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A NEW SPECIES OF CINYGMINA (EPHEMEROPTERA: HEPTAGENIIDAE) FROM SOUTH INDIA AND REEVALUATION OF GENERIC TRAITS OF CINYGMINA KIMMINS 1937

By K. VENKATARAMAN AND K. G. SIVARAMAKRISHNAN

Department of Zoology, Madura College (Autonomous), Madurai-625 011.

A New species of *Cinygmina*, *C. kumbakkaraiensis*, is described from South India. Diagnostic morphological characters of male and female imagos and nymph are illustrated and discussed. Generic traits of *Cinygmina* Kimmins are re-evaluated in the light of the morphology of *C. kumbakkaraiensis*.

Kimmins (1937) established the genus *Cinygmina* for a distinctive species, *C. assamensis*, known only from male and female imagos, collected in the Khasi Hills, Northeastern India. Jensen (1972) described for the first time the nymph of this genus from reared specimens from Thailand. Presently, *Cinygmina* includes 5 described species: *C. assamensis* from India, *C. obliquistriata* and *C. rubromaculata* from Peoples Republic of China (You *et al.*, 1981) and *C. cervina* and *C. landai* from Vietnam (Braasch and Soldan, 1984).

Koss and Edmunds (1974) and Sivaramakrishnan and Venkataraman (1987) have described the ultrastructure of *Cinygmina* spp. and *C. kumbakkaraiensis* respectively.

This genus is apparently distributed in the Palearctic and Oriental Realms. This is the first record of this genus from South India *C. kumbakkaraiensis* sp. nov. is described based on reared material from Kumbakkarai stream in Palni hills and nymphs and imagos from other regions of Western Ghats of South India. These fresh discoveries allow a reevaluation of the traits of this genus.

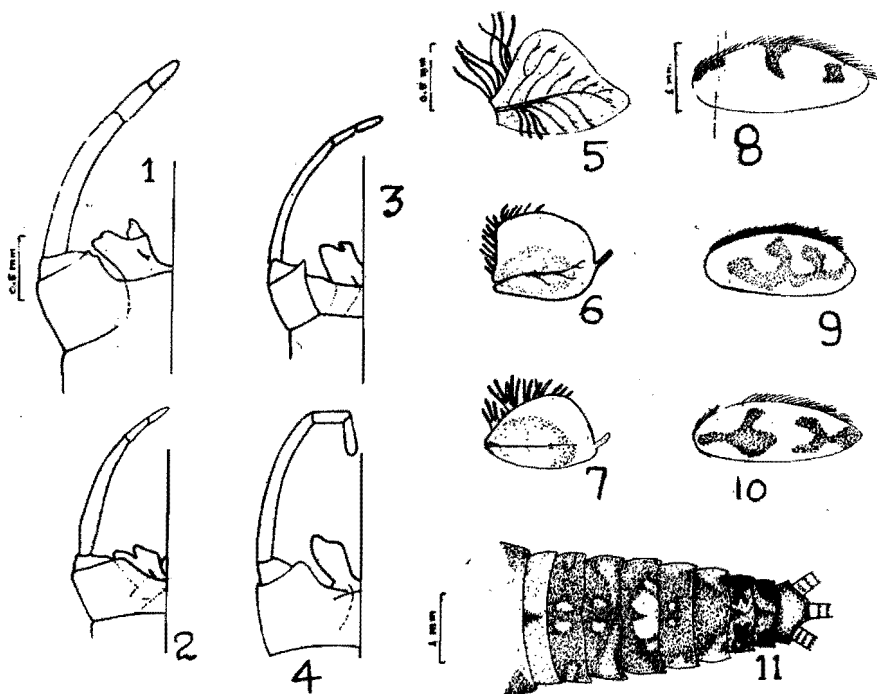
***Cinygmina kumbakkaraiensis* sp. nov.**

1987. *Cinygmina* sp., Sivaramakrishnan and Venkataraman, Proc. Indian Acad. Sci. (Anim. Sci.), 96: 637-646.

Male imago, (in alcohol): Length: body, 7.0-8.0 mm; fore wings, 7.5-8.5 mm. Head light reddish-brown, margins darker. Eyes whitish-grey. Scape and pedicel of antennae reddish-brown, flagellum pale. Basal half of ocelli black, apical

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half white. Thorax: reddish-brown, carinae darker, sutures lighter; margins of pronotum black; venter brownish-yellow. Legs: light reddish-brown, all joints of femora and tibiae dark reddish-brown. Wings: longitudinal and transverse veins of fore and hind wings pale brown; membrane of fore and hind wings hyaline, except cells C and Sc of fore wings greenish-yellow. Abdomen: terga 1-10 washed with dark reddish-brown medially; terga brownish-yellow laterally, except terga 7-10 washed with pale reddish-brown, postero-lateral edges of abdominal terga clear without any markings; sterna pale brownish-yellow, sterna 1-10 with a median reddish-brown patch, smaller and indistinct on sterna 9-10. Genitalia: penes light reddish-brown; basal half of forceps uniformly washed with blackish-brown, apical half pale brown;



LEGEND FOR FIGURES

- Fig. 1-4: Genitalia of female imago; Fig. 1. *Cinygmmina kumbakkaraiensis*;
 Fig. 2. *C. rubromaculata* (after You-Da-Shou *et al.* 1981);
 Fig. 3. *C. obliquistriata* (after You-Da-Shou *et al.* 1981);
 Fig. 4. *C. assamensis* (after Kimmins, 1937)
 Fig. 5-7: Gill 5 of; Fig. 5. *C. kumbakkaraiensis*;
 Fig. 6. *C. landai* (after Braasch and Soldan, 1984);
 Fig. 7. *C. cervina* (after Braasch and Soldan, 1984);
 Fig 8-10: Femur of nymphal foreleg of; Fig. 8. *C. kumbakkaraiensis*;
 Fig. 9. *C. landai* (after Braasch and Soldan, 1984);
 Fig. 10. *C. cervina* (after Braasch and Soldan, 1984.)
 Fig. 11: *C. kumbakkaraiensis*, nymphal abdominal segment 1-10.

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median titillators of penes well developed (Fig. 1); caudal filaments dark brown, annulations at articulations darker.

Female imago (in alcohol): Length: body, 10.0-11.0 mm; fore wings, 10.5-11.5 mm. Eyes black. Head yellowish-brown, margins darker. Colour of ocelli as in male imago. Thorax yellowish-brown, venter pale. Legs yellowish-brown, other details of colouration as in male imago. Wings: colouration as in male imago. Abdomen: terga 1-10 yellowish-brown, posterior edges of terga 1-10 with a narrow dark brown band. Sterna yellowish-brown, except a reddish-brown patch on sternum 7. Caudal filaments pale brown, annulations at articulations darker.

Mature nymph (in alcohol): Head: dorsum yellowish-brown, carinae darker sutures paler, two paired submedian, brownish-yellow patches on the vertex. Scape and pedicel of antennae dark brown, flagellum pale. Venter pale, venter of maxillary palpi, labium and labial palpi dark brown. Thorax: dorsum yellowish-brown, median suture pale, small pale spots on pro- and mesonotum, venter pale. Legs: femora dark brown with scattered pale maculae and median, transverse, zig-zag pale yellow band as in Fig. 8, joint of femora and tibiae dark brown, tibiae pale yellow with a median, transverse dark brown band, tarsi dark brown, claws pale yellow. Abdomen: terga 1-2 brownish-yellow, terga 3-10 dark brown with pale yellow maculae on terga 4-5 and 8-9 as in Fig. 11; denticles on posterior margin of abdominal terga pointed as in Fig. 11, sterna pale. Gills: lamellae pale, tracheae and filaments smoky black. Caudal filaments: 5 basal segments pale yellow, proximal 1/4 of remaining alternate segments pale yellow, other regions dark brown.

Holotype male imago, Kumbakkarai stream, 10 km west of Periakulam, Tamil Nadu, India, 17. XII. 1982. *Allotype* female imago. 17. XII. 1982. Same data as for holotype. *Paratypes* 3 nymphs, 1 male imago and 1 female imago, Silver Cascade, Kodaikanal, 100 km from Madurai, Tamil Nadu, India, 20. IX. 1983. 2 nymphs, Ramanadi, 5 km. from Kadayam, Tamil Nadu, India, 9. VI. 1982. 2 nymphs, Thirumurthi Hills, 15 km. from Udumalpet, Tamil Nadu, India, 27. II. 1983. All types are deposited in the collections of Entomology Research Institute, Loyola College, Madras, India.

Etymology. This species is named after the type locality, Kumbakkarai.

Cinygmia kumbakkaraiensis sp. nov. can be differentiated from other known *Cinygmia* by the following combination of characters in the male imago: (1) outer lobule of each penis lobe broad and flat apically (Fig. 1); (2) titillators of penis are prominent (Fig. 1) and (3) postero-lateral edges of abdominal terga clear without any markings and in the mature nymph (1) gill leaflets on abdominal segment 5 without acutely pointed apical elongation (Fig. 5) and (2) femora of legs with scattered pale maculae and median transverse, zig-zag pale yellow band (Fig. 8).

KEY TO MALE IMAGOS

1. Inner lobule of penis larger than the outer one; a small median, conical chitinous lobe present between paired penial lobes (Fig. 2); red maculae laterally on abdominal terga 2-8 *rubromaculata*.
 Penis and abdominal terga not as above 2
- 2(1) Inner lobule of penis smaller than the outer one, projecting dorsally (Fig. 3); ochreous oblique stripes on abdominal terga 2-8 laterally *obliquistriata*.
 Inner lobule of penis smaller than the outer one, not projecting dorsally (Fig. 4); abdominal terga 2-8 without ochreous oblique stripes laterally 3
- 3(2) Outer lobule of each penis rounded apically (Fig. 4); titillators reduced: a pair of triangular, yellow spots on abdominal tergum 2 and a pair of reniform yellow spots on abdominal terga 3-8 *assamensis*.
 Outer lobule of each penis lobe broad and flat apically (Fig. 1); titillators prominent; postero-lateral edges of abdominal terga clear without any markings *kumbakkariensis*.

KEY TO MATURE NYMPHS

1. Gill leaflets on abdominal segment 5 with acutely pointed apical elongation (Fig. 6); femora of legs with maculae but not with transverse, zig-zag pale yellow band (Fig. 9) 2
 Gill leaflets on abdominal segment 5 without acutely pointed apical elongation (Fig. 5); femora of legs with scattered pale maculae and median, transverse, zig-zag pale yellow band (Fig. 8) *kumbakkariensis*.
- 2(1) Gill leaflets on abdominal segment 5 with acutely pointed apical elongation (Fig. 6); femora of legs with single macula as in Fig. 9 *landai*.
 Gill leaflets on abdominal segment 5 with acutely pointed apical elongation as in Fig. 7; femora of legs with two maculae as in Fig. 10 *cervina*.

GENERIC DIAGNOSIS

The study of *C. kumbakkariensis* from South India reinforces the earlier conclusion that *Cinygmia* is most closely related to *Afronurus* (Jensen, 1972). The presence of titillators (though sometimes reduced) and fused penis base, protruding beyond the margin of styliger, seem to be consistent generic traits in the adult stage and lack of meso and metanotal spines appears to be the key nymphal generic character at least in the peninsular Indian context to differentiate from the co-occurring genus, *Thalerosphyrus*, which has well developed meso- and metanotal spines. Tomka and Zurwerra (1985) have given acutely pointed elongation in abdominal gill 5 as a generic trait to key *Cinygmia* Kimmins. This trait is exhibited only by Vietnamese species (Braasch and Soldan, 1984) and hence will not serve to diagnose *Cinygmia* from peninsular India.

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