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URANOTAENIA DIBRUGARHENSIS, A NEW SPECIES IN SUBGENUS *PSEUDOFICALBIA* FROM ASSAM, INDIA

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ABSTRACT. The adult female, adult male, pupa, and larva of *Uranotaenia* (*Pseudoficalbia*) *dibrugarhensis,* new species, are described from the Dibrugarh District of Assam State, India.

KEY WORDS Culicidae, new species, *Uranotaenia,* India

INTRODUCTION

Subgenus *Pseudoficalbia* of genus *Uranotaenia* Lynch Arribalzaga originally was described by Theobald (1911). Peyton (1972) divided and later revised this subgenus into 7 series in Southeast Asia (Peyton 1977). He treated 42 species, of which 29 were revalidated and 13 described as new. The Recondita Series of this subgenus in India is provisionally represented by 6 species. Four species of this series, *Ur. abdita* Peyton, *Ur. enigmatica* Peyton, *Ur. jacksoni* Edwards, and *Ur. luteola* Edwards possess pale-scaled basal tergal bands and uniformly pale or indefinitely marked pleura. Of these, only *Ur. luteola* is reported in India from the Malabar Coast (Peyton 1977). We describe here a new species in the Recondita Series from Assam, India. Adults closely resemble those of *Ur. abdita, Ur. enigmatica, Ur. jacksoni,* and *Ur. luteola.* The morphological terminology of Harbach and Knight (1980) and the abbreviations of generic and subgeneric names of Reinert (2001) are followed in this paper.

TAXONOMIC TREATMENT

Uranotaenia (*Pseudoficalbia*) *dibrugarhensis,* new species

Female. Medium-sized species. *Head:* Proboscis almost equal in length to forefemur; prementum dark brown–scaled; 1 pair of labial basal setae; antennal pedicel dark brown mesally, light yellowish brown laterally, with few minute setae dorsomesally; antenna longer than proboscis, flagellomeres dark-scaled; length of flagellomere 2 about 0.75 flagellomere 1; flagellar whorls each with 6 setae; maxillary palpus slightly longer than flagellomere 1; grayish-brown decumbent scales of vertex show blue-green reflections; many erect forked scales with long, slender basal stems and broadly expanded apices covering most of dorsal surface of vertex; posterior scales lighter in color than anterior ones; ocular margins with 4 setae on each side with 1 pair of stout and 1 pair of minute setae in interocular space; clypeus dark brown–scaled; grayish scales on ocular margin not forming distinct line. *Thorax:* Scutal integument dark brown contrasting with uniformly pale whitish pleura; scales narrow, curved, sparse, dark bronzy brown; paired dorsocentral and supra-alar bare lines present; dorsocentral and supra-alar setae strongly developed; acrostichal setae present; prescutelar space mostly bare, with few scales; mesopostnotum dark brown; paratergite light brown; scutum and scutellum concolorous; scutellum trilobed, with dark brown broad scales, midlobe with 4 and outer lobes with 3 stout dark brown marginal setae; pleura uniformly pale whitish; postspiracular area faintly dark; anteprotonotum with 3 (2 upper and 1 lower) stout setae and distinct patch of light brown scales anteriorly; postpronotum with 1 stout seta and patch of light gray scales on upper posterior region; prespiracular area usually with 1 seta; upper mesepisternum with 1 stout and 4 or 5 delicate setae; mesokatepisternum with 13–15 setae on upper and posterior margins, lower 5 or 6 setae weak and unpigmented; patch of translucent scales covering most of upper 0.5 of mesokatepisternum; prealar area with 1 seta; mesepimeron with 4 or 5 upper setae, 1 well-developed lower seta. *Wing:* Cell R_2 about 0.31 R_{2+3}, shorter than M_2. *Legs:* Coxa, trochanter, and pleura concolorous; forecoxa with light brown scales on upper and grayish translucent scales on lower anterior surface; mid- and hindcoxae with few transparent scales anterolaterally; femora dark brown–scaled dorsally and light grayish ventrally with conspicuous group of setae or spines; posterodorsal margin of forefemur with 11–14 slender setae and 7 or 8 strong setae on distal anteroventral margin; midfemur with 4–7 long delicate setae apicodorsally intermingled with numerous fine semierect setae, 4–8 rigid setae on distal posteroventral margin and 3–5 more delicate setae on distal anteroventral margin; hindfemur with 5 or 6 conspicuous setae on distal posteroventral margin; tibiae and tarsi dark brown–scaled; semierect spinelike setae on tibia and tarsomere 1 of all legs; similar setae also present at distal end of femora, tibiae, and all tarsomeres near joints; hindtarsomere 1 nearly equal to hindtibia; hindtarsomere 4 slightly more than twice length of tarsomere 5. *Abdomen:* Terga brownish black–scaled; terga III–VII with complete, narrow, white basal bands, bands of terga III and IV relatively less distinct; tergum VIII, when extended, with faint, gray-white basal scales and few median

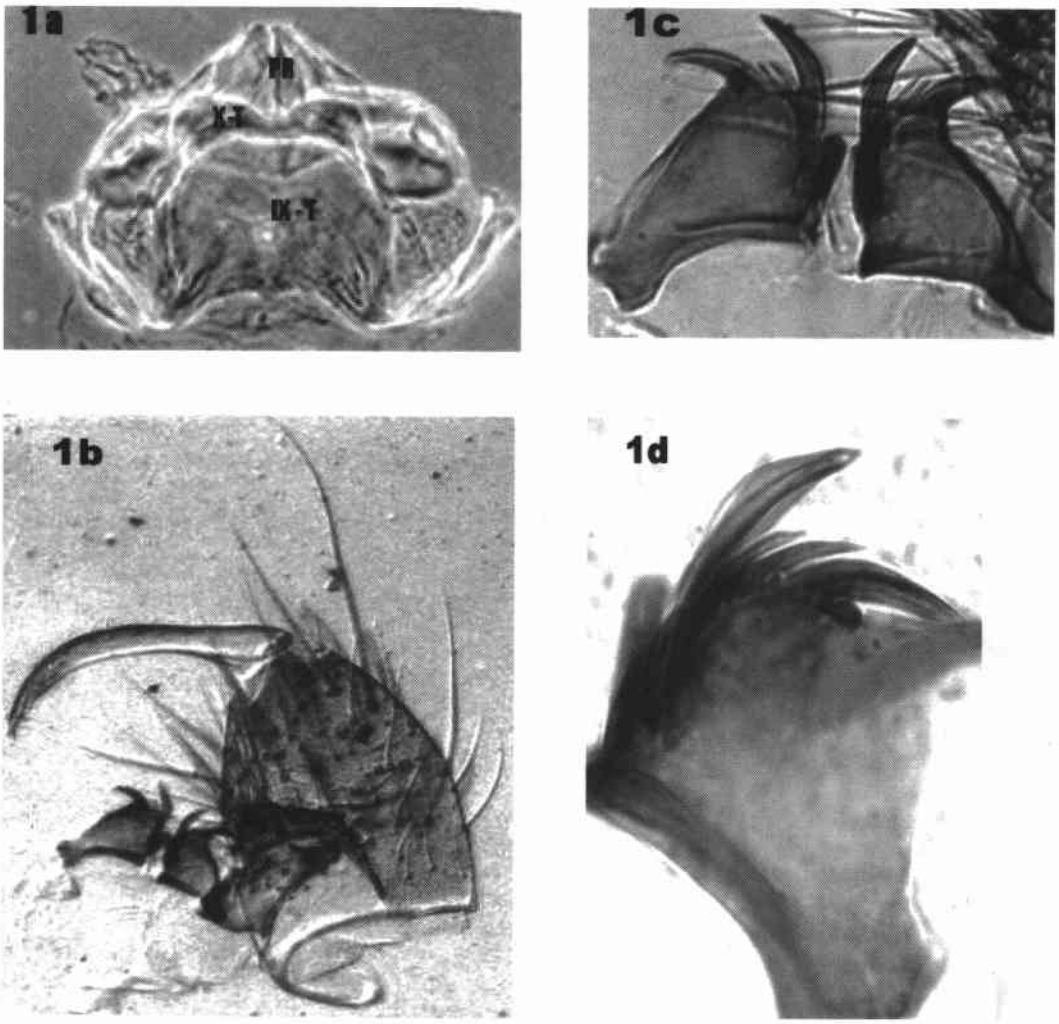

Fig. 1. Male genitalia of *Uranotaenia dibrugarhensis,* sp. nov. (a) Terga IX and X and proctiger. (b) Gonocoxite and aedeagus. (c) Aedeagus. (d) Aedeagal plate at higher magnification (1,000×).

apical light brown scales; sterna creamy white–scaled; bands on terga V–VII less than 0.25 length of each tergum.

Male. Resembles female except for sexual characters and in the following differences. *Head:* Antenna strongly plumose, just equal to proboscis in length; 2 pairs of labial basal setae; flagellomeres 12 and 13 long, 12 longer. *Abdomen:* Tergal band of segments IV–VII usually more conspicuous; tergum III usually showing faint indication of pale band; sternum VIII with dark brown scales covering more than apical half. *Genitalia:* Tergum IX with broad shallow basal emargination, broadly rounded at apical margin; tergum X complete with weak sclerotization producing 2 short, broad tergolateral lobes that project beyond apical margin of tergum IX; proctiger with 1 cercal seta on both sides (Fig. 1a); tergomesal surface of gonocoxite with several long slender setae and few weak setae basally; basomesal lobe of gonocoxite with 2 stout, long apical setae on raised process and 4 similar setae basal to process; 6–9 short (1 or 2 strong, others weak) setae further basad, 1 long, stout and 2–4 weak setae on sternal margin; gonostylus slightly tapered in basal half, curved, tapering to pointed apex; spiniform small, stout, acute (Fig. 1b); each aedeagal plate with 2 strong, grooved, curved, and apicolaterally directed tergomesal teeth (Fig. 1c); 2 small median teeth with pointed apices arise basolateral to large more tergal tooth, in high magnification 1 median tooth more sharply pointed, other relatively stouter and grooved (Fig. 1d).

Pupa. Description based on 8 pupal exuviae. Integument light yellowish brown, darker in intersegmental areas of abdominal segments I–VII; integument of abdominal segments III–VII with spicules over median, dorsal, ventral, and lateral surfaces; many setae with stout primary branches often split

into several secondary and lateral branches. *Cephalothorax:* Seta 1-CT with 2 primary branches (b) beyond basal 0.5; 2-CT with 2 or 3 b beyond basal 0.5; 3-CT 2 or 3 b; 4-CT 2–5 b; 5-CT 3 or 4 b; 6-CT single, long, strongly developed, well separated from 7-CT; 8-CT 3–5 b; 9-CT 3 or 4 b beyond base. *Trumpet:* Light yellowish brown with small dark spot on basoanterior area; with indistinct tracheoid on anterobasal 0.2; slightly expanded distally. *Metanotum:* Seta 10-CT stout in basal half, single or split beyond basal half; 11-CT similar in shape to 10-CT but more branched distally; 12-CT 3 b, stout, barbed. *Abdomen:* Seta 1-I fan-shaped with 22–33 strong branches, each branch with numerous dendritic branches; 2-I single, strong, sharply pointed; 3-I single, weakly brush-tipped; 4-I 2 or 3 b; 5-I single, short and forked (2-branched); 6-I double; 7-I 2 or 3 b from basal 0.5; 9-I single, minute; seta 1-II 4–7 b; 2-II single, longer than segment III; 3-II brush-tipped; 4-II 4 or 5 b; 6-II double; 7-II single or double beyond base; 9-II small, single; seta 1-III 3 b; seta 2-III-VII single, short, spinelike; seta 3-III stout, single, distal half split into 2 primary and many secondary branches; 5-III 5 b; 6-III-V double; 7-III short, 2–4 b; 8-III short, 3 or 4 b beyond base; 9-III single, minute; 10-III single, 2 or 4 b distally; 11-III-VI single, short; seta 1-IV and 3-IV 3 or 4 b; 4-IV 2 or 3 b distally; 5-IV single, strong, about 1.5 length of segment V; 6-IV short, 2 or 4 b; 7-IV 2 or 4 b beyond base; 8-IV 2 or 3 b distally; 9-IV minute, single; 10-IV 2–4 b distally; seta 1-V 2 or 3 b; 3-V 2 b distally; 4-V 2 or 3 b beyond base; 5-V single, strongly developed, length almost equal to combined length of abdominal segment V and VI; seta 6-V 2 or 3 b; seta 7-V 2 or 3 b beyond base; seta 8-V short, single to 3 b distally; seta 9-V single, minute; seta 1-VI single to 2 b; seta 3-VI single or double; seta 4-VI 2 or 3 b beyond base; seta 5-VI single, strongly developed, length slightly more than combined length of segments VI and VII; 6-VI single, much longer and stouter than 6-V; 7-VI single; 8-VI short with 2–4 b distally; 9-VI minute, single; 10-VI single; setae 1,3,4-VII single; 5-VII single, length less than segment VIII; 6-VII short, 2–4 b distally, inserted ventrally; 7-VII single; 8-VII 2–4 b beyond base; 9-VII 2 or 3 b; 10-VII single; seta 4-VIII single; 9-VIII with 4–6 stout, barbed branches, 1 or 2 median branches much longer than lateral branches (Fig. 2a); seta 1-IX absent. *Paddle:* Midrib pale and yellowish brown; outer margin with short sawtoothed spicules from basal 0.25 to apex; inner margin from basal 0.5 with 10–14 stout, straight, widely spaced, pointed spines, each spine well anchored within paddle margin (Fig. 2b), a few smaller spines present towards base; inner margin wider than outer margin; seta 1-P present; 2-P absent.

Larva. Description based on 1 full-grown larva and 4 exuviae. *Head:* Orange-brown; labral process prominent with distinct angular apicomesal projection on basomesal side of seta 1-C; seta 1-C narrow at base, expanded apically; 4-C 6–8 b, delicate; 5, 6-C single, simple; 7-C 7–11 b; 8,9-C 1 or 2 b; 10-C 2 or 3 b; 11-C 4–7 b; 12-C 2–4 b; 13-C double; 14-C single; dorsomentum with 17 teeth; seta 1-A weak, double. *Thorax:* Seta 0-P stellate with 5 or 6 acutely pointed branches; 1,2-P single or double; 3-P 4–6 b; 4-P 5–8 b; 5,6-P single; 7-P 4 or 5 b; all stout and barbed; 14-P stellate with 8–12 acutely pointed barbed branches; seta 1-M stellate with 4 or 5 sharp, acutely pointed barbed branches; 14-M stellate, 6–14 b, stout; seta 1-T stellate with 2–5 sharp acutely pointed branches; 3-T stellate, 2–4 b, lightly barbed; 5-T single, stout, acutely pointed. *Abdomen:* Seta 1-I stellate with 4–6 barbed and acutely pointed branches, posterior branches shorter than anterior branches; seta 11-I 2 or 3 b, stout; 1-II stellate, 2–5 b; 5-II stellate with 2 or 3 short, stiff, acutely pointed branches; 9-II single, stout, sharply pointed, darkly pigmented, gradually becoming shorter and less pigmented on each succeeding segment from II to VI (Fig. 2c); seta 13-I single, stiff, pointed; 13-II 3 b; 13-III stout, darkly pigmented, 2 b, barbed; 13-IV,V 3 b, stout, barbed; 13-VI stellate with 4–7 short, stiff, and acutely pointed branches; 13-VII stellate, 2–6 b; seta 5-III-VI stellate with 2 or 3 short, stiff branches, shorter by more than half length of seta 1 (Fig. 2d); seta 1-VII stout, barbed, 2 or 3 b; seta 1-VIII stout, 2 b, inserted on long narrow sclerotized plate with seta 2-VIII; 3-VIII 6 or 7 b, strong, barbed; 5-VIII triple, stellate, acutely pointed; comb scales 13–16, with spiculate fringe on lateral and apical margins, on small, weakly sclerotized, apically rounded plate. *Segment X:* Saddle complete, light yellowish brown with numerous short, sharp spicules on posterior margin; seta 1-X single, strong with 1 weak basolateral branch; 2,3-X double. *Siphon:* Yellowish; acus well developed; 21–26 pecten teeth reach to about 0.5 length of siphon, all long, narrow, evenly spaced, distal 1–4 teeth simple, other teeth apically fringed; seta 1-S 6–9 b, strong, conspicuously barbed, inserted beyond distal pecten tooth; siphonal index about 2.5.

TAXONOMIC DISCUSSION

The adults of *Ur. dibrugarhensis* are similar to those of *Ur. abdita, Ur. enigmatica, Ur. jacksoni,* and *Ur. luteola* in having pale-scaled basal tergal bands with uniformly pale or indefinitely marked pleura. However, *Ur. dibrugarhensis* differs from *Ur. abdita* and *Ur. enigmatica* in having the pale whitish pleura contrasting with the dark brown scutum and a distinct patch of light brown scales on the antepronotum and usually only 1 prespiracular seta, whereas *Ur. abdita* and *Ur. enigmatica* have only a line of light brown scales on the antepronotum and usually 2 setae on the prespiracular area. Presence of delicate opaque setae on the anterior margin of the mesokatepisternum is a diagnostic character of *Ur. jacksoni. Uranotaenia luteola* Edwards differs

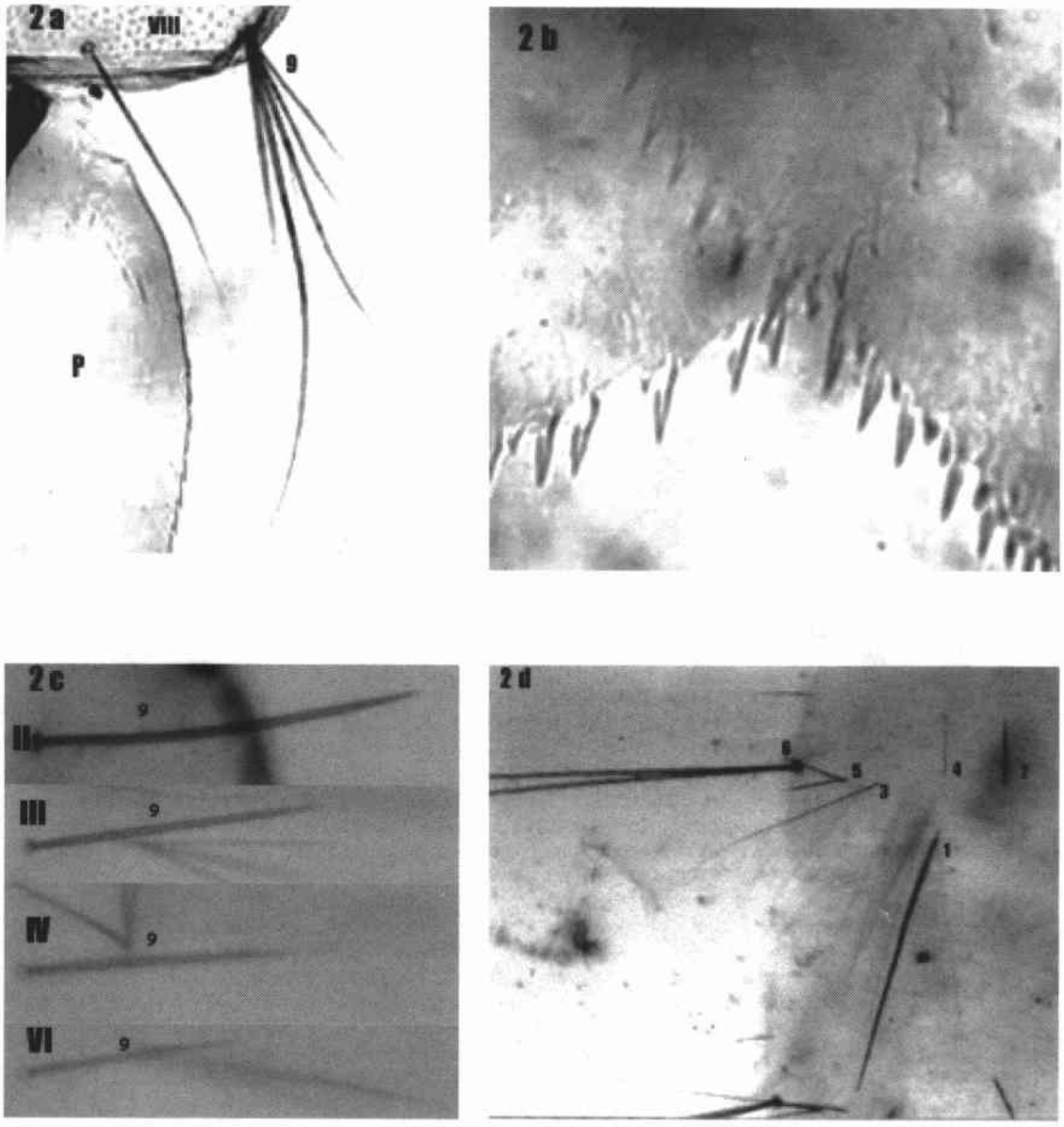

Fig. 2. *Uranotaenia dibrugarhensis,* sp. nov. (a) Seta 9 on abdominal segment VIII of the pupa. (b) Inner margin of pupal paddle. (c) Seta 9 on various abdominal segments of the larva. (d) Setal arrangement on the dorsal side of abdominal segment III of the larva.

from similar species in having a distinct narrow basal band of pale scales on abdominal tergum II and hindtarsomere 4 more than 3 times longer than tarsomere 5. In comparison, hindtarsomere 4 is less than 2.5 times the length of tarsomere 5 and the pale basal band on tergum II is absent in *Ur. abdita, Ur. enigmatica, Ur. jacksoni,* and *Ur. dibrugarhensis.* The aedeagal plates of the male genitalia of *Ur. dibrugarhensis* differ from those of similar species in having 2 smaller median teeth with pointed apices arising basolaterad of the more tergal tooth. In 5 males examined, 2 median teeth were present. In *Ur. abdita,* the number of median teeth varies from 1 to 3 and they are smaller, short and rounded apically, and arise between the tergal- and sternalmost teeth rather than basolaterally. In *Ur. enigmatica,* even though the middle tooth, with a pointed apex, arises basolateral to the slightly larger more tergal tooth, *Ur. enigmatica* has only 1 middle tooth, which is nearly equal in size to the other 2 teeth. *Uranotaenia jacksoni* has tergum IX slightly emarginated apicomesally, the number of strong, curved median teeth of aedeagal plates varies from 2 to 4, and its proctiger usually has 2 or 3 (1–3) cercal setae on each

side. *Uranotaenia luteola* has 3 or 4 median teeth on each aedeagal plate. These teeth are curved, very broad, leaflike, and equal in size to the 2 subapical tergomesal teeth. Further, its gonostylus is more slender and curved on distal half.

The pupa of *Ur. dibrugarhensis* is closer to that of *Ur. abdita, Ur. spiculosa* Peyton and Rattanarithikul, and *Ur. koli* Peyton and Klein of Recondita Series. Although the presence of widely spaced stout and straight spicules on the inner margin of the paddle of *Ur. dibrugarhensis* is similar to that of *Ur. koli,* seta 9-VIII with 1 or 2 median branches much longer (more than 2 times) than the lateral branches is similar to *Ur. abdita* and *Ur. spiculosa.* Furthermore, the position of seta 2-VII in *Ur. dibrugarhensis* is similar to that of *Ur. abdita* and *Ur. spiculosa.* Although this seta is closer and inserted lateral to seta 1 towards the middorsal line in *Ur. koli,* it is well separated and inserted between seta 1 and 5 in *Ur. abdita, Ur. spiculosa,* and *Ur. dibrugarhensis.* Both seta 9-VIII and the inner margin of the paddle may be diagnostic for the pupa of *Ur. dibrugarhensis.*

The larva of *Ur. dibrugarhensis* is distinct in having abdominal seta 5 short, stiff, acutely pointed, and usually 2-branched. In *Ur. abdita* and *Ur. enigmatica,* seta 5 on segments III–VI is similar to seta 1, that is, stellate with 3 strong and stout branches. The species of the Recondita Series with a complete saddle usually have seta 5-III-VI either single (weak or stout) and spinelike, or stellate with stout branches, which is not the case in *Ur. dibrugarhensis.* Seta 9 is single, stout, acutely pointed on segments II, and becomes progressively shorter, weaker, and less pigmented on segments III–VI in *Ur. dibrugarhensis,* similar to that of *Ur. sumethi* Peyton and Rattanarithikul, also of the Recondita Series. However, in *Ur. sumethi,* seta 5-III-VI is single and minute. Finally, unlike *Ur. jacksoni, Ur. enigmatica* has all pecten teeth long, simple, and spinelike and the saddle is complete. The immature stages of *Ur. luteola* are unknown.

TYPE SERIES

The holotype male (A-1847), with associated larval (l-907) and pupal (p-892) exuviae mounted on 2 separate microscope slides, and the allotype female (A-1848) with associated larval (l-908) and pupal (p-893) exuviae mounted on the same slide, are deposited in the Natural History Museum, London. They bear the following collection data: INDIA. North-east India. Assam. Dibrugarh District. Soraipung. Dihing reserve forest (152 meters above mean sea level). 26th October, 2002. Collected as larva from a rain fed crab hole. Coll. Dipak Dutta.

Three paratype males (A-1849, A-1850, and A-1851) and 1 paratype female (A-1853) with associated larval (l-909, l-910, l-911, and l-912), pupal (p-894, p-895, p-896, and p-897) exuviae, dissected genitalia of 2 paratype males (G-575 a and G-575 b, and G-576 a and G-576 b), 1 paratype male (A-1852) with dissected genitalia mounted on a slide (G-577), and 1 slide-mounted 4th-stage larva (L-682) also are deposited in the Natural History Museum, London. One male (A-1854) with dissected genitalia (G-578 a and G-578 b) and 2 females (A-1855 and A-1856) with their associated larval (l-913, l-914, and l-915) and pupal (p-898, p-899, and p-900) exuviae are kept in the museum of the Regional Medical Research Centre (RMRC), Dibrugarh, India.

BIONOMICS

Specimens of *Ur. dibrugarhensis* were collected on 1 occasion during ongoing bioecological studies on *Anopheles (Cellia) dirus* Peyton and Harrison in the Soraipung forest range of the Dihing reserve forest. The white 2nd- to 3rd-stage larvae with contrasting black setae, resembling larvae of *Aedes,* were collected in association with the larvae of *Culex (Lophoceraomyia) mammalifer* (Leicester), from a rainwater-filled, completely shaded crab hole in the forest. In the laboratory, the 2nd- and 3rd-stage larvae took about 25–28 days to reach the adult stage.

ETYMOLOGY

The species is named after the Dibrugarh District, Assam, India, where the type locality is located.

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