

## DESCRIPTION OF A NEW SPECIES OF *Aedes* (*Rhinoskusea*) FROM SOUTH INDIA

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**ABSTRACT.** The adults, male and female genitalia, pupa and larva of *Aedes* (*Rhinoskusea*) *portonovoensis* n. sp. from southern India are described and illustrated. The new species is compared to closely related species.

### INTRODUCTION

Recently Reinert (1976) had reviewed the subgenus *Rhinoskusea* Edwards of the genus *Aedes* Meigen which consists of only three species having very similar habitus, viz. *Ae.* (*Rhi.*) *longirostris* (Leicester, 1908), *Ae.* (*Rhi.*) *pillaii* Mattingly, 1958 and *Ae.* (*Rhi.*) *wardi* Reinert, 1976. Of these, only the first species was recorded from Andaman Islands of India (Barraud 1934). We have added one new species, *Ae.* (*Rhi.*) *portonovoensis*, to this subgenus which was collected from the mangrove forest of the eastern coast of south India. This species is very similar to *Ae. wardi*. The distinguishing characters of both the species are discussed.

Nomenclature and chaetotaxy used follow Harbach and Knight (1980, 1982) and abbreviations of generic and subgeneric names are from Reinert (1975) and Bickley and Ward (1989). In immature descriptions the range of setal branching number is followed by mode in parenthesis.

#### *Aedes* (*Rhinoskusea*) *portonovoensis* n. sp.

**Female. Head:** Antenna dark brown, 0.76-0.80 (mean = 0.78) length of proboscis, pedicel light brown with short fine setae; clypeus dark brown, bare; maxillary palpus dark brown-scaled, about 0.08 length of proboscis; proboscis dark brown-scaled, long, about 1.08 length of forefemur; eyes contiguous, a pair of long dark brown interocular setae, 5,6 well developed ocular setae; vertex with broad, dark brown decumbent scales, postgena with a patch of broad pale scales, a narrow line of pale scales around the eye mar-

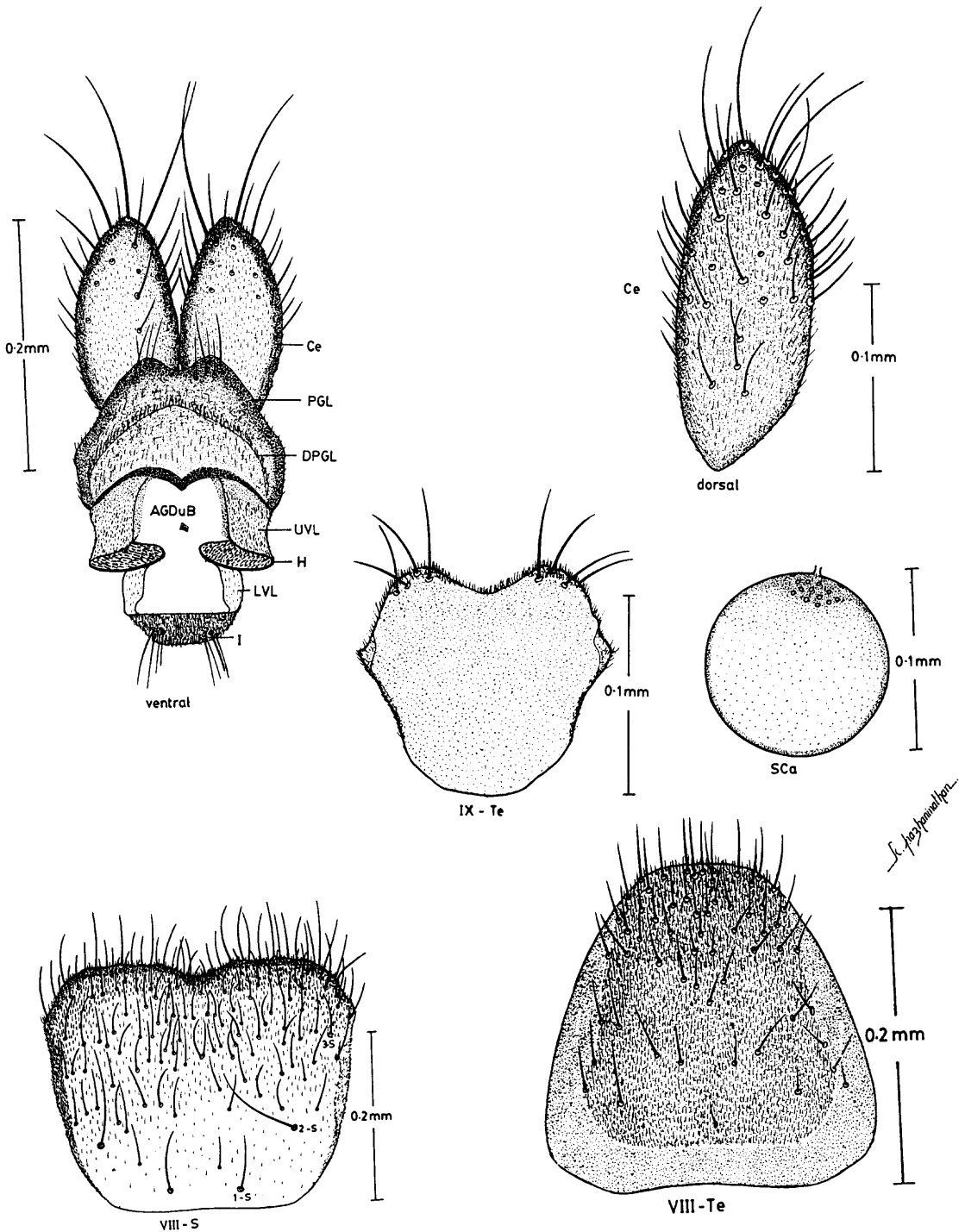
gin. Occiput with few erect, short, dark, forked scales. **Thorax:** Scutal integument dark brown, scutum covered with narrow, curved, dark brown scales, a very small patch of broad dark scales on median anterior promontory, prescutellar area with few narrow, curved, dark brown scales; scutellum with a patch of broad, dark brown scales on each lobe, 5,6 long and 2-4 short setae on median lobe and 3,4 long and 2,3 short setae on lateral lobes; scutum with well developed dark brown setae on anterior promontory, acrostichal, dorsocentral, scutal fossal, supraalar, antealar, posterior median scutal and parascutellum areas; paratergite narrow, bare; pleural integument brown, without scales except a small patch of broad, pale brown scales on lower mesokatepisternum, pleural setae dark brown, on following areas: 7-11 anteprenotal, 1,2 postprenotal, 2-4 proepisternal, 1-3 postspiracular, 1-3 prealar, 1-4 upper and 2,3 long and 2-4 short lower mesokatepisternal, 2-5 upper mesepimeral, lower mesepimeral setae absent. **Legs:** Coxae I-III each with a patch of pale brown scales and numerous setae; trochanters I-III each with pale brown scales and few short, fine, brown setae; femora I-III each blackish brown-scaled with some pale-scaled area ventrally, III with pale-scaled area more basally; tibiae I-III and tarsi I-III each with blackish-brown scales, tarsus III with tarsomere I slightly longer than tibia III; posttarsi I-III each with 2 equal, simple ungues. **Wing:** Veins with dark squame and plume scales; cell  $R_2$  about the same length of  $R_{2+3}$ ; alula with narrow, dark scales; upper calypter with several, slender, long setae. **Halter:** Pedicel pale, capitellum with blackish-brown scales. **Abdomen:** Terga mainly dark; tergum I

with a lateral patch of pale scales, terga II-VI with a small, basolateral patch of pale scales not produced onto the dorsum; sterna II-VI pale-scaled, VII mainly dark with a narrow pale basal band; terga and sterna with numerous setae on apical margins. *Genitalia* (Fig. 1): Tergum VIII lightly pigmented, spiculate, with short setae covering about 0.8 caudal area, basal 0.9 retracted into segment VII, index 0.96; sternum VIII moderately pigmented, covered by short setae, more numerous caudally, posterior margin with a median indentation, anterior margin slightly concave, index 0.91-0.97; tergum IX lightly pigmented, spiculate, anterior margin without indentation, posterior margin with an indentation forming 2 apical lobes, each with 2-7 short, strong setae, lateral area with a small flap, length 0.12-0.13, width 0.11-0.12, index 1.00-1.04; insula lip-shaped, covered with minute hair-like spicules, 4-6 long setae; lower vaginal lip narrow, covered with minute spicules; upper vaginal lip broad laterally, spiculate, lower and upper vaginal sclerite absent; postgenital lobe short, broad, spiculate, distally with a small median indentation, 2-5 long setae on each side of midline; cercus moderately long, broader basally, apex sharply rounded, spiculate, covered with long and short setae, index 2.50-2.87; 1 large spermathecal capsule.

**Male.** Essentially as in female but with following differences: *Head:* Antenna 0.70-0.77 length of proboscis, lightly plumose with 5,6 setae on flagellar whorls, apical 2 flagellomeres conspicuously elongated and slightly longer than combined length of remaining 11 flagellomeres; palpus very short, 0.06 length of proboscis; proboscis long, 1.07-1.15 length of forefemur. *Thorax:* Scutum and pleura with relatively fewer setae. *Abdomen:* Terga with basolateral pale-scaled patches relatively smaller; sternum VIII with well developed, numerous setae on posterior margin. *Leg:* Posttarsi I,II with 2 unequal unguis, larger unguis with a small basal tooth, smaller unguis simple, tarsus III with 2 equal, simple unguis. *Genitalia* (Fig. 2): Tergum IX moderately pigmented, spiculate, apical area broader laterally, without setae; gonocoxite short, curved, moderately to heavily pigmented, spiculate, dorsal and ventral surfaces with comparatively numerous broad scales and long and short

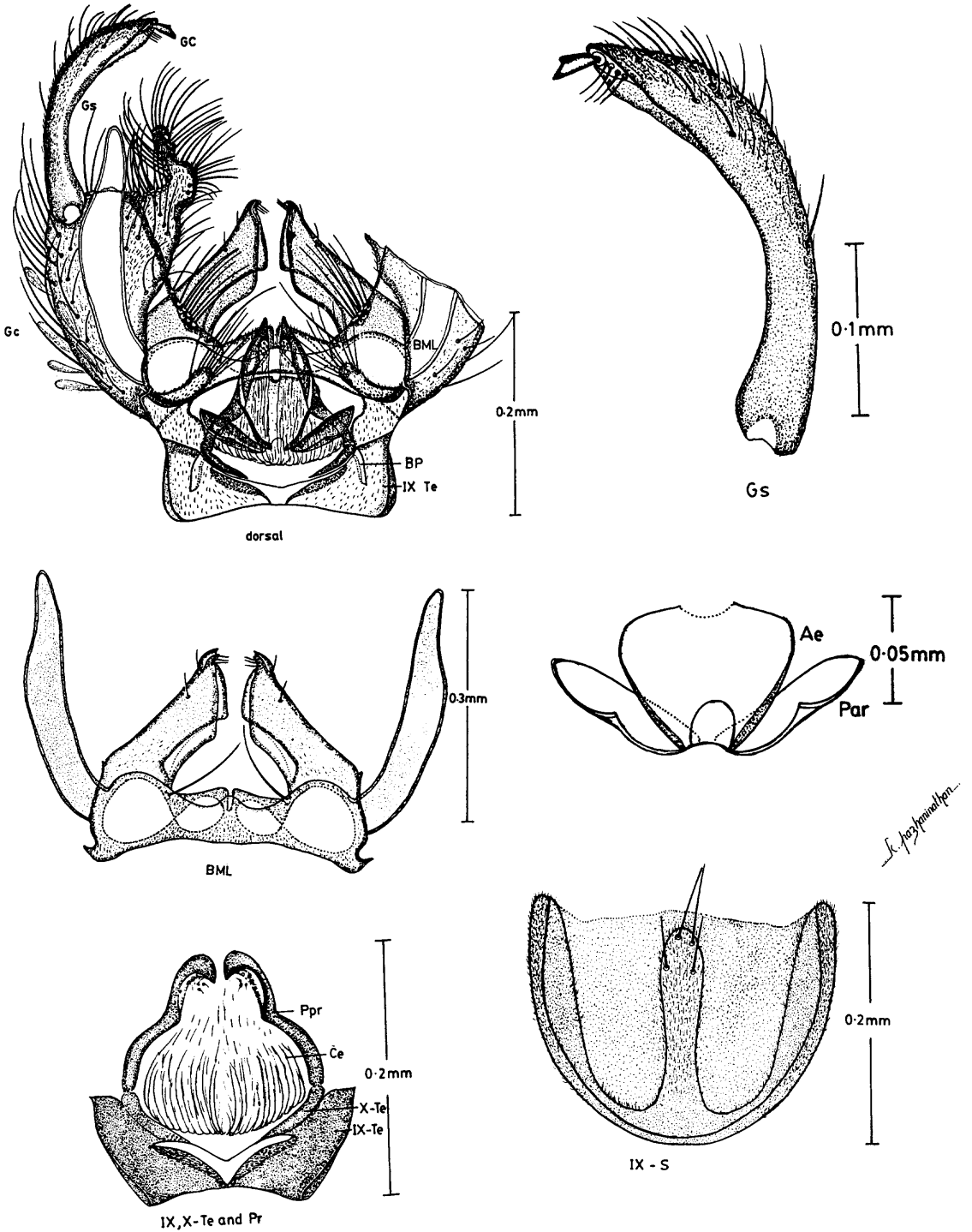
setae, outer margin with longer setae, apicomesal area extended laterally with a finger-like projection on apex bearing numerous long and short setae, basomesal area with a small lobe dorsally bearing 8-11(9) long, narrow setae, a few stout setae on ventral surface; gonostylus long, 1.03-1.05 length of gonocoxite, spiculate, distal 0.48-0.56 area moderately expanded bearing 32-41 setae, gonostylar claw short, heavily pigmented, scoop-like; basal mesal lobe large, bifurcate into a heavily pigmented, long, narrow, bluntly pointed dorsal arm and a broad, heavily pigmented, relatively shorter ventral arm, connected basally to its mate by a broad, spiculate band, dorsal arm protruding laterally, about 1.52-1.60 and 1.00-1.05 length of ventral arm and gonocoxite respectively, ventral arm consisting of 2 short, unequal, broad, curved flaps with 3-5 short, fine setae apically, a long, stout seta at bifurcation; paraproct heavily pigmented, band-shaped with a lobe-like process apically, cercus membranous with 5-9 very short setae on each side near apex; phallosome simple, aedeagus lightly pigmented, broad, concave basally, slightly convex apically with a median indentation, paramere moderately pigmented, broad mesally, about length of aedeagus, basal piece narrow, moderately pigmented; sternum IX large, spiculate, lateral areas heavily pigmented, a moderately pigmented narrow band mesally with 3-6 setae near apex (in one specimen a scale mixed with setae).

**Pupa** (Fig. 3). Chaetotaxy and measurements based on 57 pupal exuviae with associated adults. *Cephalothorax:* Moderately pigmented, setae 1-5-CT with 2,3(2) branches, seta 2-CT short, about 0.5 length of 1-CT; 6-CT single, occasionally bifid; 7-CT long with 2,3(3) branches; 8-CT with 3-5(4) branches; 9-CT double, occasionally single; 10-CT with 3,4(4) branches; 11-CT bifid, occasionally triple; 12-CT with 2-4(3) branches. *Trumpet:* Heavily pigmented, spiculate, index 3.17-3.75. *Abdomen:* Moderately pigmented, spiculate (more in VII,VIII), minute dark granules present on segment 1 under seta 1-I and intersegmental areas of segments II-VII (more prominent in II,III); seta 1-I dendritic with 40-65 branches; 2,9-1 single; 3-1 with 2,3(2) branches; 4-I with 2-5(4) branches; 5-I with 2,3(3) branches; 6-I with



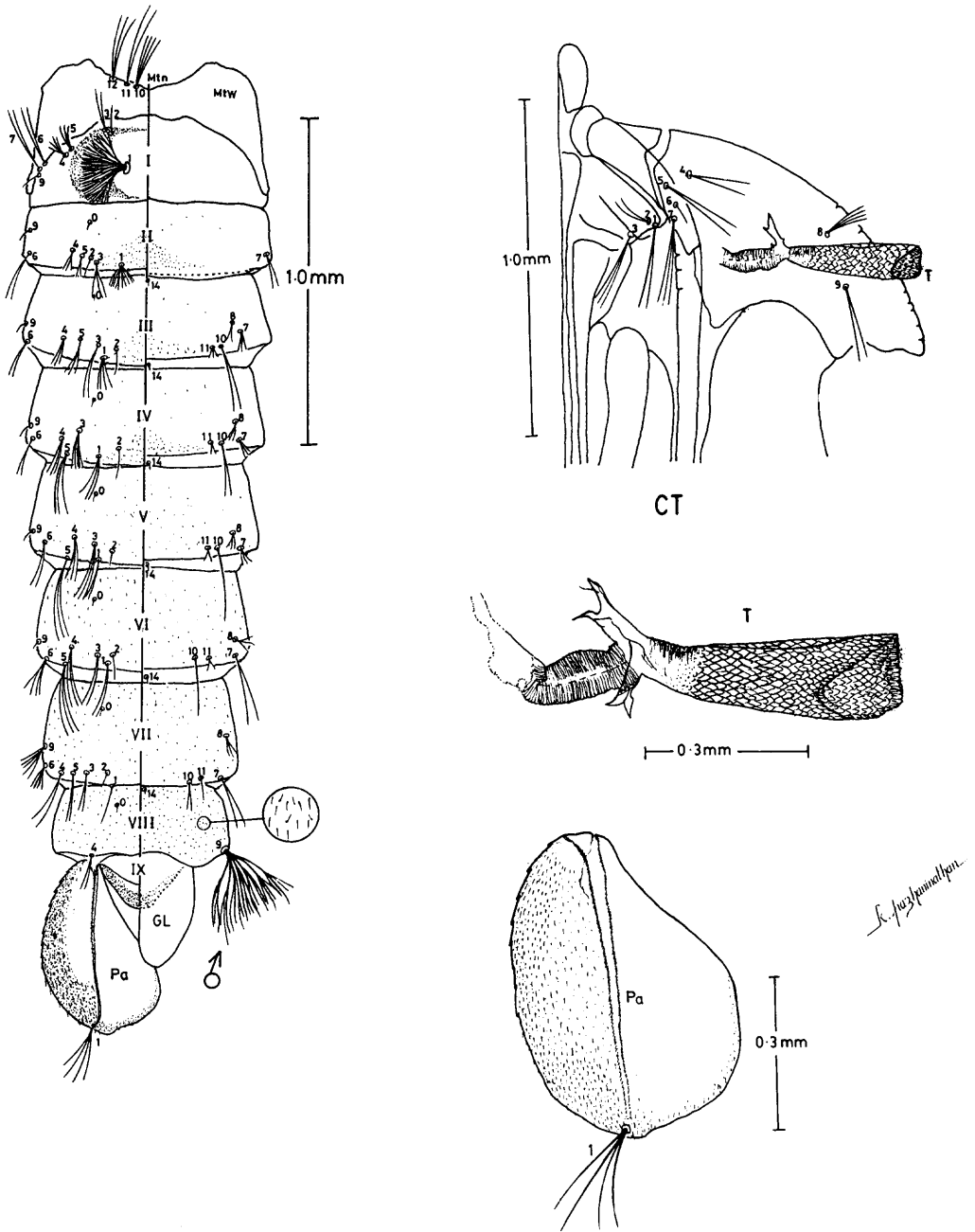
*Ae. (Rhi.) portonovoensis*

Fig. 1. *Aedes (Rhinoskusea) portonovoensis* female genitalia. AGDB = accessory gland duct base; Ce = cercus; DPGL = line of attachment of proctiger to dorsal surface of PGL; H = hinge; I = insula; LVL = lower vaginal lip; PGL = postgenital lobe; SCa = spermathecal capsule; UVL = upper vaginal lip; VIII-S = sternum VIII; VIII-Te = tergum VIII; IX-Te = tergum IX.



*Ae. (Rhi.) portonovoensis*

Fig. 2. *Aedes (Rhinoskusea) portonovoensis* male genitalia. Ae = aedeagus; BML = basal mesal lobe; BP = basal piece; Ce = cercus; Gc = gonocoxite; GC = gonostylar claw; Gs = gonostylus; Par = paramere; Ppr = paraproct; Pr = proctiger; IX-S = sternum IX; IX-Te = tergum IX; X-Te = tergum X.



*Ae. (Rhi.) portonovoensis*

Fig. 3. *Aedes (Rhinoskusea) portonovoensis* pupa. CT = cephalothorax; GL = genital lobe; Mtn = metanotum; MtW = metathoracic wing; Pa = paddle; T = trumpet; I-IX = abdominal segments.

1-3(2) branches; 7-I bifid, rarely single; 0,9-II single; 1-II with 8-15(10) branches; 2-II with 1,2(1) branches; 3-II with 2,3(3) branches; 4-II with 2-5(3) branches; 5-II with 2-4(2) branches; 6-II with 1-3(2) branches; 7-II with 2,3(2) branches; 0,9,14-III single; 1-III with 2-7(4) branches; 2-III single, occasionally bifid; 3-III with 2,3(2) branches; 4-III with 2-4(3) branches; 5-III with 2-5(3) branches; 6,8-III with 1-3(2) branches; 7-III with 1-4(3) branches; 10-III bifid; 11-III single to triple; 0,9,14-IV single; 1-IV with 2,3(3) branches; 2-IV with 1,2(1) branches; 3-IV with 3-7 branches; 4,7-IV with 2-4(3) branches; 5-IV with 2-5(3) branches; 6-IV single or double; 8-IV with 1-4(3) branches; 10-IV bifid; 11-IV with 1-3(2) branches; 0,9,14-V single; 1-V with 1-3(2) branches; 2-V with 1-3(1) branches; 3,4,7,8-V with 2-4(3) branches; 5-V with 2-5(3) branches; 6,11-V with 1-3(2) branches; 10-V with 1,2(1) branches; 0,9,14-VI single; 1-VI with 1-3(2) branches; 2-VI with 1-3(1) branches; 3,7-VI bifid, occasionally single; 4,5,8-VI with 2-4(3) branches; 6-VI with 3-6(4) branches; 10-VI single, occasionally bifid; 11-VI with 1,2(2) branches; 0,14-VII single; 1,11-VII with 1,2(1) branches; 2-VII with 1-3(1) branches; 3,4-VII with 2,3(2) branches; 5-VII with 2-4(2) branches; 6-VII with 2-8(4) branches; 7,10-VII with 1,2(2) branches; 8-VII with 2-4(3) branches; 9-VII with 3-8(5) branches; 0,14-VIII single; 4-VIII bifid; 9-VIII well developed with 5-8(7) branches, divided into 2-5 sub-branches; basolateral area of genital lobe with minute spicules (more conspicuous in male). *Paddle*: Oval, spicules on almost all outer and 0.20-0.36 of inner apical marginal areas; minute serrations on basal 0.47-0.59 of outer margin; midrib reaching near to the apex; apex of paddle slightly protruding near base of 1-P; seta 1-P with 3-6 branches, index 1.42-1.50 (mean = 1.48).

**Larva** (Fig. 4). Chaetotaxy and measurements based on 60 specimens. *Head*: Moderately pigmented, without spicules, setae 1,3,14-C single (1-C long, curved); 4-C short, 2,3-branched; 5-C long, weakly barbed with 6 branches (occasionally 7-branched); 6-C 2-branched, weakly barbed, longer than 5-C; 7-C barbed with 7-13(10) branches; 8,9-C with 2,3(2) branches; 10,15-C with 2-4(2) branches; 11-C with 4-7 branches; 12-C with 1-3 branches; 13-C

bifid; 18-C minute, single; dorsomentum with 9,10 teeth on each side of a central tooth; seta 6-Mx single, occasionally bifid. *Antenna*: Long, 0.73-0.80 length of head, spiculate, relatively more spiculate basally; seta 1-A barbed with 5-8(6) branches, inserted about middle of the shaft; 2,3-A single, attached subapically; 4-6-A single, attached at apex, 5-A short, about 0.5 the length of 6-A. *Thorax*: Seta 0-P with 2-4 branches; 1,2,3,4,5,6,9,10,12-P single (occasionally 2,5-P bifid and 4-P trifold, 5,6-P weakly barbed); 7-P always bifid, barbed; 8-P with 1-4 branches; 11-P single to 2-branched; 14-P with 2,3(2) branches; 1,2-M single, rarely 2-branched; 3,5,7,10,11,12-M single (5,7,10-M weakly barbed); 4-M with 1-3(2) branches; 6-M barbed with 4-6(6) branches; 8-M barbed with 5-7 branches; 9-M weakly barbed with 4-6(5) branches; 13,14-M with 2-4 branches; 1,2,3-T with 1,2(1) branches; 4-T with 1-3(2) branches; 5,6,10,11,12-T single (10-T weakly barbed); 7-T weakly barbed with 6-11 branches; 8-T with 2-4(3) branches; 9-T weakly barbed, 3-branched; 13-T with 2,3 branches. *Abdomen*: Setae 1,2,7,11,12,13-I single (7-I weakly barbed); 3-I with 1,2(2) branches; 4-I with 3-5(4) branches; 5-I with 2,3(2) branches; 6-I barbed, with 2,3(3) branches; 9-I with 2-4(2) branches; 10-I with 1,2(1) branches; 0,1,9,11-II single; 2,5-II bifid; 3-II with 1,2(2) branches; 4-II with 2-4 branches; 6-II barbed with 2,3(3) branches; 7-II with 1-3(3) branches; 8-II single, rarely bifid; 10,12-II single to 2-branched; 13-II with 2-4(3) branches; 0,1,3,8,9,10,13,14-III single; 2,5-III single to 2-branched; 4,12-III with 1,2(2) branches; 6-III barbed with 2 branches; 7-III single to 4-branched; 11-III with 2,3(2) branches; 0,2,8,9,10,13,14-IV single; 1,3-IV single, occasionally bifid; 4,5,11,12-IV with 1,2(2) branches; 6-IV barbed, 2-branched; 7-IV with 2-4(2) branches; 0,2,3,8-14-V single; 1,5-V with 1,2(1) branches; 4-V with 2,3(3) branches; 6-V barbed, 2-branched; 7-V with 2-4(3) branches; 0,1,2,3,9,10,12,14-VI single; 4-VI with 1,2(2) branches; 5,7,11-VI with 1,2(1) branches; 6-VI barbed, 2-branched; 8,13-VI with 3-6 branches; 0,2,4,7,11,12,14-VII single; 1,3,13-VII single to 2-branched; 5,9-VII with 1-3 branches; 6-VII with 4-6 branches; 8-VII with 3-7(6) branches; 10-VII with 2,3(2) branches; 0,2,4,14-VIII single; 1-VIII weakly barbed with 3-6 branches; 3-VIII barbed with 8-10(8)

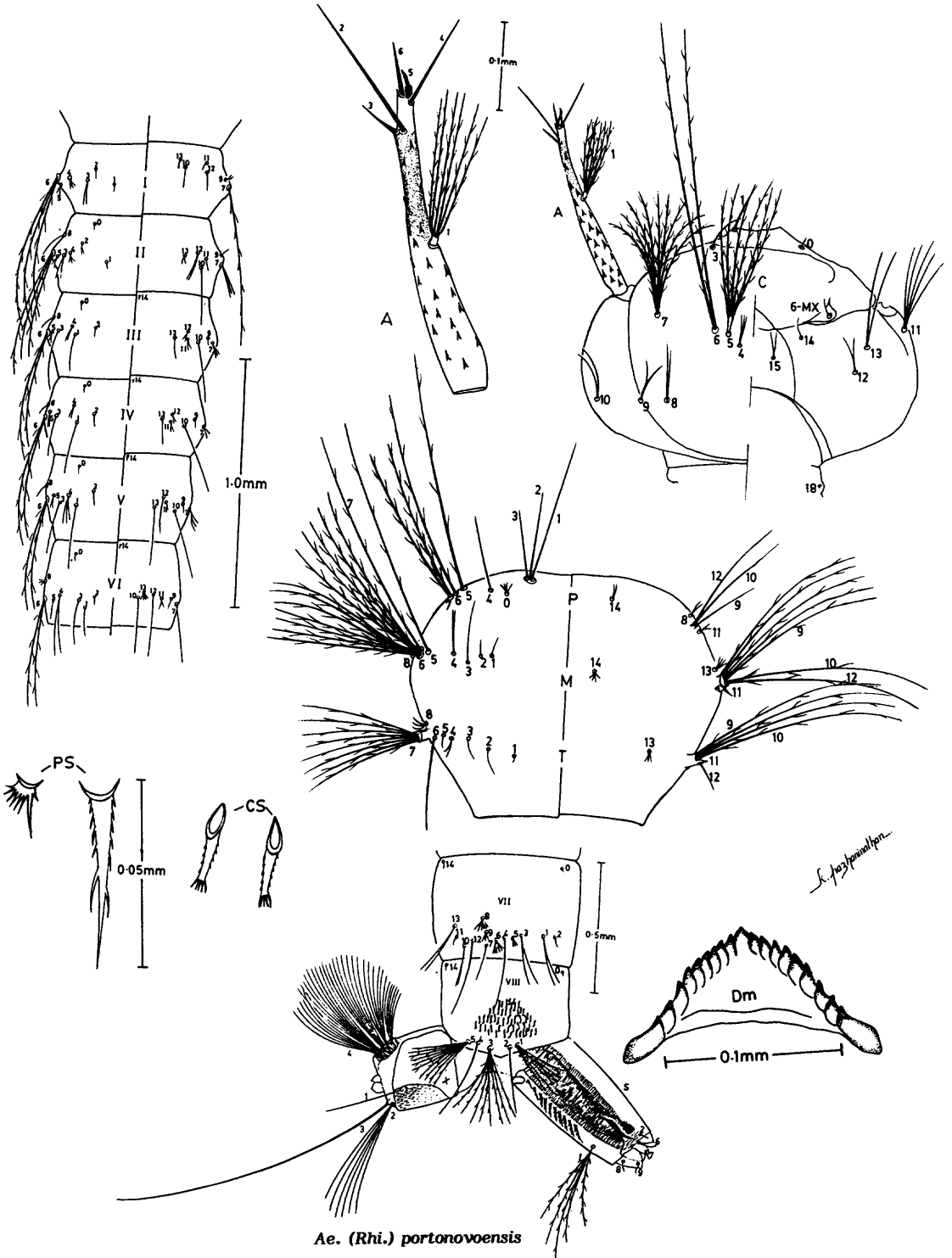


Fig. 4. *Aedes (Rhinoskusea) portonovoensis* larva. A = antenna; C = cranium; CS = comb scale; Dm = dorsontemum; M = mesothorax; P = prothorax; PS = pecten spine; S = siphon; T = metathorax; I-VIII, X = abdominal segments; 6-Mx = seta 6-Mx.

branches; 5-VIII barbed with 8-13 branches; segment VIII consists of a triangular shaped patch of 40-59 comb scales, each scale fringed with spicules from near base to apex, 5,6 longer spicules apically; 1-X long, single; 2-X long with 4-6 branches; 3-X very long, single; 4-X composed of 5 pairs of long, multiple-branched setae; saddle short, moderately pigmented, spiculate, incomplete ventrally, acus absent; anal papillae 2 pairs, very short, knob-shaped. *Siphon*: Short, heavily pigmented, acus well developed, index 2.0-2.2; pecten on basal 0.58-0.63 of siphon, composed of 8-15(10) long teeth with a few fine denticles (usually basal teeth relatively shorter); 1-S long, barbed with 4-8(5) branches, inserted on basal 0.79-0.85 of siphon, distad of last pecten tooth; 2,6,7,8,9-S single.

**Egg.** Unknown.

## TAXONOMIC DISCUSSION

Adults of *Ae. (Rhi.) portonovoensis* are extremely similar to *Ae. (Rhi.) longirostris*, *Ae. (Rhi.) pillaii* and *Ae. (Rhi.) wardi* and cannot be separated in adult habitus. However, male and female genitalia have distinguishing features to separate these four species.

Female genitalia of *portonovoensis* are similar to *wardi*, *longirostris* and *pillaii* but the structure of tergum IX differs (Fig. 1) which can be easily separated from the latter three species. In *portonovoensis* the length and index of tergum IX are 0.12-0.13 mm and 1.00-1.04 respectively, whereas the values for the other three species are between 0.09-0.10 mm and 0.72-0.87 respectively (Reinert 1976).

Male genitalia of *portonovoensis* are similar to *wardi* but can be easily distinguished from them by several features. *Aedes portonovoensis* possesses: gonostylus long, about 1.03-1.05 length of gonocoxite; 8-11(9) long setae on small lobe of basomesal area of gonocoxite; dorsal arm of basal mesal lobe distinctly long, about 1.52-1.60 length of ventral arm, tergum IX without setae. *Aedes wardi* possesses: gonostylus 0.83-0.88 length of gonocoxite; small lobe on basomesal area of gonocoxite bearing 3-8 (usually 4-6) setae; dorsal arm of basal mesal lobe about length of ventral arm; tergum IX with 0-3 setae (Reinert 1976).

Pupae of *portonovoensis* are similar to the other three species of the subgenus *Rhinoskusea* except for the presence of minute spicules on basolateral area of genital lobe. The paddle with apical margin slightly protruding near the base of 1-P resembles *longirostris* as shown in the illustrations of Reinert (1976). Larvae of *portonovoensis* can be distinguished from the other species by the presence of apically fringed comb scales (Fig. 4). The values of siphonal indices also vary. In *portonovoensis* it ranges from 2.0-2.2 while it is higher (2.43-3.57) in the case of *longirostris*, *pillaii* and *wardi* (Reinert 1976).

**Type Data.** The holotype male of *Aedes portonovoensis* (A 897) with associated larval (l 309) and pupal (p 269) exuviae mounted on a slide with following collection data: Pichavaram mangrove swamp (sea level), South Arcot District, South India, India, 16.9.1987, collected as larva from a crab hole, coll. A. Munirathinam. Deposited in the National Museum of Natural History (NMNH), Smithsonian Institution, Washington, DC.

The allotype female (A 895) with associated larval (l 342) and pupal (p 304) exuviae mounted on a slide with following collection data: Pichavaram mangrove swamp, South Arcot District, South India, India, 18.9.1987, collected as a larva from a swamp pool, coll. K. Ayanar. Deposited in NMNH.

Additional specimens designated as paratypes with collection data same as allotype are deposited as follows: One male (A 896) with associated slides, l 335, p 297, G 203, one female (A 894) with associated slides, l 338, p 300, G 207, two males (A 1061, A 1062) and one 4th instar larva (L 113) mounted on a slide deposited in NMNH; one male (A 1301) with associated slides, l 332, p 294, one female (A 1302) with associated slides l 314, p 274, one male genitalia (G 224) and one female genitalia (G 215) mounted on two separate slides are deposited in National Institute of Virology, Pune, India.

This species is named after a well known, small, coastal town Porto Novo situated nearby the type locality.

**Distribution.** A survey of mosquito fauna was made in the islets of mangrove forest,



Pichavaram, South Arcot District, Tamil Nadu situated on the eastern coast of south India. A total of 360 specimens of *portonovoensis* were examined which were collected during September, 1987 (premonsoon season) from the following habitats: crab hole, 23 males, 26 females, 16 l, 19 p, 1 male and 1 female genitalia, 8 L; swamp pool, 14 males, 50 females, 34 l, 36 p, 8 male and 15 female genitalia, 1 L; tree hole (ground level), 3 males, 16 females, 1 l, 2 p; adults captured resting indoors (Rest House on the islet), 11 females; outdoor resting (crab hole), 32 males, 30 females, 9 males and 4 female genitalia.

**Bionomics.** Immatures of *Ae. portonovoensis* were found in a swamp pool, crab holes and tree holes on the ground level. *Culex (Culex) sitiens* was the only species found in association of this species in an open swamp pool. Adults were captured while resting outdoors in crab holes and on one occasion at dusk. Eleven females were captured while resting in human habitation close to the breeding site.

**Medical Importance.** Not known.

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