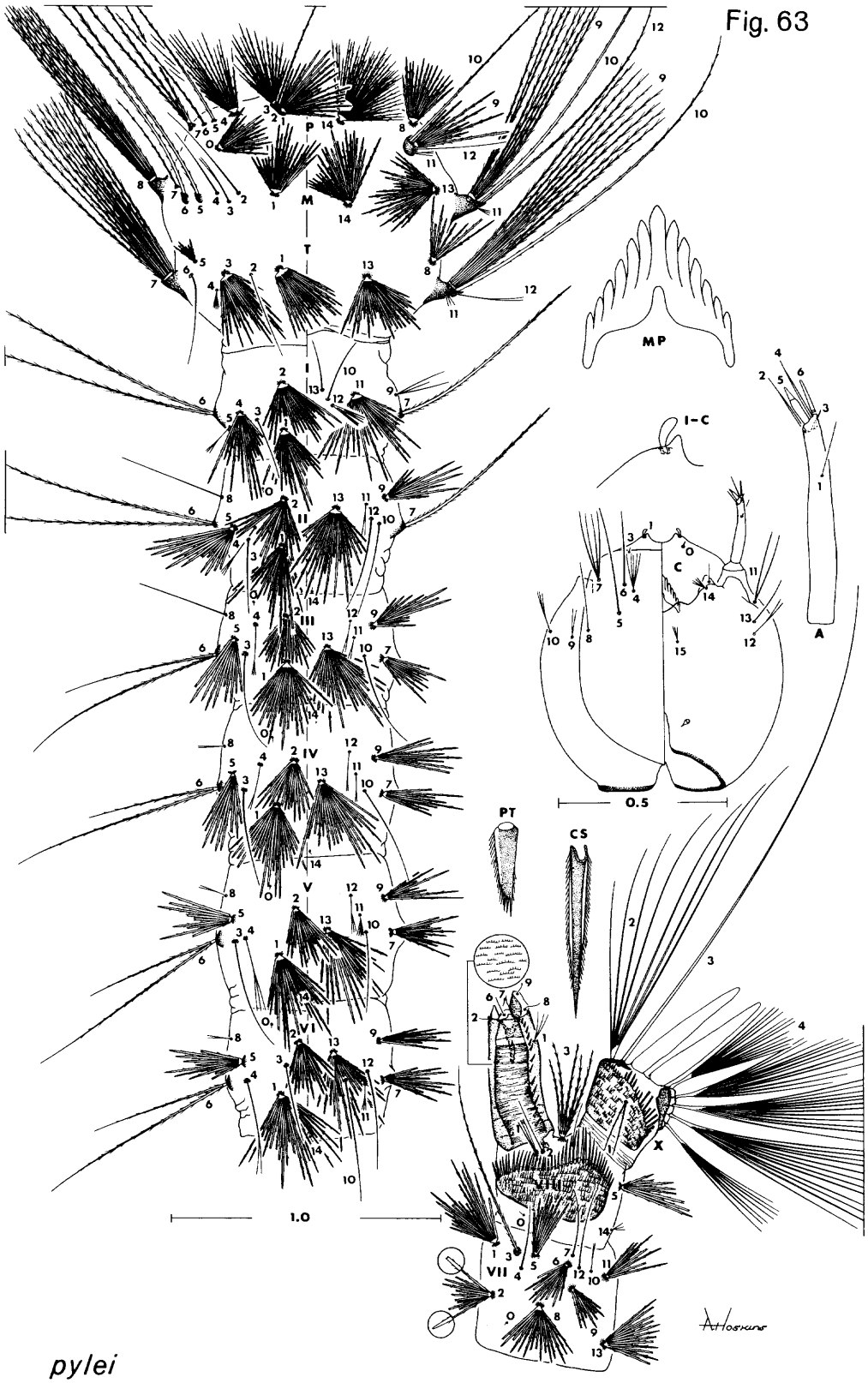
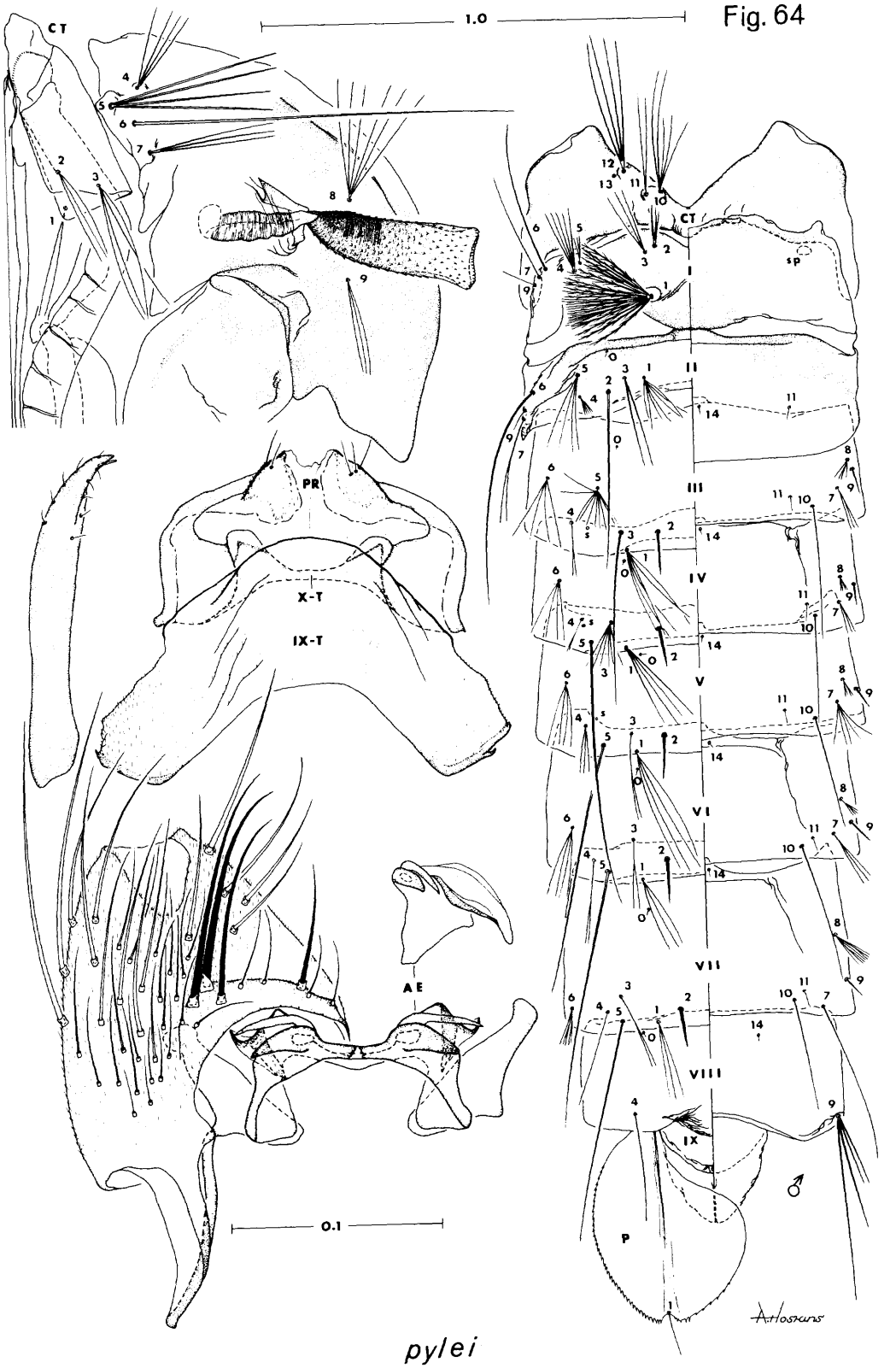


Fig. 63



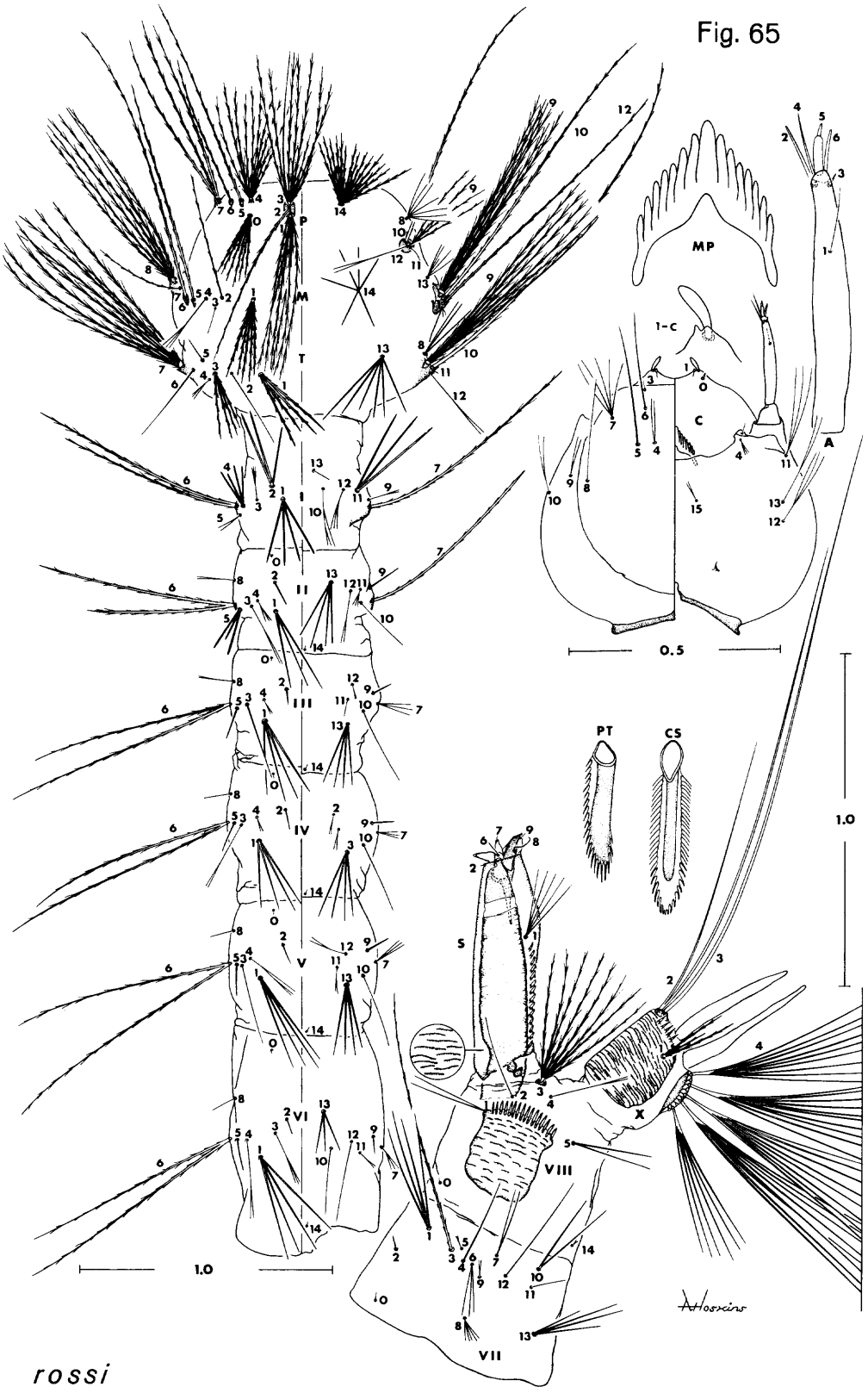
pylei

Fig. 64



pylei

Fig. 65



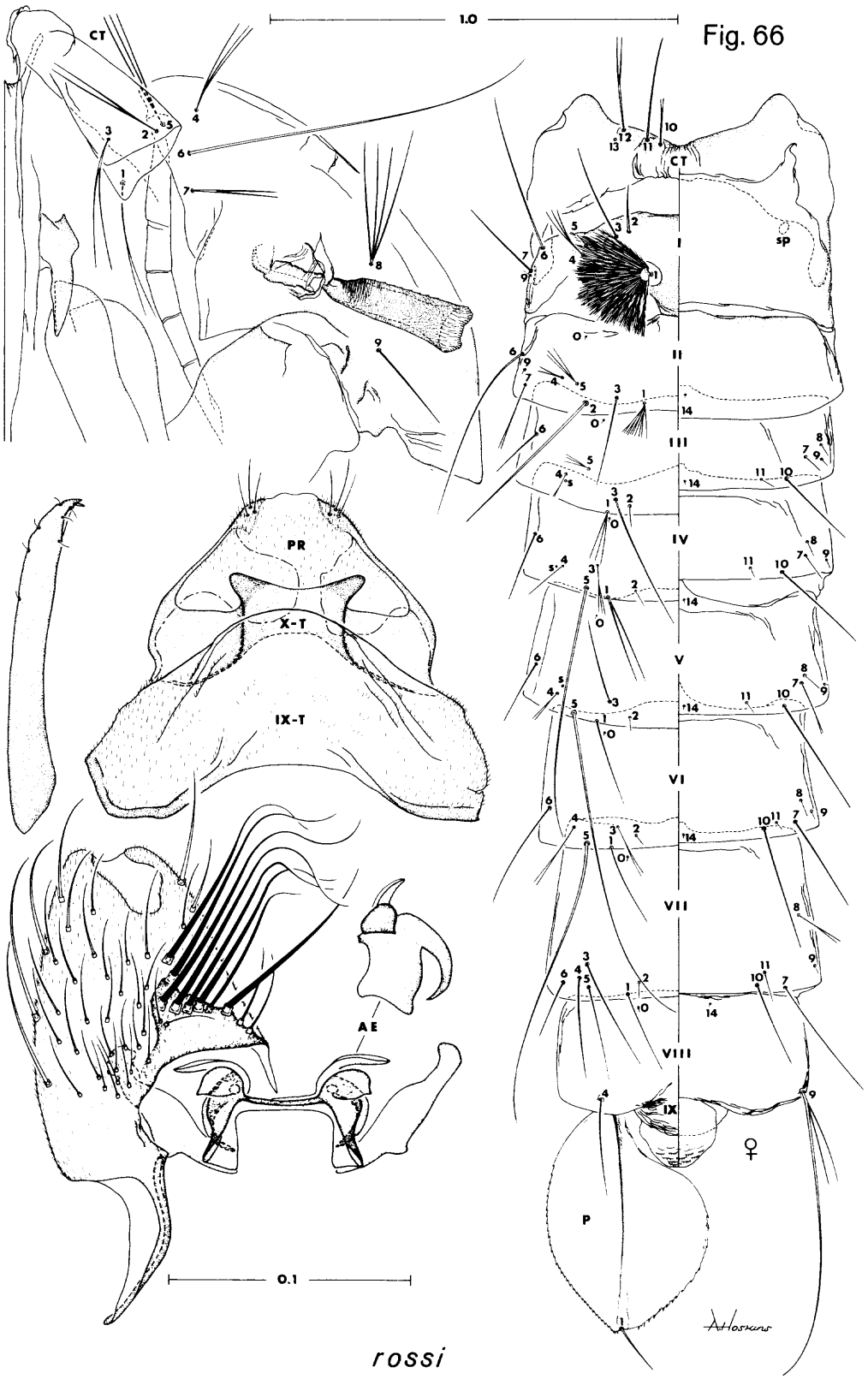


Fig. 66
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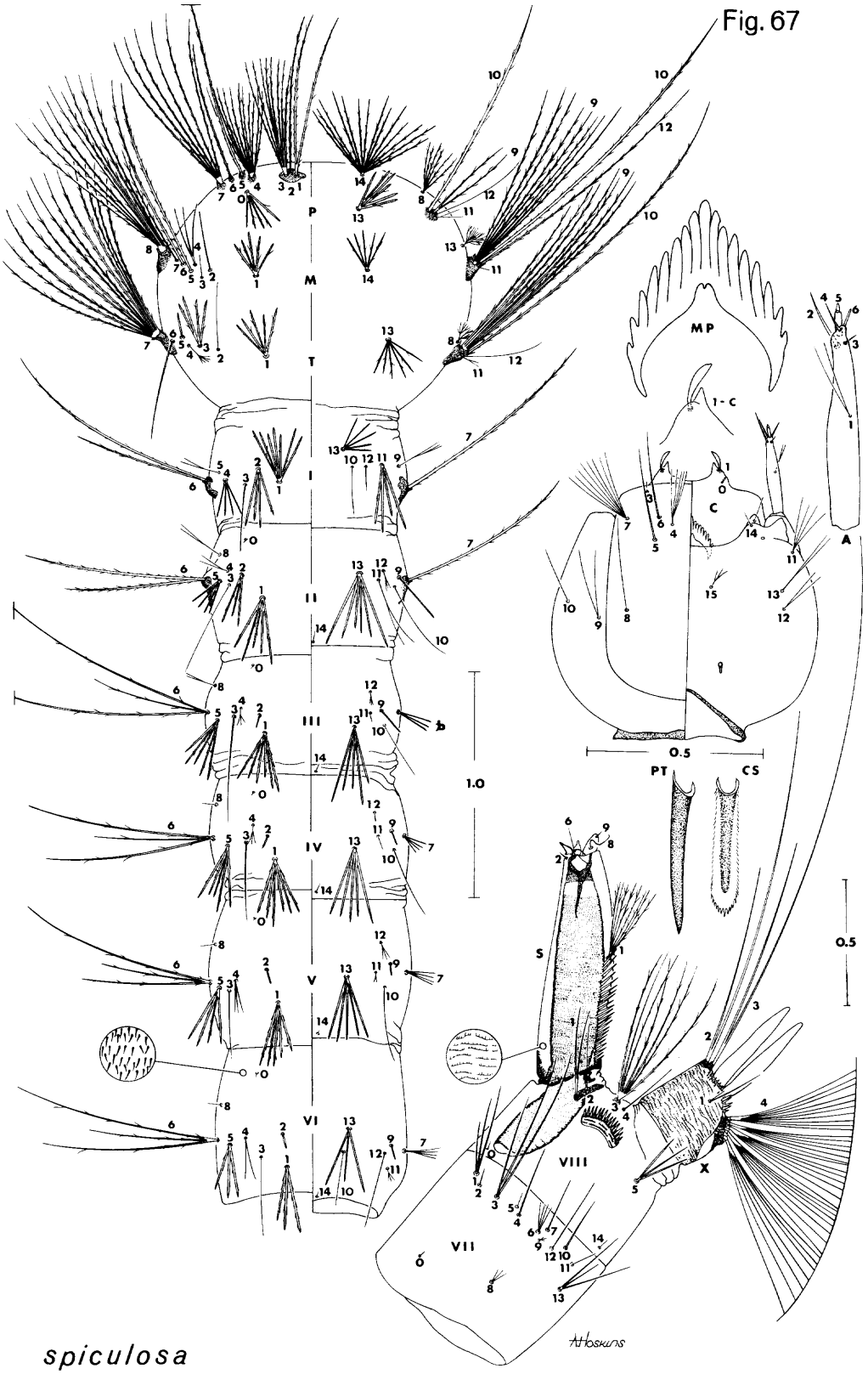
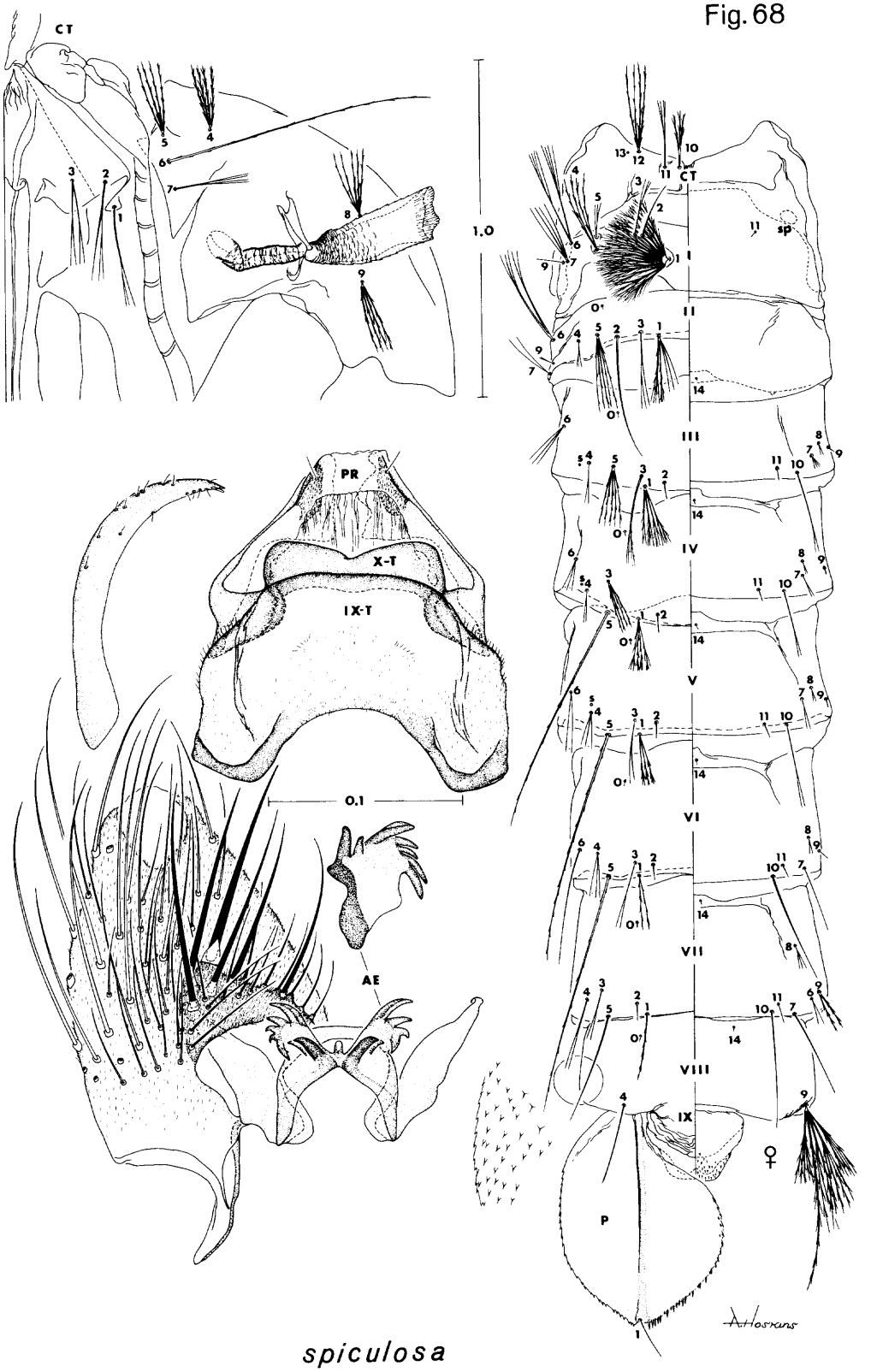
Fig. 67



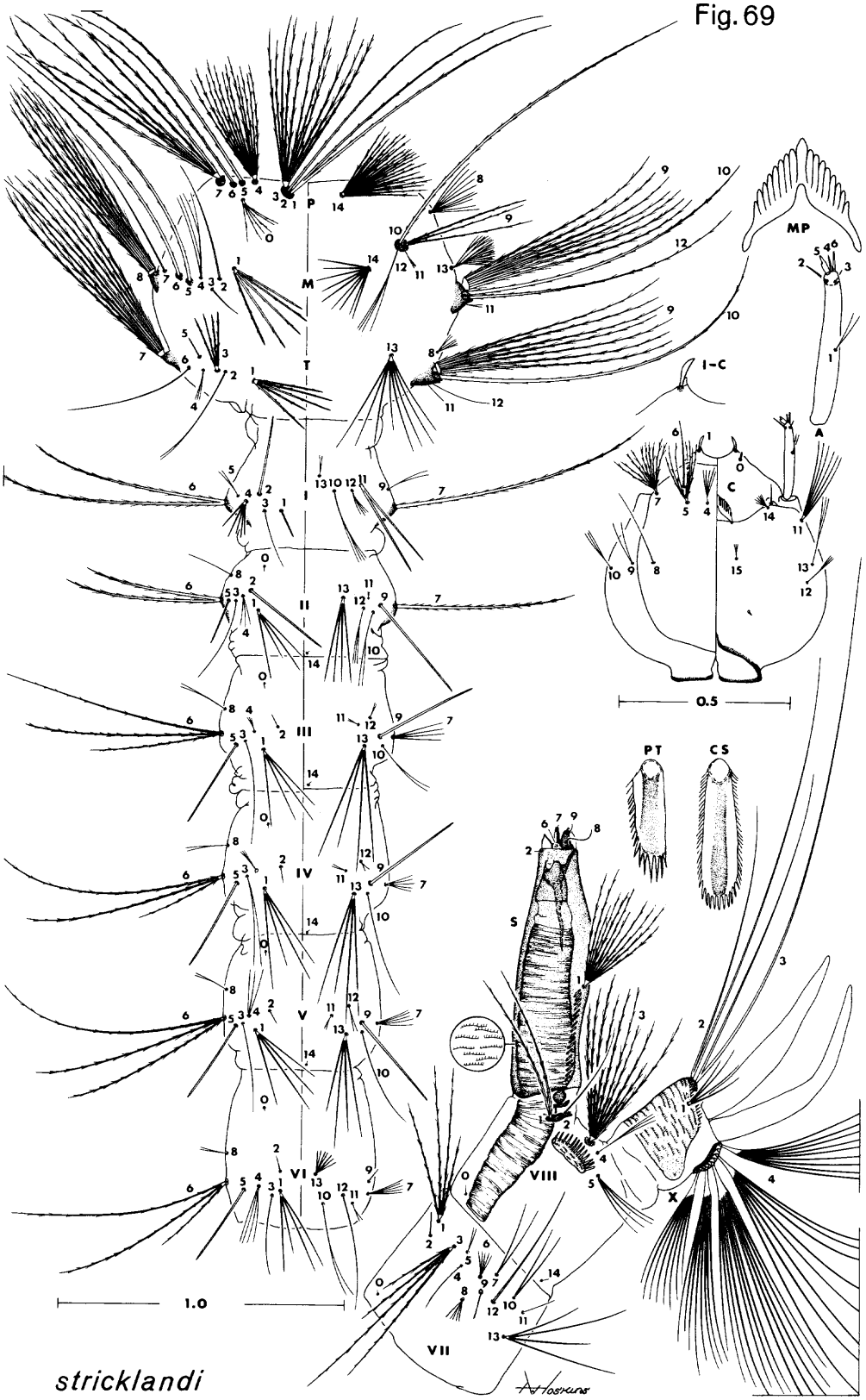
spiculosa

Fig. 68



spiculosa

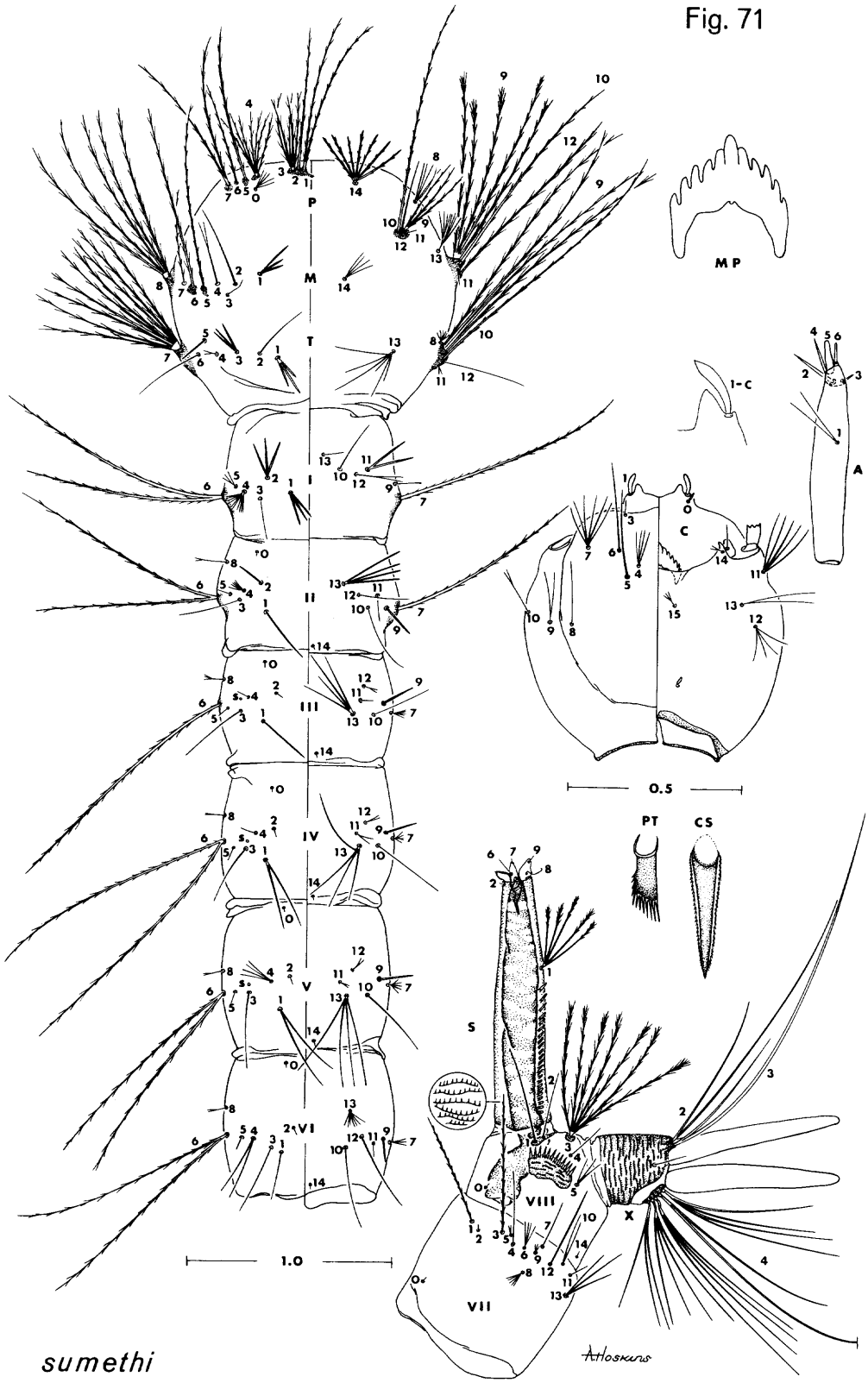
Fig. 69



stricklandi

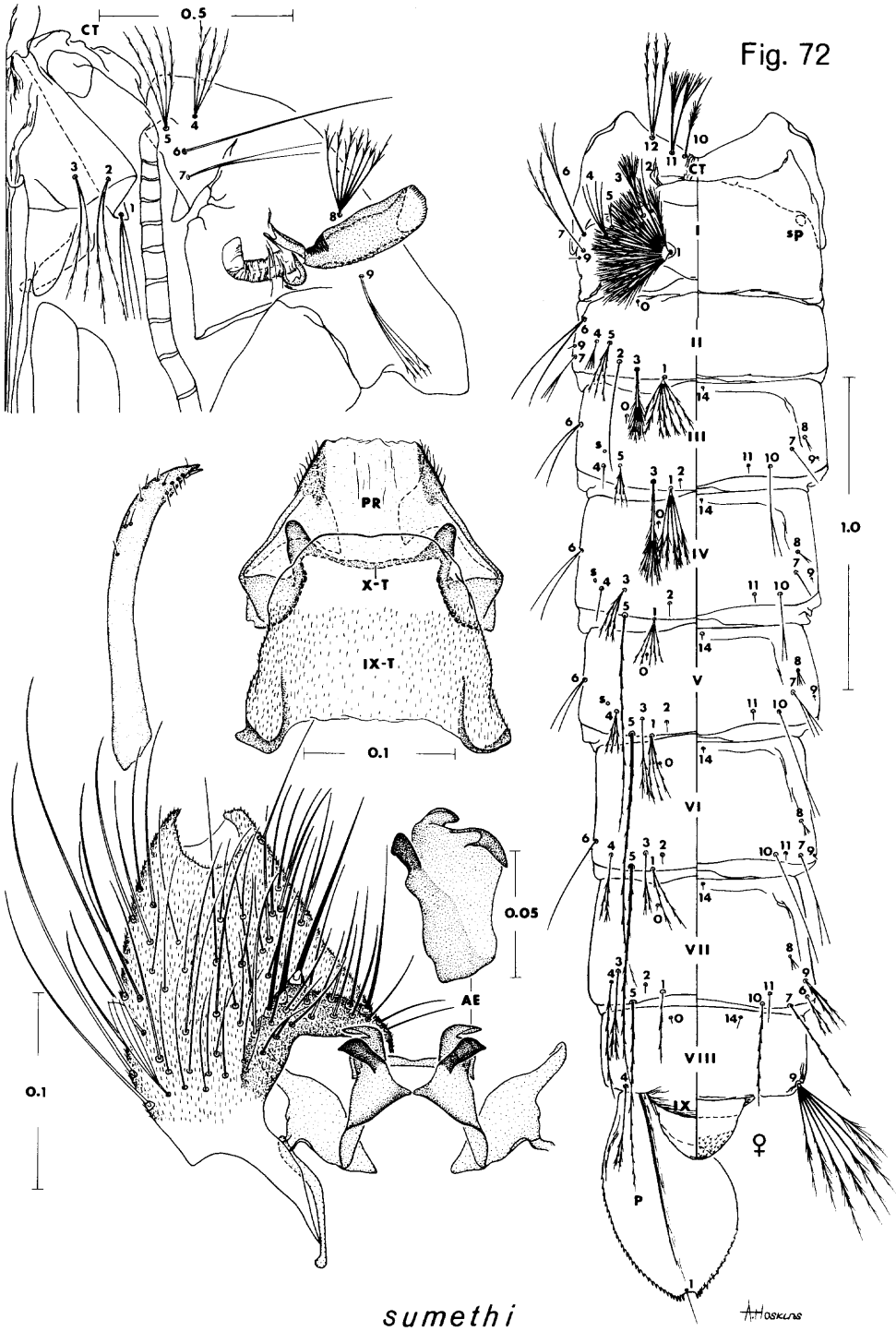
Fig. 70

Fig. 71



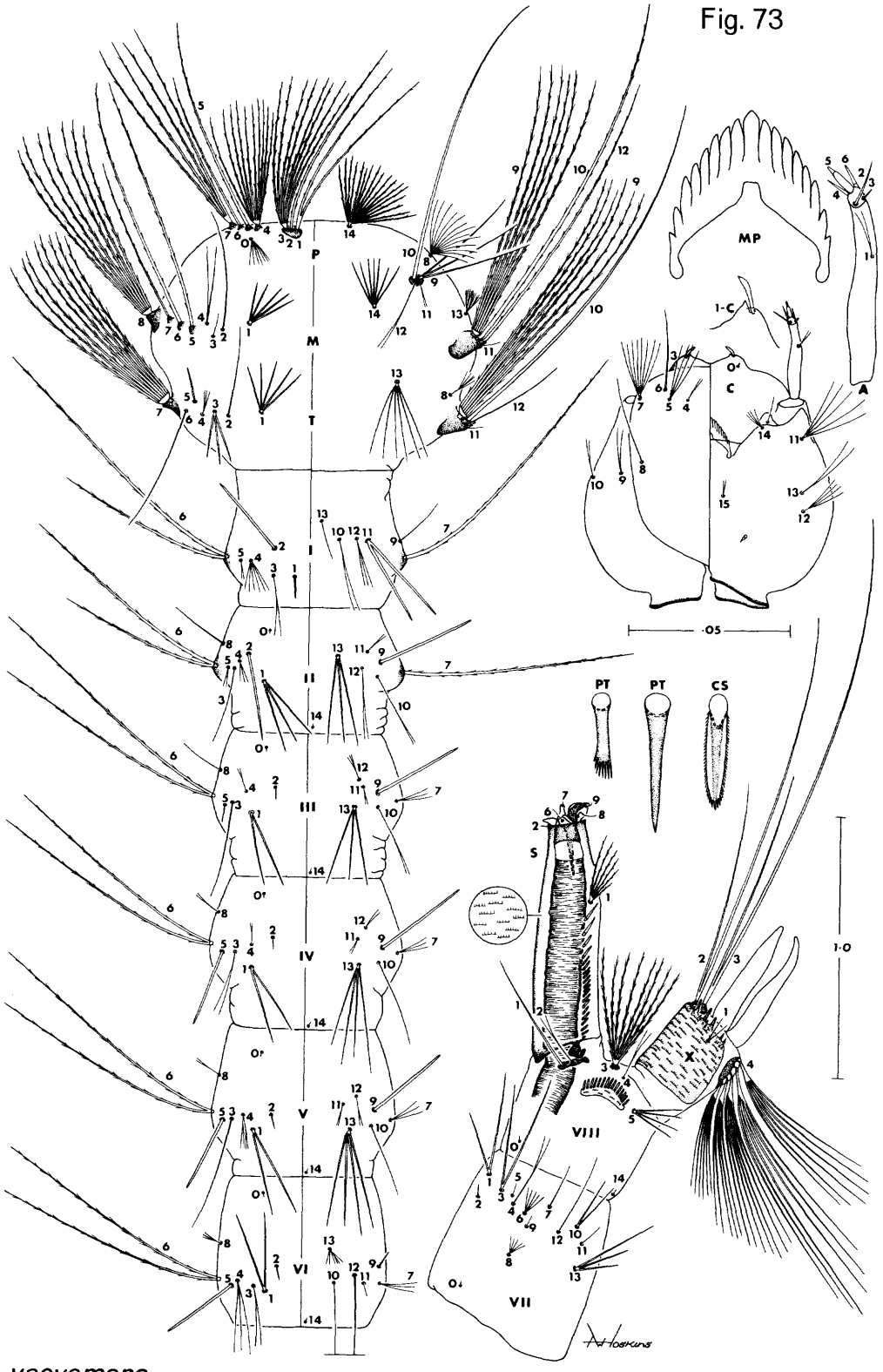
sumethi

Fig. 72



sumethi

Fig. 73



yaeyamana

Fig. 74

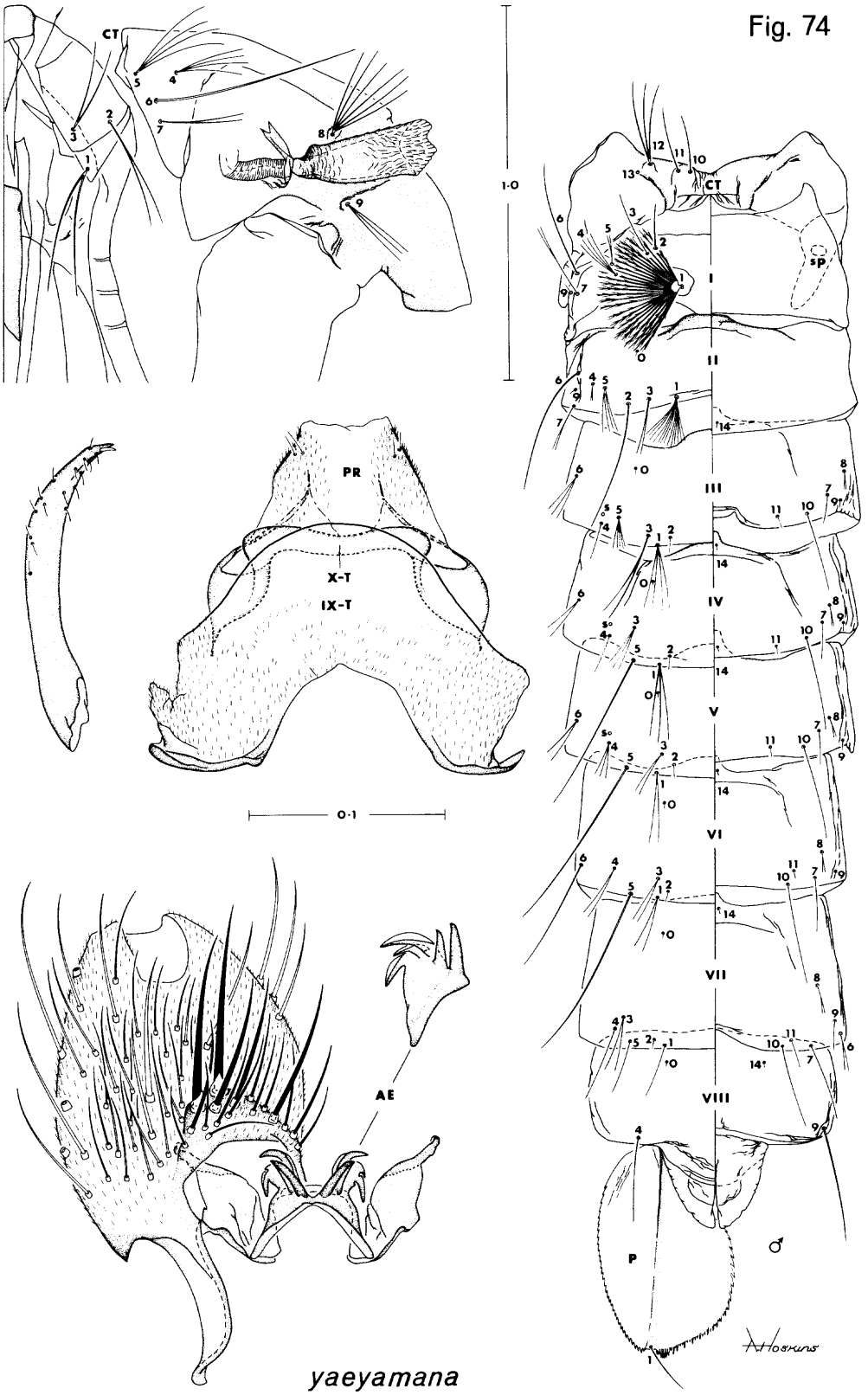
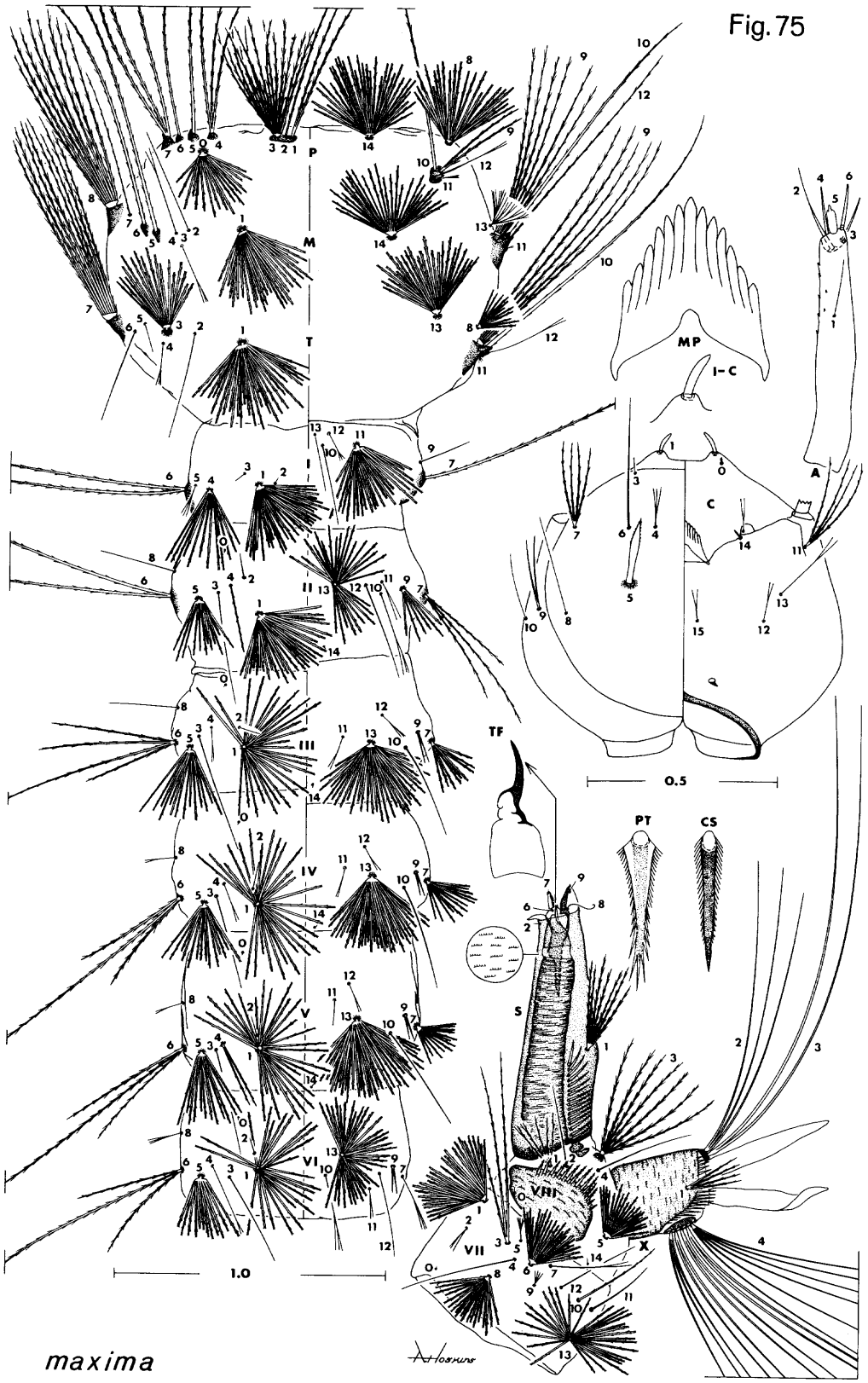


Fig. 75



maxima

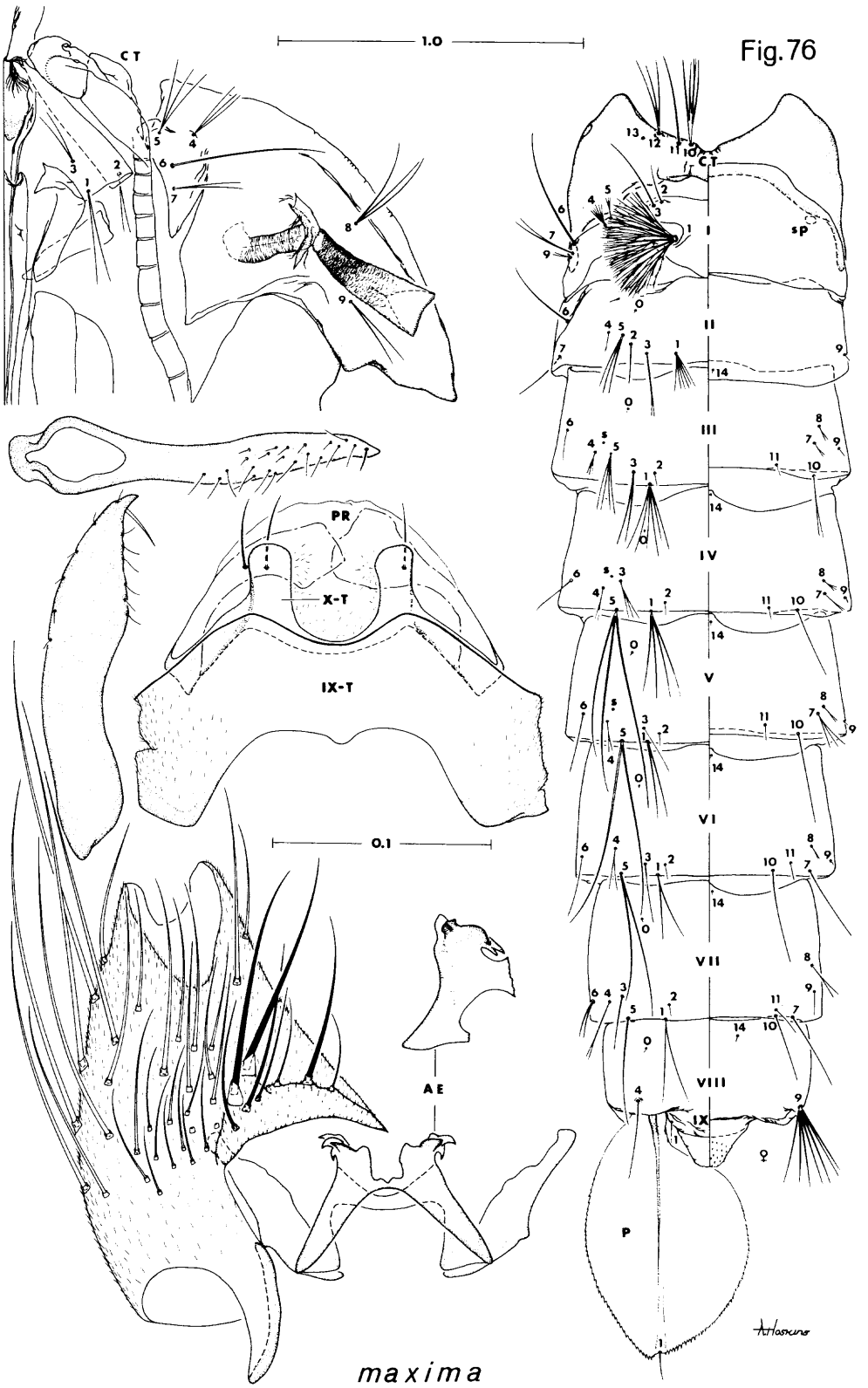


Fig.76
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Valid names are set in roman type, synonyms and nonvalid names are italicized. Italicized pages refer to the primary treatment of the taxon, arabic numerals refer to secondary text references and numbers in parentheses refer to figures.