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Taxonomic revision of *Anacaena* THOMSON, 1859
III. The Indian Subcontinent
(Coleoptera: Hydrophilidae)

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Abstract

The species of the genus *Anacaena* THOMSON, 1859 (Coleoptera: Hydrophilidae) from the Indian Subcontinent are revised. Four new species are described: *A. boukali*, *A. jaegeri*, *A. laevoides*, and *A. setifera*. Five species are redescribed. Figures of diagnostic morphological features and a key to all nine species are provided.

Key words: Coleoptera, Hydrophilidae, *Anacaena*, taxonomy, revision, key to species, new species, Oriental Region, Indian Subcontinent.

Introduction

The hydrophilid genus *Anacaena* THOMSON, 1859 comprises 57 known species and is distributed in all major biogeogeographical regions, except the Australian Region. Five species have been described so far from the Indian Subcontinent (India, Nepal, Bhutan, Bangladesh, and Sri Lanka). The original descriptions of the five known species (made between 1890–1942) are not detailed and thorough redescriptions have never been published. Although many specimens of *Anacaena* were collected over the last several decades, the Indian Subcontinent is still poorly investigated regarding this genus. In the present contribution all species previously known from the Indian Region are redescribed and four new species are described. The male genitalia of all species are figured. A key to the species of *Anacaena* from the Indian Subcontinent is provided.

Material and methods

All accessible type specimens of the species known from the Indian Subcontinent were examined. In addition, about 1200 specimens from eight collections were studied. Mouth parts, thoracic structures and male genitalia were dissected, macerated and cleared in concentrated lactic acid and examined several hours later by means of a transmitted light microscope (Olympus BX 41) and a stereoscopic microscope (Leica MZ 12.5) with diffuse and focused light sources. Measurements were taken using a micrometric eyepiece, and ink drawings were made with a drawing tube. The morphological terminology is based on KOMAREK (2004). Many label data are cited precisely, " / " indicates the change of line, " \ " the change of label.

All lectotype designations in this article are made in order to stabilize nomenclature (ICZN, Art. 74a).

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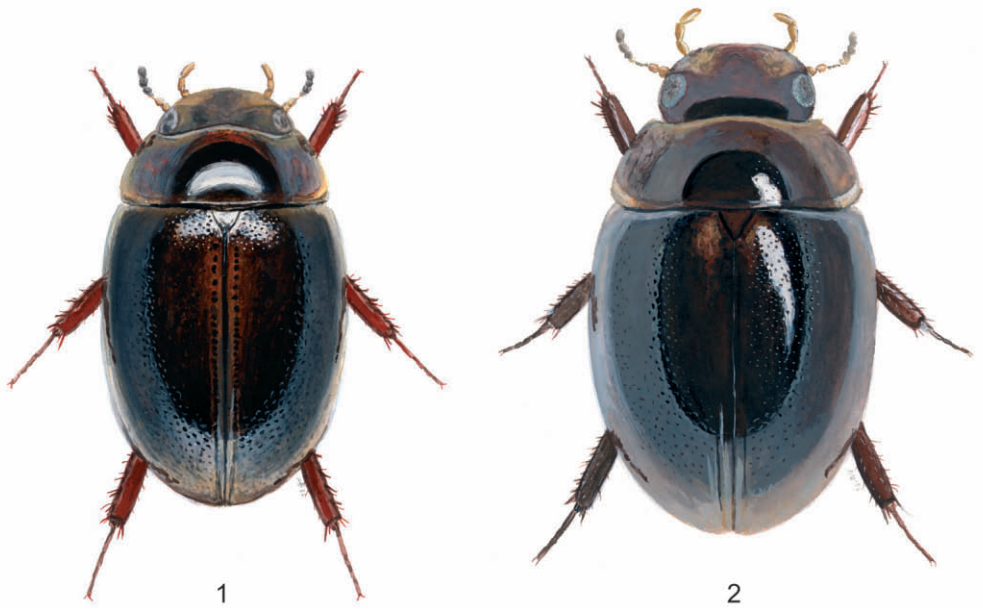

Figs. 1–2: Habitus (pronotum and head slightly flexed dorsad, in order to show more details): 1) *Anacaena advena*, 2) *A. laevis*.

Abbreviations:

AEZS	A.E.Z. Short Collection, Ithaca (New York, U.S.A.)
ASC	Collection of Andre Skale, Hof/Saale (Germany)
E.I.	elytral index (= largest elytral length /largest elytral width)
FMNH	Field Museum of Natural History, Chicago (Illinois, U.S.A.)
ISNB	Institut National des Sciences Naturelles, Bruxelles (Belgium)
MTD	Museum für Tierkunde Dresden (Germany)
NHM	Natural History Museum, London (U.K.)
NMW	Naturhistorisches Museum Wien (Austria)
ZMUC	Zoological Museum Copenhagen (Denmark)

Checklist of the species of *Anacaena* from the Indian Subcontinent

1. *Anacaena advena* (SHARP, 1890)	Sri Lanka (records from Japan and Russia doubtful)
2. *Anacaena boukali* sp.n.	India (Kerala)
3. *Anacaena jaegeri* sp.n.	Nepal
4. *Anacaena laevis* d'ORCHYMONT, 1936	India (Himachal Pradesh, Uttaranchal, Sikkim), Nepal
5. *Anacaena laevoides* sp.n.	India (Meghalaya, Uttaranchal)
6. *Anacaena minima* (SHARP, 1890)	Sri Lanka
7. *Anacaena minuscula* d'ORCHYMONT, 1942	India (Tamil Nadu, Karnataka, West Bengal, Orissa, Kerala), Vietnam
8. *Anacaena minutalis* d'ORCHYMONT, 1942	India (Bihar, Karnataka, West Bengal, Kerala, Tamil Nadu), Bangladesh, Sri Lanka
9. *Anacaena setifera* sp.n.	India (Karnataka)

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Figs. 3–6: Habitus (pronotum and head slightly flexed dorsad, in order to show more details): 3) *Anacaena laevoides*, 4) *A. minima*, 5) *A. minuscula*, 6) *A. minutalis*.

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Anacaena advena (SHARP, 1890)

Hydrobius (*Anacaena*) *advena* SHARP 1890: 349.
Anacaena advena (SHARP); ZAITZEV 1908: 377; d'ORCHYMONT 1942: 45.

TYPE LOCALITY: Bogawantalawa (village), Central Province, Sri Lanka.

TYPE MATERIAL: **Lectotype**, here designated (NHM): "Type H.T. [red-bordered white round label] \ Ceylon / G. Lewis \ Hydrobius (Anacaena) advena Type D.S. / Ceylon 9.4.82 / Lewis [handwritten] \ specimen found damaged. XI 63 / J. Balfour- Browne [handwritten]". **Paralectotype**: 1 ex. (ISNB): "Ceylon. Bogawantalawa 4,900–5,200 ft. / G. Lewis 1910-320. 21.III.-4.IV.82 / Coll. A. d'Orchym. [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Ceylan"] \ Anacaena / advena / Sharp [handwritten]". The lectotype specimen is dissected and glued with the dorsal face to the card. The gender of the lectotype and of the paralectotype is unidentified. SHARP (1890) based his original description on "Three specimens", stemming from "Bogawantalawa, in April". These specimens are regarded as syntypes. The label of the lectotype specimen does not bear the precise indication of the type locality, in contrast to the label of the paralectotype specimen. The decision for the selection of the lectotype specimen was based on the fact that this specimen was labelled as "Type" by Sharp. The third specimen of the series mentioned by SHARP (1890) could not yet be found.

ADDITIONAL MATERIAL EXAMINED:

SRI LANKA: 12 exs. (NMW): Uva Province, Tangamalai Nat. Res., 3 km W Haputale, 1500 m, shallow pool in primary forest, 28.XII.2000.

DIAGNOSIS: Body comparatively small, evenly rounded. Clypeus, frons, pronotum and elytra rather unicoloured brown, sometimes with inconspicuous brighter areas. Clypeus rather short with indistinct antero-lateral angles; eight antennomeres; maxillary palpi moderately stout without apical infuscation; punctation on head and pronotum very fine, on elytra coarser, only laterally with indistinct short subseriate rows of punctures; mesoventrite with indistinct, low horizontal ridge; procoxae with few spine-like setae; legs dark brown like ventrites; metafemoral pubescence extended with oblique hairline; metatarsus as long as metatibia.

DIFFERENTIAL DIAGNOSIS: This species differs from the similar *A. minima* by the following features: clypeus without distinct yellow preocular patches; maxillary palpomere 4 without apical infuscation; eight antennomeres; pronotum unicoloured brown; pronotal punctures very fine; elytra unicoloured brown; metafemoral pubescence extended with oblique hairline; distinctly different aedeagus.

REDESCRIPTION: Total length 1.8–2.0 mm; total width 1.2–1.3 mm; E.I.: 1.13. Habitus (Fig. 1) oblong oval, with greatest width in midlength; elytra about four times as long as pronotum in dorsal view.

Head (Figs. 7, 15): Clypeus, frons and labrum brown, clypeus sometimes indistinctly brighter to variable degree; temporal regions, gula, maxilla, submentum, mentum, prementum and labial palpi rufous. Punctures very fine, widely spaced, not distinctly denser towards clypeal margins, without setae; a very indistinct series of very fine, densely arranged punctures present along inner margin of eyes. Interstices shiny, microsculpture absent. Clypeus short in length, not excised anteriorly, with very indistinct anterior angles. Frontoclypeal suture very indistinct. Eyes not constricted, dorsal and ventral portion of equal size. Interocular distance 4.5 x as large as horizontal diameter of dorsal portion of one eye. Eight antennomeres; pedicellus about twice as long as wide; antennomere 3 elongate, about as long as antennomere 4 and cupula together; antennal club with slightly elongate ovoid apical antennomere. Maxillary palpi moderately stout; palpomere 2 slightly inflated; palpomere 4 with slightly asymmetrical edges, apex oval. Palpomeres unicoloured yellow, palpomere 4 without apical infuscation, sometimes very slightly infuscated in midlength. Mentum ca. 1.6 x as wide as long, flat, anterior margin slightly flexed dorsad; very sparse setae arising from irregularly distributed, very fine punctures on ventral face; microsculpture absent; lateral margins slightly projecting, densely fringed with long fine setae, with distinct anterior angles; anterior edge projecting, rounded, with slight emargination mesally. Labial palpi moderately stout; palpomere 3 slightly longer than palpomere 2.

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Thorax (Fig. 24): Pronotum dark brown, very indistinctly brighter towards lateral margins; in some individuals pronotum bright rufous with indistinctly darker brown, small, central patch. Punctation very fine, widely spaced, slightly denser and coarser towards lateral margins, microsculpture absent. Lateral margins with a fine bead, weakly convex, with broadly rounded anterior and posterior angles. Transverse fold present. Prosternum and hypomeron rufous; prosternum slightly bulged, very slightly projecting towards gula mesally. Scutellar shield almost equilateral, rufous, smooth, very finely punctate. Elytra not explanate, without impressions, with very weak callosity on shoulder regions, with distinct anterior and lateral bead. Elytra dark or light brown, often with very indistinct brighter lateral margins. Elytral punctures fine, distinct, equidistant, densely distributed, interstices slightly larger than diameter of punctures; irregular on elytral disc, with very indistinct short rows of subserially arranged coarser punctures laterally. Very fine minute setae on lateral elytral margin, longer and denser towards elytral apex, visible in more than 100 x amplification. Microsculpture absent. Sharply impressed sutural stria present in posterior 0.75–0.80. Epipleura, meso- and metaventrite unicoloured brown. Anapleural sutures distinct, anterior sections converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous like mesoventrite, with reticulate microsculpture, with short oblique ridge antero-laterally. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with a very short, low, inconspicuous horizontal ridge postero-mesally. Metaventrite bulged mesally, in most individuals completely pubescent, sometimes with a small glabrous median area.

Legs (Fig. 33) coloured like ventrites. Procoxa pubescent, with inconspicuous short stiff spine-like setae present near trochanter. Femoral hairlines distinct. Profemur 2.2 times as long as wide; pro- and mesofemur pubescent on proximal 0.75, with straight to slightly convex hairline; metafemur pubescent on proximal 0.66, with oblique hairline. Metatibia with moderately strong spines on lateral margin; metatibial spurs strong, the longer mesal spur extending to halflength of tarsomere 2. Protarsus ventrally set with stiff hairs rather than with spines; metatarsomeres 1–4 with rows of short spines, metatarsomere 5 with fine hairs on ventral face. Metatarsus about as long as metatibia. Metatarsomere 2 slightly longer than metatarsomere 5.

Abdominal ventrites rufous, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 42): Phallobase distinctly longer than parameres, manubrium broadly rounded, elongate, indistinctly demarcated from phallobase. Parameres moderately slender, lateral margins slightly sinuate, mesal margins basally inflated, apices very weakly sclerotized, rounded. Median lobe distinctly shorter than parameres; corona in apical position; median lobe wide, basal apophyses about as long as main part, with distinct extension into phallobase. Base of median lobe connected with parameres by a small tooth.

BIONOMICS: The individuals of this rare species were found in shallow pools in primary mountain forest at about 1500 m.

DISCUSSION: *Anacaena advena* is characterized by the extended metafemoral pubescence and the elytral punctures which are slightly coarser than in the similar *A. minima*. In congruence with d'ORCHYMONT (1942) a small elevation on the mesoventrite is present. In contrast to the original description (d'ORCHYMONT 1942), this species does not differ significantly in size from *A. minima.*

DISTRIBUTION: Sri Lanka. The species has been recorded from Russia (Far East) and Japan (SHATROVSKIY 1989, HANSEN 1999). The occurrence in the northeast of the Palearctic Region of a species described from a very restricted area in the tropics is very doubtful.

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Anacaena boukali sp.n.

TYPE LOCALITY: Spring next to the Ponmudi – Kallar Bridge road, 30 km NNE of Trivandrum, 8°45'N 77°05'E, Kallar Bridge (village), Kerala, South India.

TYPE MATERIAL: **Holotype** ♂ (NMW): "INDIA: Kerala, 30 km NNE Trivandrum, 400 m, Kallar Bridge, 8°45'N 77°05'E, leg. D. Boukal (30)". **Paratypes:** 16 exs. (NMW, AEZS): same data as holotype.

DIAGNOSIS: Body small, evenly rounded. Clypeus, frons, pronotum and elytra brown with large, indistinctly demarcated preocular patches and with very large brighter pronotal margins; clypeus short with indistinct antero-lateral angles; nine antennomeres; maxillary palpi moderately stout, palpomere 4 without infuscation; punctation on head and pronotum very fine, on elytra fine, widely spaced, with slight subserial arrangement; posterior elytral margin densely set with minute setae, mesoventrite with very low horizontal median ridge; procoxae with few spine-like setae; legs brown like ventrites; metafemoral pubescence reduced to anterior margin and proximal portion, metatarsus shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: *A. boukali* is very similar to *A. minuscula.* It can be distinguished from this species mainly by the aedeagus. Other differences are: smaller body size, slightly lower relation of total body length to width, slightly shorter clypeus, indistinct brightenings on clypeus, absence of distinct preocular patches, obsolete punctation on head, and more reduced metafemoral pubescence. Apart from the distinctive aedeagus, the morphological differences are rather subtle. For reliable separation, the direct comparison of the two species is therefore recommended. *Anacaena boukali* differs distinctly from *A. setifera* by the sparser and more finely impressed elytral punctation with slight subserial arrangement.

DESCRIPTION: Total length 2.1–2.4 mm; total width 1.3–1.5 mm; E.I.: 1.1. Habitus oval, with greatest width in midlength; elytra about 2.8 x as long as pronotum in dorsal view.

Head (Figs. 8, 16): Clypeus, frons, and labrum brown; labrum and clypeus indistinctly brighter than frons, particularly in preocular area; temporal regions, gula, submentum, mentum, cardo, stipes, prementum and labial palpi unicoloured brown. Punctation obsolete, sometimes very few very fine punctures present. Interstices shiny, microsculpture absent. Clypeus short in length, without distinct anterior angles. Frontoclypeal suture weak. Eyes not constricted; dorsal portion almost circular, about as large as ventral portion. Interocular distance ca. 2.5 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus 1.2 x as long as wide; antennomere 3 slightly elongate, about as long as antennomeres 4 and 5 together. Antennal club more than 3 x as long as wide, with slightly elongate apical antennomere. Maxillary palpi rather slender; palpomere 2 weakly inflated, palpomere 3 asymmetrical, with concave mesal and convex lateral edge; palpomere 4 elongate, with slightly convex lateral and mesal edges; apex oval. Palpomeres yellow, without infuscations. Mentum ca. 1.9 x as wide as long, flat, anterior margin very weakly flexed dorsad; sparse, widely separated, very long setae, arising from very fine punctures on ventral face; microsculpture absent; lateral margins distinctly projecting, densely fringed with setae, with distinct anterior angles; anterior margin semicircular, emarginate. Labial palpi moderately slender, palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 25): Pronotum light brown, with darker central patch, not reaching anterior pronotal margin, variably reaching posterior margin. Punctation obsolete. Surface smooth, shiny, microsculpture absent. Lateral margins with very fine bead, weakly convex, with distinct, rounded anterior and posterior angles. Transverse fold long, sharp. Prosternum and hypomeron brown. Prosternum bulged, projecting towards gula mesally. Scutellar shield almost equilateral, in most individuals light brown with darker margins, sometimes entirely dark, surrounded by a large, lighter brown adjacent elytral area; smooth, punctures obsolete. Elytra not explanate postero-laterally, without impressions, without distinct callosity on shoulder regions, with fine

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anterior and lateral bead. Elytra light brown, with indistinct, large, brighter areas along elytral margins, particularly antero-mesally. Elytral punctures fine, very flat, widely spaced; denser and with slight subserial arrangement towards lateral margins. Border of elytra densely set with fine, minute setae, arising from ventral face of elytral margin, distinctly longer posteriorly. Microsculpture absent. Sharply impressed sutural stria present in posterior 0.66–0.75 of elytra. Anapleural sutures distinct, anterior sections slightly converging craniad, not present on anterior collar of mesothorax. Epipleura, meso- and metaventrite unicoloured brown. Anepisternum 2 glabrous, with reticulate microsculpture, with very indistinct oblique ridge antero-laterally. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with very low horizontal ridge postero-mesally. Metaventrite bulged mesally, almost completely pubescent with a very small less pubescent or glabrous central area.

Legs (Fig. 34) coloured like ventrites. Procoxa with some stiff, spine-like setae near trochanteral joint. Pro- and mesofemoral hairlines distinct. Profemur 3.0 times as long as wide, profemur pubescent on proximal 0.75, with round to slightly oblique hairline; mesofemur almost completely pubescent except on extreme apical portion, with slightly convex hairline; metafemur with indistinct, almost horizontal hairline, hydrofuge pubescence confined to anterior margin, with rather scattered setae on proximal portion. Metatibia with moderately strong spines on lateral margin; metatibial spurs moderately strong, the longer mesal spur extending to halflength of tarsomere 2. Protarsomeres 1–4 ventrally set with strong spine-like setae; mesotarsomeres 1–4 with some spine-like setae ventrally, with long fine sparse setae dorsally. Metatarsus as long as metatibia. Tarsomere 2 twice as long as tarsomere 1, distinctly longer than tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 43): Phallobase about as long as parameres, parallel-sided to slightly widening basad, manubrium very narrow, distinctly demarcated from phallobase. Parameres moderately slender, mesal margin with distinct incision in midlength, lateral margin almost straight with very indistinct indentation subapically, apices weakly sclerotized, broadly rounded. Median lobe very short and wide; corona in apical position; apex bluntly rounded; basal apophyses narrow, almost straight, shorter than main piece of median lobe, with distinct extension into phallobase. Base of median lobe visibly connected with parameres by a very small tooth.

BIONOMICS: The individuals of this species were found in a small spring in secondary growth almost entirely covered with rich decaying plant material, probably bamboo (personal communication by D.S. Boukal).

DISCUSSION: The specific rank of this species is justified mainly by the very distinctive aedeagus. *Anacaena boukali* resembles *A. setifera* and *A. minuscula*. With *A. setifera* it shares the distinct setae on elytral margin. This feature may represent a synapomorphy of the two species.

ETYMOLOGY: This species is dedicated to the collector and esteemed water beetle specialist, David S. Boukal, České Budějovice, Czech Republic.

DISTRIBUTION: Southern India (Kerala).

Anacaena jaegeri sp.n.

TYPE LOCALITY: Stream near Ganpokhara (village, 30 km NE of Pokhara), Telbrung Danda (mountain), 2000 m a.s.l., Kaski District, Gandaki Zone, Western Region, Nepal.

TYPE MATERIAL: **Holotype** ♂ (MTD): "Nepal, Himalaya, SE Annapurna Mts. / leg. O. Jäger 1997 \ bel. [below] Telbrung Danda / near Gangpokhara [sic!], / 2000m, 14.-15.VI.". **Paratypes**: 9 exs. (MTD, NMW): same data as holotype.

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DIAGNOSIS: Body small, evenly rounded. Clypeus, frons, pronotum and elytra dark brown with indistinct, brighter preocular patches, indistinctly brighter pronotal margins; clypeus large with indistinct antero-lateral angles; nine antennomeres; maxillary palpi stout, palpomere 4 with slight infuscation; mentum flat; gular sutures narrow anteriorly; punctation on head and pronotum very fine, on elytra fine, widely spaced, with a slight subserial arrangement on lateral and posterior portions; mesoventrite with distinct, pointed, mesal protuberance; procoxae without spine-like setae; legs lighter brown than ventrites; metafemoral pubescence on more than proximal half, metatarsus shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: This species is easily recognizable and can be distinguished from the sympatric *A. laevis* by the very dark colour of head, pronotum and elytra, the flat mentum, the comparatively reduced metafemoral pubescence, the larger relation of metatarsus to metatibia, and by the distinctive aedeagus.

DESCRIPTION: Total length 2.0–2.2 mm; total width 1.4 mm; E.I.: 1.15. Habitus oval, with greatest width in midlength; elytra about 3.2 x as long as pronotum in dorsal view.

Head (Figs. 9, 17): Clypeus, frons and labrum very dark brown, with brighter, yellowish preocular patches; temporal regions, gula, cardo, stipes, submentum, mentum, and prementum dark brown, labial palpi light brown. Punctation very fine. Interstices shiny, microsculpture absent. Clypeus large in length, with distinct anterior angles. Frontoclypeal suture very weak. Eyes not constricted; dorsal portion almost circular, about as large as ventral portion. Interocular distance ca. 4.0 x as large as horizontal diameter of dorsal portion of one eye. Gular sutures narrowed anteriorly. Nine antennomeres; pedicellus two times as long as wide; antennomere 3 slightly elongate, about as long as antennomeres 4 and 5 together. Antennal club about three times as long as wide, with slightly ovoid apical antennomere. Maxillary palpi stout; palpomere 2 distinctly inflated, palpomere 3 almost symmetrical, with convex mesal and lateral edge; palpomere 4 elongate, with slightly convex lateral and mesal edges; apex oval. Palpomeres yellowish to reddish brown, palpomere 4 with slight apical infuscation. Mentum ca. 1.5 x as wide as long, rather flat, anterior margin very weakly flexed dorsad; rather sparse, widely separated, long setae, arising from very fine punctures on ventral face; microsculpture absent; lateral margins slightly projecting, loosely fringed with setae, with rather indistinct anterior angles; anterior margin semicircular, slightly emarginate. Prementum with comparatively weakly projecting lateral sclerites. Labial palpi moderately slender; palpomere 3 about as long as palpomere 2.

Thorax (Fig. 26): Pronotum dark brown, with yellowish to light brown narrow margins. Punctation very fine to obsolete; Surface smooth, shiny, microsculpture absent. Lateral margins with a very fine bead, weakly convex, with distinct, rounded anterior and posterior angles. Transverse fold short, sharp. Prosternum bulged, projecting towards gula mesally. Scutellar shield almost equilateral, dark brown, punctures obsolete. Elytra not explanate postero-laterally, without impressions, with a distinct callosity on shoulder regions, with fine anterior and lateral bead. Elytra unicoloured dark brown; punctures fine, densely distributed; spaces about twice the diameter of a puncture in center of elytra, about as wide as punctural diameter towards lateral margins; punctation with slight subserial arrangement, particularly towards lateral areas. Borders of elytra without setae. Microsculpture absent. Sharply impressed sutural stria present in more than posterior half to posterior 0.66 of elytra. Anapleural sutures distinct, anterior sections slightly converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous, with reticulate microsculpture, with indistinct oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured dark brown. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with postero-mesal, distinct, acutely pointed protuberance. Metaventrite bulged mesally, almost completely pubescent without glabrous median area.

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Legs (Fig. 35) coloured like ventrites. Procoxa without spine-like setae. Femoral hairlines distinct. Pro- and mesofemur pubescent on proximal 0.75, with round to slightly oblique hairline; metafemur pubescent on proximal 0.66, with oblique hairline. Metatibia with rather weak spines on lateral margin; metatibial spurs moderately strong, the longer mesal spur not reaching to halflength of tarsomere 2. Protarsomeres 1–5 with dense, fine setae. Metatarsus shorter than metatibia; tarsomere 2 about three times as long as tarsomere 1, twice as long as tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 44): Phallobase longer than parameres, almost parallel-sided, manubrium very short, indistinctly demarcated from phallobase. Parameres wide basally, continuously widening towards very broadly rounded apex, lateral margin almost straight, medial margin very slightly sinuate. Median lobe shorter than parameres; corona in subapical position; apex bluntly rounded; basal apophyses narrow, shorter than main part of median lobe, slightly curved inwards, with distinct extension into phallobase. Base of median lobe visibly connected with parameres by short tooth.

BIONOMICS: The specimens of this species were collected in the back water areas of a small temporary stream with moderately steep slopes, covered with secondary forest and spiny shrub (personally communicated by O. Jäger).

DISCUSSION: The very distinctive aedeagus which separates this species from all other known species of *Anacaena* is a supposed autapomorphy and justifies the separate specific rank.

ETYMOLOGY: The species is dedicated to Olaf Jäger (MTD), who collected the specimens during one of his expeditions to Nepal.

DISTRIBUTION: Nepal.

Anacaena laevis d'ORCHYMONT, 1936

Anacaena laevis d'ORCHYMONT 1936: 257.

TYPE LOCALITY: Aglar River, Tehri Garhwal District, Uttaranchal, northern India (see d'ORCHYMONT 1936).

TYPE MATERIAL: **Holotype** ♂ (not examined, deposited in the Agricultural and Forest Research Institute, Dehra Dun, Uttaranchal, India, see d'ORCHYMONT 1936). **Paratype**: 1 ♂ (ISNB): "m [male]\ W. Almora / Kumaon India / H.G. Champion / coll. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ Knisch det. 1922 / bipustulata M. \ A. d'Orchymont det. / Anacaena / laevis m. Paratype \ Paratype [red label]." The paratype specimen was examined.

ADDITIONAL MATERIAL EXAMINED:

INDIA: Himachal Pradesh: 28 exs. (NHM): "Jibhi, Seraj / Punjab 6,000 ft, H.C.G., v.1926 \ H.G. Champion Coll. / B.M.1953-156"; 4 exs. (NHM): "Jhatingri / Mandi. Punjab. / 6,000 ft. H.C.G.\ H.G. Champion Coll. / B.M.1953-156"; 2 exs. (NHM): "Dharmsala. / Punjab.H.C.G. \ H.G. Champion Coll. / B.M.1953-156"; **Uttaranchal:** 2 exs. (NHM): "Nainital. / India. 7–8,000 ft. / vii 1923. H.C.G. \ A. bipustulata Marsh. [handwritten] \ det. Knisch. / W.E.Z. 1924"; 1 ex. (NHM): "[handwritten]: Nainital. / Kumaon / H.C.G. \ A. bipustulata M. \ det. Knisch. / W.E.Z. 1924"; 1 ex. (NHM): "Gori R.Gorge / N.Kumaon, India. / 5–9000 ft. H.C.G. \ A. bipustulata M. [handwritten]"; 4 exs. (FMNH): "Mussoorie. On gilled mushrooms", 20.VIII.1947, leg. D. LeShane-Woodstock; **Sikkim:** 1 ex. (NHM): "Singhik. 5.000 ft., 24.IV.1924, Maj. R.W.G. Hingston, Everest exp. Brit. Mus. 1924-386".

NEPAL: 12 exs. (NMW, AEZS): Nepal central, Godawari, 16.–17.V.1992, leg. I. Jeniš; 2 exs. (NMW): Langtang Area, E Dhunche, small brook, N big road bridge, 28°06'N, 85°18'E, 13.XI.2003, leg. Freitag "23a"; 44 exs. (NMW): Narayani Prov., Sauraha Ufer Rapti Riv., 27°34'80"N 84°29'49"E, 180 m, 18.IV.2000, leg. Skale, A. Weigel & F. Wolf; 1 ex. (NMW): near border to Tibet, torrent, 1–2 m wide, in degraded primary forest above Tatopani/Kodari, 1800 m a.s.l., 1.III.1981, leg. M. Jäch, "N31"; 2 exs. (NMW): near border to Tibet, Bairavkund Khola, right tributary to Bhote Koshi river at Tatopani/Kodari, 1600 m a.s.l., 1.III.1981, leg. M. Jäch, "N32"; 282 exs. (ASC, NMW): Manaslu Mts., Bara Pokhari Lekh, Chhandi Khola Valley, 2000–2200 m, 11.–

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12.IV.2003, leg. J. Schmidt; 5 exs. (ASC, NMW): Manaslu Mts., Dudh Pokhari Lekh, 2100–2500 m a.s.l., above Phulinggiri Mardi, 19.–21.IV.2003, leg. J. Schmidt; 11 exs. (ASC, NMW): Manaslu Mts., Dudh Pokhari Lekh, below Helam Pokhari, 2000 m a.s.l., 22.IV.2003, leg. J. Schmidt; 1 ex. (NHM): Bakhri Kharka, 28°23'N 84°7.5'E, 5500 ft., 24.VI.1954, damp mossy grassy earth in shade of trees & rocks, leg. K.H. Hyatt; 12 exs. (NHM): Kathmandu Dist., Godawari, 24.V.–6.VI.1983, at light, leg. M.J.D. Brendell "B.M.1983-222"; 32 exs. (NHM): Kathmandu Dist., Godawari, 22.VI.1983, at light, leg. M.J.D. Brendell "BMNH (E)1983-222"; 1 ex. (MTD): Annapurna, Krapa Danda, 26.V.97, leg. J. Schmidt; 2 exs. (MTD): Myagdi Distr., Bhuji Khola above Sukurdung, 2000–2500 m, 6.III.1994, leg. D. Ahrens 1994; 1 ex. (MTD): Annapurna, Telbrung Danda, 2000 m, 15.VI.1997, leg. J. Schmidt; 2 exs. (MTD): SE Annapurna Mts., Siklis Mts., torrent at Kyojo–Kharka, 1850 m, in pools of a W tributary to Madi Khola, about 2 m wide, with steep slopes in dense secondary forest, leg. O. Jäger 1996; 4 exs. (MTD): Annapurna Mts., Madi Khola Valley, N Siklis, river near Kyojo Kharka, 1900 m, W tributary to Madi Khola, in dense secondary forest, 2.V.1996, leg. O. Jäger; 4 exs. (MTD): 20 km W Pokhara, Mt. Panchase, 2300 m a.s.l., in pools of a temporary stream in secondary forest, 20.V.1997, leg. O. Jäger; 3 exs. (MTD): Mt. Panchase, 20 km W Pokhara, 2300 m, forest soil sievings, 20.V.1997, leg. O. Jäger; 5 exs. (MTD): Mt. Panchase, W Pokhara, above Tute, 1900 m, south oriented, slowly flowing, narrow stream in loose secondary forest, in shallow pools (ca. 2 m²), shady, lacking vegetation, 22.V.1997, leg. O. Jäger; 3 exs. (MTD): S Annapurna, Lamjung Himal, Madi Khola Valley, 3 km N Siklis, 1750 m, stream beneath Dhara Kharka, 1–6 m wide, course of stream largely influenced by water mills, unshaded, SE oriented, in rather flat area with bushy pastures, 26.IV.1996, leg. O. Jäger; 1 ex. (MTD): Annapurna, S-slope Madi Khola Valley, river above Khilang, 1950 m, NW tributary to Madi Khola, 2–4 m wide, with moderately steep decline, in secondary forest and scrubland, partly shady, 12.–13.V.1996, leg. O. Jäger; 1 ex. (MTD): Annapurna Mts., Madi Khola Valley, N Siklis, small stream near Hogo Kharka, W tributary to Madi Khola, 1–4 m wide, in steep area, in pools, 1900–2000 m, 4.V.1996, leg. O. Jäger; 12 exs. (MTD): Kathmandu–Valley, Godawari, Mt. Phulchoki, North slope, 1750 m, temporary stream, in pools (ca. 0.5 m²), at roadside in scrubland and secondary forest, 6.V.2001, leg. O. Jäger; 3 exs. (MTD): Annapurna, W Mardi Himal, N of Bhichok – Deurali, 28°18'57"N 83°49'59"E, 2100 m, highly polluted buffalo-pool in pasture, 10.V.2001, leg. O. Jäger; 34 exs. (MTD, NMW): SW Manaslu, Bhara Pohari Lekh, above Taksa, way on ridge, siftings, 2100–2200 m a.s.l., 11.IV.1999, leg. O. Jäger; 7 exs. (MTD, NMW): SE Daulaghiri Himal, Rahughat Khola Valley, riverbank S Dwari, 1850 m a.s.l., 28°31'03"N 83°30'36"E, 10.V.2002, leg. O. Jäger; 56 exs. (ASC, NMW): Annapurna Mts., Baglung Lekh, ca. 18 km W Baglung, above Okhle Village, 2300 m a.s.l., 13.V.2004, leg. J. Schmidt; 65 exs. (ASC, NMW): Manaslu Mts., Bara Pokhari Lekh above Taksar village, 2100 m a.s.l., 11.IV.1999, leg. J. Schmidt; 1 ex. (ASC): Manaslu Mts., S Bara Pokhari, 2300 m a.s.l., 8.IV.2003, leg. J. Schmidt; 33 exs. (ASC, NMW): Manaslu Mts., S Bara Pokhari, 2000 m a.s.l., 1.IV.1999, leg. H. Lau & J. Schmidt; 9 exs. (ASC, NMW): Kathmandu Valley, Godawari, Mahabharat, 15.V.–25.VI.1995, leg. J. Kolibáč; 13 exs. (ASC, NMW): Baglung Lekh, W Pokhara, 10–15 km Baglung, 28°18'36"N 83°31'56"E, 2300–2550 m a.s.l., 10.–12.V.2004, leg. J. Schmidt; 1 ex. (ZMUC): Nepal, Kosi Valley, Induwa Kola, 2000 m, 16.IV.1984, leg. I. Löbl & A. Smetana.

DIAGNOSIS: Body moderately small, evenly and broadly rounded. Clypeus, frons, pronotum and elytra dark brown with distinct yellow preocular patches and indistinctly brighter lateral areas on pronotum and elytra; clypeus rather large with blunt antero-lateral angles; nine antennomeres; maxillary palpi moderately stout with or without apical infuscation; mentum excavated; punctation on head and pronotum very fine, on elytra coarser, denser, and only laterally with short subseriate rows of coarser punctures; mesoventrite with distinct, acutely pointed mesal protuberance; procoxae without spine-like setae; legs dark brown like ventrites; metafemoral pubescence extended with round hairline; metatarsus distinctly shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: This species is very similar to *A. laevoides*, differing from this species mainly by the darker pronotum and elytra, in most individuals with brighter areas, by the excavated mentum, the large clypeus, the acutely pointed protuberance on the mesoventrite, the rounded metafemoral hairline, the metatarsus much shorter than the metatibia, and the different aedeagus.

REDESCRIPTION: Total length 2.1–2.4 mm; total width 1.4–1.6 mm; E.I.: 1.09. Habitus (Fig. 2) rather broadly oval, with greatest width in midlength; elytra about 4.2 x as long as pronotum in dorsal view.

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Head (Figs. 10, 18): Clypeus, frons, and labrum dark brown, clypeus with large, yellow, indistinctly demarcated preocular patches, sometimes confluent; some individuals with very dark brown to almost black clypeus and frons, without brighter areas. Temporal regions, gula, maxilla, submentum, mentum, prementum, and labial palpi dark brown. Punctures fine, with irregular distribution and moderately wide distances, not distinctly denser towards clypeal margins, without setae, without series of punctures along inner margin of eyes. Interstices shiny, microsculpture absent. Clypeus large in length, straight anteriorly, with blunt anterior angles. Frontoclypeal suture indistinct. Eyes very slightly constricted anteriorly by clypeal extension; dorsal portion sligthly larger than ventral portion. Interocular distance 3.7 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus about twice as long as wide; antennomere 3 elongate, about as long as antennomeres 4 and 5 together. Antennal club 3.5 x as long as wide, with elongate ovoid apical antennomere. Maxillary palpi moderately stout; palpomere 2 slightly inflated; palpomere 4 with almost symmetrical edges; apex round. Palpomeres unicoloured yellow, with or without apical infuscation. Mentum ca. 1.7 x as wide as long, with distinct large depression on center of ventral face, anterior margin flexed dorsad; short setae arising from irregularly distributed fine punctures on ventral face; rather strong short setae on anterior margin; microsculpture absent; lateral margins distinctly projecting, densely fringed with long fine setae, with distinct anterior angles; anterior edge projecting, sinuate, with deep emargination mesally. Prementum with large lateral sclerites. Labial palpi moderately stout; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 27): Pronotum dark brown, indistinctly brighter towards lateral margins; some individuals with almost entirely dark brown to almost black pronotum. Punctation very fine, widely spaced; microsculpture absent. Lateral margins with a very fine bead, weakly convex, with broadly rounded anterior and posterior angles. Transverse fold present. Prosternum slightly bulged, slightly projecting towards gula mesally. Scutellar shield almost equilateral, dark brown, smooth, very finely punctate. Elytra not explanate, without impressions, without callosity on shoulder regions, with indistinct anterior and lateral bead. Elytra dark brown to black; indistinct brighter brown areas antero-mesally near scutellar shield and on lateral and posterior portions often present; some individuals with entirely black elytra. Elytral punctures fine but much coarser than on pronotum and head, distinct, shallow, rather equidistant, densely distributed, interstices 1–3 x as large as diameter of punctures. Punctures irregular on elytral disc, indistinct short rows of subserially arranged coarser punctures laterally. Setae on elytral margins absent, microsculpture absent. Sharply impressed sutural stria in posterior 0.66, ending in a distance of 2–4 x the length of scutellar shield. Anapleural sutures distinct, anterior sections converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous like mesoventrite, with reticulate microsculpture, with oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", with a distinct, sharply pointed protuberance postero-mesally, with slightly craniad pointing apex. Metaventrite bulged mesally, pubescent, with a small, variably sized glabrous median area.

Legs (Fig. 36) coloured like ventrites. Procoxa pubescent, without spine-like setae. Femoral hairlines distinct. Profemur 2.0 x as long as wide, pubescent on proximal 0.75, mesofemur on 0.80, with straight to slightly convex hairline; pubescence of metafemur on proximal 0.66, with rounded, slightly oblique hairline, reaching posterior margin proximal of halflength. Metatibia with moderately strong spines on lateral margin; metatibial spurs strong, the longer mesal spur extending to halflength of tarsomere 2. Protarsus ventrally set with stiff hairs rather than with spines; metatarsomeres 1–4 with terminal short spines, ventral rows of spines absent, metatarsomere 5 with fine hairs ventrally. Metatarsus distinctly shorter than metatibia; metatarsomere 2 slightly longer than metatarsomere 5.

Abdominal ventrites rufous, entirely covered with dense hydrofuge pubescence.

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Aedeagus (Fig. 45): Phallobase slightly longer and wider than parameres, manubrium broadly rounded, demarcated from phallobase. Parameres moderately slender, lateral margins slightly dented subapically, mesal margins slightly bisinuate, apices broadly rounded. Median lobe wide, distinctly shorter than parameres; corona in subapical position; basal apophyses slightly shorter than main part of median lobe, with distinct extension into phallobase. Base of median lobe connected with parameres by a small tooth.

BIONOMICS: The individuals of this species are mainly found in pools of permanent or temporary streams and torrents in forests, scrubland, and even in highly polluted pools in pastures. It is also collected in damp mossy grassy earth, by forest soil sievings, and at light.

DISCUSSION: *A. laevis* was compared with *A. mista* d'ORCHYMONT, 1932 and *A. modesta* d'ORCHYMONT, 1932, and also with *A. bipustulata* (MARSHAM, 1802) by d'ORCHYMONT (1936) who underlined the differential characters of these species. This species is very similar to *A. laevoides*, including the aedeagus, a fact which may point to a closer phylogenetic relationship of these two species.

DISTRIBUTION: Northern India (Himachal Pradesh, Uttaranchal, Sikkim) and Nepal.

Anacaena laevoides sp.n.

TYPE LOCALITY: Nokrek National Park, 25°29.6'N 90°19.5'E, ca. 1100 m a.s.l., West Garo Hills District, Meghalaya, northeastern India.

TYPE MATERIAL: **Holotype** ♂ (NMW): "India, Meghalaya, W Garo Hills, Nokrek NP, ca. 1100m, 25° 29,6' N 90° 19,5' E, 9.-17.5.1996, leg. Jendek & Sausa". **Paratypes**: 26 exs. (NMW, AEZS): same data as holotype; 1 ex.: "NE India Meghalaya State / Khasi Hills Reg., / MAWPHLANG vill. / 2-3.VI., 10.VI. 1996 \ alt 1700±50m / GPS N 25°26.7' / E 91° 45.2' (WGS 84) / E. Jendek & O. Šauša leg."; 3 exs. (NHM): "[Uttaranchal] Haldwani Dist. / Kumaon, India. / H.C.G. \ H.G. Champion Coll. / B.M.1953-156"; 1 ex. (NHM): "[Uttaranchal] Haldwani Div. / Kumaon / India. H.C.G. \ A. bipustulata M. [handwritten]".

DIAGNOSIS: Body moderately small, evenly and broadly rounded; frons, pronotum and elytra light brown, clypeus indistinctly brighter, pronotum and elytra unicoloured light brown; clypeus rather short without antero-lateral angles; nine antennomeres; maxillary palpi rather stout without apical infuscation; punctation on head very fine, on pronotum very fine to obsolete, on elytra fine and only laterally with short subseriate rows of coarser punctures; mesoventrite with indistinctly pointed mesal horizontal ridge; procoxae without spine-like setae; legs dark brown like ventrites; metafemoral pubescence extended with oblique hairline; metatarsus as long as or slightly shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: *A. laevoides* is very similar to *A. laevis*, differing from this species mainly in the brighter brown pronotum and elytra (in most specimens), the flat mentum, the comparatively short clypeus, the lower, less pointed protuberance on the mesoventrite, the oblique metafemoral hairline, and a longer metatarsus (almost as long as metatibia). From *A. jaegeri* it differs mainly in the bright colour, the slightly more extended metafemoral pubescence, and the aedeagus.

DESCRIPTION: Total length 2.3–2.4 mm; total width 1.4 mm; E.I.: 1.16. Habitus (Fig. 3) rather broadly oval, with greatest width in midlength; elytra more than four times as long as pronotum in dorsal view.

Head (Figs. 11, 19): Clypeus, frons and labrum dark brown, clypeus with large, indistinctly demarcated, yellow preocular patches, sometimes confluent; temporal regions, gula, maxilla, submentum, mentum, prementum and labial palpi dark brown. Punctures very fine, with irregular distribution, widely spaced, not distinctly denser towards clypeal margins, without

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setae, without distinct series of punctures along inner margin of eyes. Interstices shiny, microsculpture absent. Clypeus short in length, not excised anteriorly, without discernible anterior angles. Frontoclypeal suture indistinct. Eyes not constricted, with equally sized dorsal and ventral portion. Interocular distance 3.7 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus about twice as long as wide; antennomere 3 slightly elongate, about as long as antennomere 4 and cupula together. Antennal club 3.0 x as long as wide, with elongate ovoid apical antennomere. Maxillary palpi rather stout; palpomere 2 slightly inflated; palpomere 4 with almost symmetrical edges; apex evenly rounded. Palpomeres unicoloured yellow, without or with very slight apical infuscation. Mentum ca. 1.7 x as wide as long, flat, anterior margin flexed dorsad; setae arising from irregularly distributed fine punctures on ventral face; microsculpture absent; lateral margins distinctly projecting, densely fringed with long fine setae, with distinct anterior angles; anterior edge projecting, rounded, with slight emargination mesally. Labial palpi moderately stout; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 28): Pronotum unicoloured light brown with very indistinct slightly darker areas. Punctation very fine, almost obsolete, widely spaced, microsculpture absent. Lateral margins without distinct bead, weakly convex, with broadly rounded anterior and posterior angles. Transverse fold present. Prosternum and hypomeron equally brown. Prosternum slightly bulged, slightly projecting towards gula mesally. Scutellar shield almost equilateral, brown, smooth, very finely punctate. Elytra not explanate, without impressions, without callosity on shoulder regions, with indistinct anterior and lateral bead. Elytra almost unicoloured light brown, with very indistinct darker areas, with a parasutural series of small dark spots. Elytral punctures fine but much coarser than on pronotum and head, distinct, shallow, almost equidistant, moderately densely distributed, interstices much larger than diameter of punctures; irregular on elytral disc, with indistinct short rows of subserially arranged coarser punctures laterally. Setae on elytral margins absent. Microsculpture absent. Sharply impressed sutural stria present in posterior 0.66, ending in a distance of 2–3 x the length of scutellar shield. Anapleural sutures distinct, anterior sections converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous like mesoventrite, with reticulate microsculpture, with short, oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", with a sharply edged, very indistinctly pointed horizontal ridge postero-mesally. Metaventrite bulged mesally, pubescent with a small glabrous median area.

Legs (Fig. 37) coloured like ventrites. Procoxa pubescent, without spine-like setae. Femoral hairlines distinct. Profemur 2.3 times as long as wide, profemur pubescent on proximal 0.66, mesofemur on 0.75, with convex hairline; pubescence of metafemur on proximal 0.66, with oblique hairline reaching posterior margin of femur approximately in midlength. Metatibia with moderately strong spines on lateral margin; metatibial spurs moderately strong, the longer mesal spur extending to less than halflength of tarsomere 2. Protarsus ventrally rather with stiff hairs than with spines, tarsomere 5 with finer setae; metatarsomeres with rows of short spines. Longer dorsal setae absent. Metatarsus slightly shorter than metatibia; tarsomere 2 longer than tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 46): Phallobase longer than parameres, manubrium broadly rounded, weakly demarcated from phallobase. Parameres moderately slender, lateral margins slightly dented in distal third, mesal margins slightly bisinuate, apices pointing mesad. Median lobe moderately wide, shorter than parameres; corona in apical position; basal apophyses shorter than main part of median lobe, with distinct extension into phallobase. Base of median lobe connected with parameres by a small tooth.

BIONOMICS: Nothing is known about the habitat of the species.

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DISCUSSION: *A. laevoides* has close morphological affinities to *A. laevis*, including a similar aedeagus, but the distinctly brighter colour of pronotum and elytra, the flat mentum, the short clypeus, the different protuberance on the mesoventrite, the different metafemoral hairline, and the distinctly longer metatarsus justify a separate specific rank.

ETYMOLOGY: The epithet refers to the similarity with *A. laevis*.

DISTRIBUTION: Northern India (Meghalaya, Uttaranchal).

Anacaena minima (SHARP, 1890)

Hydrobius minimus SHARP 1890: 348.
Paracymus minimus (SHARP 1890): ZAITZEV 1908: 379.
Anacaena minima (SHARP 1890): d'ORCHYMONT 1942: 47.

TYPE LOCALITY: Dikoya (6°52'N 80°37'E, 1400 m a.s.l.), Central Province, Sri Lanka.

TYPE MATERIAL: **Lectotype**, here designated (NHM): Two specimens mounted on one card, bearing the inscription "Lectotype" behind the left specimen, "Paralectotype" behind the right one [handwritten]: "1882-1-22 Hydrobius minimus, Type D.S., Ceylon, 22.I.82. Lewis [handwritten] \ Type [red-bordered white round label] \ Ceylon / G. Lewis \ Sharp coll. 1905-313, leg. Lewis". The genders of the specimens are not identified. In his original description, SHARP (1990) mentions "a small series of examples" from "Dikoya, in January". The specimens examined must be regarded as part of the syntype series. From its redescription it can be inferred that d'ORCHYMONT (1925) had re-examined these two specimens. Although the author's name is missing, it must be assumed that it was d'Orchymont who denoted the two specimens from Sharp's syntype series as "Lectotype" and "Paralectotype". A valid Lectotype designation by d'ORCHYMONT is though missing in his publications. Therefore, following d'ORCHYMONT's notion, the left specimen is here designated as Lectotype, the right one has to be regarded as **Paralectotype**, together with the following twelve specimens, without doubt also belonging to the syntype series**:** 2 exs. (NHM): "Hydrobius / minimus / D. S. / Ceylon 21.1.82 / Lewis [handwritten; 2 specimens mounted on one card] \ Ceylon / G.Lewis \ Sharp. Coll / 1905–313"; 4 exs. (NHM): "Hydrobius / minimus / D. S. / Ceylon 22.1.82 Lewis [handwritten; four specimens mounted on one card] \ Ceylon / G.Lewis \ Sharp. Coll / 1905–313"; 2 exs. (NHM, 2 specimens mounted on one card): "Ceylon / G.Lewis / 1910-320 \ Dikoya. / 3,800–4,200 ft./ 21.I.-7.II.82"; 1 ex. (NHM): "Hydrobius / minimus / D.S. [handwritten] \ Ceylon. / G.Lewis / 1910–320 \ Dikoya. / 3,800–4,200 ft./ 21.I.-7.II.82"; 3 exs.(NHM): "Ceylon. / G.Lewis. / 1910–320 \ Dikoya. / 3,800–4,200 ft. / 21.I.-7.II.82".

ADDITIONAL MATERIAL EXAMINED:

SRI LANKA: 1 ex. (NHM): "Kitulgalle. / 1,700 ft. / 17.–20.I.82 \ Ceylon. / G.Lewis. / 1910–320 \ Anacaena minima Sh. [handwritten]"; 1 ♀ (ISNB) "Ceylan, Kitulgalle 1.700 ft. / 17–20 I 82 / lg. Lewis 1910–320 / Coll. A. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Ceylan"] \ Anacaena minima / Sh." [this specimen has been investigated by d'ORCHYMONT (1942)]; 1 ex. (NMW): Kitulgala, ca. 60 m a.s.l., XII.1980, leg. M. Jäch "45b"; 3 exs. (NMW): Nuwara Eliya-Lake (artificial lake), ca. 1900 m a.s.l., 16.XI.1980, leg. M. Jäch; 4 exs. (NMW): Nuwara Eliya, unshadowed pool at Ragala, ca.1600 m a.s.l., 8.I.1981, leg. M. Jäch "C54"; 2 exs. (NMW): Nuwara Eliya, artificial pond with water lilies at Hakgala, ca.1700 m a.s.l., 21.XI.1980, leg. M. Jäch "C20"; 5 exs. (NMW): "Sri Lanka / Kitulgala / Sabarra Gamuwa \ Starmühlner / FC 36 a 27.12.70"; 1 ex. (NMW): "Sri Lanka / Horton Plains / Sabarra Gamuwa \ Starmühlner / FC 25 a 8.12.70".

DIAGNOSIS: Body comparatively small, evenly rounded. Clypeus brown with lighter brown to yellowish preocular patches, pronotum and elytra unicoloured brown or darker brown on central portion with large yellowish brown margins; clypeus large with blunt antero-lateral angles; nine antennomeres; maxillary palpi moderately stout with apical infuscation; punctation on head very fine, on pronotum obsolete, on elytra coarser and only laterally with indistinct short subseriate rows of punctures; mesoventrite with indistinct, low horizontal median ridge; procoxae with few spine-like setae; legs dark brown like ventrites; metafemoral pubescence reduced to anterior margin and proximal portion with horizontal hairline; metatarsus as long as metatibia.

DIFFERENTIAL DIAGNOSIS: This species differs from the similar *A. advena* by the following features: clypeus with distinct yellow preocular patches; maxillary palpomere 4 infuscated

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apically; antennae with nine antennomeres; pronotal punctures obsolete; metafemoral pubescence reduced to anterior margin and proximal portion; distinctly different aedeagus.

REDESCRIPTION: Total length 1.7–1.8 mm; total width 1.1–1.2 mm; E.I.: 1.21. Habitus (Fig. 4) oblong oval, with greatest width in midlength; elytra about 3.7 x as long as pronotum in dorsal view.

Head (Figs. 12, 20): Clypeus, frons, and labrum very dark brown, clypeus with distinct yellow triangular preocular patches, as wide as horizontal diameter of eye or slightly wider; temporal regions, gula, cardo, stipes, mentum, and submentum darker brown, prementum and labial palpi somewhat lighter. Punctures very fine, in some individuals obsolete, moderately densely distributed, not distinctly denser towards clypeal margins, without setae; a very indistinct series of very fine, densely arranged punctures along inner margin of eyes sometimes present. Interstices shiny, microsculpture absent. Clypeus large in length, not excised anteriorly, with blunt anterior angles. Frontoclypeal suture very indistinct or absent, in most individuals only present as a short black line laterally, delimiting preocular patches. Eyes not constricted; dorsal portion about as large as ventral portion. Interocular distance 5.8 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus about twice as long as wide; antennomeres 3–5 very small, of almost equal length. Antennal club 3.3 x as long as wide, with slightly elongate ovoid apical antennomere. Maxillary palpi not stout; palpomere 2 slightly inflated; palpomere 4 elongate, with almost symmetrical biconvex edges; apex oblique oval. Palpomeres yellow, palpomere 4 with infuscation apically. Mentum ca. 1.9 x as wide as long, flat, anterior margin slightly flexed dorsad; very sparse setae arising from irregularly distributed very fine punctures on ventral face; microsculpture absent; lateral margins distinctly projecting, densely fringed with long fine setae, with distinct anterior angles; anterior edge projecting, rounded, with slight emargination mesally. Labial palpi moderately stout; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 29): Pronotum dark, in some individuals lighter brown, unicoloured or with large, indistinctly demarcated yellow margins, often as wide as length of lateral pronotal edge. Punctation obsolete, microsculpture absent. Lateral margins with a fine bead, weakly convex, with slightly more pronounced posterior angles and broadly rounded anterior angles. Transverse fold present. Prosternum dark brown, slightly bulged, very slightly projecting towards gula mesally. Hypomeron lighter brown. Scutellar shield almost equilateral, dark brown, smooth, very finely punctate. Elytra not explanate, without impressions, callosity on shoulder regions absent; with distinct anterior and lateral bead. Elytra dark to light brown, unicoloured or with indistinctly demarcated brighter lateral margins of variable width, sometimes with slightly brighter area postero-laterally. Elytral punctures fine, shallow, distinct, equidistant, densely distributed, intervals slightly larger than diameter of punctures; irregular on elytral disc, indistinct short rows of subserially arranged coarser punctures laterally. Very fine, minute setae on elytral margin, arising from ventral elytral face, visible with more than 100 x amplification. Microsculpture absent. Sharply impressed sutural stria present in posterior half, very finely impressed and fading anteriorly, not reaching scutellar shield. Anapleural sutures distinct, anterior sections converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous like mesoventrite, with reticulate microsculpture, with short oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with a short, low, indistinct horizontal ridge postero-mesally. Metaventrite bulged mesally, in most individuals completely pubescent, sometimes with a small glabrous median area.

Legs (Fig. 38) coloured like ventrites. Procoxa pubescent, indistinct short stiff spine-like setae present near trochanter. Femoral hairlines distinct. Profemur 2.4 x as long as wide, pro- and mesofemur pubescent on proximal 0.75, with straight to slightly convex hairline; pubescence of

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metafemur confined to anterior margin and proximal portion, with almost horizontal hairline. Metatibia with strong spines on lateral margin; metatibial spurs moderately strong, the longer mesal spur extending to less than halflength of tarsomere 2. Tarsi with long fine setae on dorsal face. Protarsus ventrally set with strong spines, metatarsomeres 1–4 with rows of short spines. Metatarsus about as long as metatibia; metatarsomere 2 slightly longer than metatarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 47): Phallobase slightly shorter than parameres, manubrium narrow, broadly rounded, distinctly demarcated from phallobase. Parameres wide, stout, lateral margins distinctly dented in apical third, mesal margins very slightly curved, apices broadly rounded. Median lobe almost as long as parameres; corona in apical position; median lobe very wide basally, distinctly and rather abruptly narrowed apicad in midlength, basal apophyses slightly shorter than main part of median lobe, extension into phallobase curved mesad. Base of median lobe not visibly connected with parameres.

BIONOMICS: The species inhabits different stagnant water bodies, including artificial ponds and lakes.

DISCUSSION: see *A. advena*.

DISTRIBUTION: Sri Lanka.

Anacaena minuscula d'ORCHYMONT, 1942

Anacaena minuscula d'ORCHYMONT 1942: 47.

TYPE LOCALITY: Shembaganur (village), near Madurai, Tamil Nadu, India.

TYPE MATERIAL: **Holotype** ♂ (ISNB): "Chembaganor / Madura, Inde / coll. A. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ A. d'Orchymont det. / Anacaena / minuscula m. \ Type". **Paratypes**: 16 exs. (ISNB): "Chambaganor / Madura, Inde / coll. A. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ Paratype"; 39 exs. (ISNB): "Shembaganur / Madura, Inde / coll. A. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ Paratype"; 4 exs. (ISNB): "Hanoï / A. Grouvelle / coll. A. d'Orchymont [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Nord / Vietnam"] \ Paratype"; 22 exs. (ISNB): "Hanoï [handwritten] \ Coll. R.I.Sc.N.B. / Nord Vietnam: Hanoï / ex coll. A. Grouvelle / coll. A. d'Orchymont \ Paratype". d'ORCHYMONT (1942) specifies the type data as follows: "Inde, méridionale (Madura), Shembaganur, massiv de Palni, male, 2,58 x 1,58 mm. Paratypes de deux sexes. Même provenance. D'autres identiques du Tonkin (Hanoi)".

ADDITIONAL MATERIAL EXAMINED:

INDIA: 1 ex. (NHM): "India / 88–40 \ A. minima Sh."; **Karnataka:** 1 ex. (ZMUC): Gersoppa (Jog Falls), ca. 600 m, 19.–24.XI.1977; 1 ex. (NMW): Coorg, Kakkabe env., 900–1200 m, 12°15'N 75°35'E, hygropetrical (small stream flowing over a rock); some leaves and living plants, no algae; current rather fast; moderately shaded, draining disturbed forest, 22.XII.1998, leg. D. Boukal (14); **West Bengal**: 1 ex. (NMW): Santiniketan, 8.II.1999, leg. D. Boukal "92"; **Orissa**: 4 exs. (NMW): 2 km S Konark, 5.II.1999, leg. D. Boukal "91"; **Tamil Nadu**: 2 exs. (NHM): Nilgiri Hills, H.L. Andrewes, "Andrewes Bequest, BM. 1922–221"; 21 exs. (NMW, AEZS): Nilgiri Hills, 15 km SE Kotagiri, Kunchappanai, 900 m, 11°22'N 76°56'E, 17.XI.1993, leg. Z. Kejval & D. Boukal "3"; 1 ex. (NMW): Nilgiri Hills, 15 km SE Kotagiri, Kunchappanai, 900 m, 11°22'N 76°56'E, 17.–28.XI.1993, leg. D. Boukal & Z. Kejval; 5 exs. (NMW): Nilgiri Hills, Kunjappanai, 900 m, 11°22'N 76°56'E, 17.I.1999, leg. D. Boukal "69"; 2 exs. (NMW): Nilgiri Hills, Kotagiri env., Kadashola, 1500 m, 11°25'N 76°55'E, 19.I.1999, leg. D. Boukal "74"; 6 exs. (NMW): Nilgiri Hills, Kotagiri env., Honnatti, 1500 m, 11°25'N 76°55'E, 19.I.1999, leg. D. Boukal "75"; 2 exs. (NMW): Nilgiri Hills, Manjoor env., E Chamraj, 2000 m, 11°19'N 76°41'E, 21.I.1999, leg. D. Boukal "77"; 12 exs. (NMW): Nilgiri Hills, 5 km E Kundah, 1900 m, 11°18'N 76°40'E, 23.I.1999, leg. D. Boukal "80"; 9 exs. (NMW): Palni Hills, Kodaikanal – Perumalmalai road, 1700 m, 10°15'N 77°31'E, 10.I.1999, leg. D. Boukal "56"; 8 exs. (NMW): Palni Hills, Kodaikanal, Bear Shola Falls, 2100 m, 10°14'N 77°29'E, 2100 m, 11.I.1999, leg. D. Boukal "57"; 16 exs. (NMW): Palni Hills, Kodaikanal, Bear Shola Falls, 2100 m, 10°14'N 77°29'E, 2100 m, 11.I.1999, leg. D. Boukal "58"; 17 exs. (NMW): Palni Hills, Perumalmalai, 1500 m, 10°16'N 77°33'E, 12.I.1999, leg. D. Boukal "59"; 6 exs. (NMW): Palni Hills, Perumalmalai, 1600 m, 10°16'N 77°33'E, 12.I.1999, leg. D. Boukal "60"; 1 ex. (NMW): Palni Hills, Perumalmalai, 1600 m, 10°16'N 77°33'E, 12.I.1999,

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leg. D. Boukal "61"; 18 exs. (NMW): Palni Hills, Kodaikanal env., Vellagavi, 900 m, 10°11'N 77°29'E, 13.I.1999, leg. D. Boukal "62"; 7 exs. (NMW): Palni Hills, Kodaikanal – Batlagundu road, Poolathur [village], 900 m, 10°14'N 77°39'E, 15.I.1999, leg. D. Boukal "65"; 3 exs. (NMW): Palni Hills, Kodaikanal – Batlagundu road, Moolayar, 1200 m, 10°16'N 77°37'E, 16.I.1999, leg. D. Boukal "66"; 22 exs. (NMW): Palni Hills, Kodaikanal – Batlagundu road, Machur env., 1200 m, 10°18'N 77°35'E, 16.I.1999, leg. D. Boukal "68"; 23 exs. (NMW): Shevaroy Hills, Yercaud Kiliyur Falls env., 1400 m, 11°47'N 78°12'E, 25.I.1999, leg. D. Boukal "85"; 1 ex. (NMW): Shevaroy Hills, Yercaud Kiliyur Falls env., 5 km E Kundah, 1200 m, 11°47'N 78°12'E, 25.I.1999, leg. D. Boukal "86"; 3 exs. (NMW): Shevaroy Hills, 5 km SE Cauvery Peak, 1100 m, 11°48'N 78°16'E, 25.I.1999, leg. D. Boukal "88"; 4 exs. (NMW): same data, 26.I.1999, "89"; 4 exs. (NMW): road Ooty – Mettupalayam, 1000 m, hygropetric rock, 29.XII.1994, leg. P. Mazzoldi; 8 exs. (NMW): road Ooty – Masnigudi, stream at foot of Nilgiris, 27.XII.1994, leg. P. Mazzoldi; 24 exs. (NMW): Palni Hills, Kodaikanal, 1250 m, stream, 31.XII.1994, leg. P. Mazzoldi; 1 ex. (NMW): Kodaikanal, 1250 m, 31.XII.1994, leg. P. Mazzoldi; 5 exs. (NMW): road Palni – Kodaikanal, small pool 28–29 km from Kodaikanal, 1500 m, 30.XII.1994, leg. P. Mazzoldi; 1 ex. (NMW): road Salem – Yercaud, pond at 8–9 km from Yercaud, 1000 m, 4.I.1995, leg. P. Mazzoldi; **Kerala**: 42 exs. (NMW): Palni Hills, 30 km E Munnar, Top Station, 1900 m, 10°08'N 77°15'E, 2.–3.XII.1993, leg. D. Boukal & Z. Kejval "4"; 5 exs. (NMW): Palni Hills, Kodaikanal, Pallangi, 1900 m, 10°15'N 77°30'E, 2.–3.XII.1993, leg. D. Boukal & Z. Kejval "5"; 1 ex. (NMW): Palni Hills, Kodaikanal, Perumalmalai, 1500 m, 10°16'N 77°33'E, 20.XII.1993, leg. D. Boukal & Z. Kejval; 6 exs. (NMW): Cardamom Hills, 15 km SW Munnar, Kallar Valley, 1000 m, 10°02'N 76°58'E, 6.–18.XII.1993, leg. D. Boukal & Z. Kejval "7"; 8 exs. (NMW): Cardamom Hills, 10 km SW Kumily, Vallakadavu, 1000 m, 9°31'N 77°07'E, 24.XII.1993, leg. D. Boukal & Z. Kejval "10"; 1 ex. (NMW): 10 km W Munnar, 1100 m, Peechadu – Mangulam road, 10°04'N 76°58'E, large stream, ca. 5 m wide; flowing through degraded forest with cardamom plantations, steep slope, bedrock, with a small shore puddle, containing a few leaves, mud, unshaded and a slow flowing part, almost completely shaded, with roots of a shore tree, 6.I.1999, leg. D. Boukal "48"; 1 ex. (NMW): 10 km WSW Munnar, 1100–1200 m, Kallar Valley, 10°03'N 76°58-59'E, 7.–8.I.1999, leg. D. Boukal "49/52"; 17 exs. (NMW): 10 km WSW Munnar, 1100 m, Kallar Valley, 10°03'N 76°58'E, 7.I.1999, leg. D. Boukal "50"; 1 ex. (NMW): same data "51"; 5 exs. (NMW): same data "52"; 2 exs. (NMW): same data "53"; 2 exs. (NMW): same data "54"; 1 ♀ (FMNH): Calicut District, Chembra Peak, V.1970, leg. T.R. Susai Nathan, Coll. Verne Reaves.

DIAGNOSIS: Body moderately sized, evenly rounded. Clypeus, frons, pronotum and elytra brown; distinct preocular patches; pronotum with small dark central area and very large yellow margins; clypeus moderately short with indistinct antero-lateral angles; nine antennomeres; maxillary palpi moderately stout without apical infuscation; punctation on head very fine, on pronotum very fine to almost obsolete, on elytra coarser and partly arranged subserially; mesoventrite with low horizontal median ridge; procoxae with few spine-like setae; legs brown like ventrites; metafemoral pubescence reduced to anterior half and proximal portion, with horizontal, rather indistinct hairline; metatarsus shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: *A. minuscula* differs from *A. minima* mainly by the larger body size, the absence of infuscation on maxillary palpomere 4, and by the aedeagus; from *A. boukali* by the larger and more elongate body shape, the distinct preocular patches, and the aedeagus.

REDESCRIPTION: Total length 2.2–2.7 mm; total width 1.3–1.6 mm; E.I.: 1.18. Habitus (Fig. 5) oval, with greatest width in midlength; elytra about 3.3 x as long as pronotum in dorsal view.

Head (Figs. 13, 21): Clypeus, frons, and labrum dark brown. Clypeus with yellow preocular patches of varying extension; temporal regions, gula, cardo, stipes, submentum, mentum, and prementum brown, labial palpi yellowish brown. Punctures very fine, widely spaced, with a few coarser setiferous punctures interspersed; without distinct series of punctures along inner margin of eyes. Interstices shiny, microsculpture absent. Clypeus moderately short in length, straight anteriorly, with very weak anterior angles. Frontoclypeal suture indistinct. Eyes not constricted; dorsal portion ovoid, slightly larger than ventral portion. Interocular distance 4.0 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus 1.3 x as long as wide, antennomere 3 elongate, about as long as antennomeres 4 and 5 together. Antennal club about two times as long as wide, with almost spherical apical antennomere. Maxillary palpi moderately stout; palpomere 2 weakly inflated, palpomere 3 asymmetrical, with concave mesal

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and convex lateral edge; palpomere 4 elongate, with slightly convex lateral and mesal edges; apex oval. Palpomeres unicoloured yellow, without distinct terminal infuscation. Mentum ca. two times as wide as long, rather flat, anterior margin slightly flexed dorsad; setae on ventral face sparse, irregularly distributed; microsculpture absent; lateral margins distinctly projecting, densely fringed with setae, with distinct anterior angles; anterior margin semicircular, distinctly emarginate mesally. Labial palpi moderately slender; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 30): Pronotum with a dark brown central patch, with indistinctly demarcated large yellowish lateral margins and variably sized narrow yellowish anterior and posterior margins, or almost completely dark brown. Punctation very fine, slightly coarser and denser towards lateral margins, obsolete in some individuals; interstices smooth, shiny, microsculpture absent. Lateral margins with a fine but distinct bead, weakly convex, with rounded anterior and posterior angles. Transverse fold long, sharp. Prosternum and hypomeron light brown. Prosternum bulged, projecting towards gula mesally. Scutellar shield almost equilateral, dark brown, often contrasting with lighter brown adjacent areas of elytra; smooth and very finely punctate. Elytra not explanate, without impressions, with a very slight callosity on shoulder regions, often distinctly darker brown than adjacent elytral area; with distinct anterior and lateral bead. Elytra light to dark brown, with indistinct brighter areas along elytral margins in most individuals. Punctures fine, almost equidistant, unordered in anterior third, with subserial arrangement in posterior 0.66. Lateral margins of elytra with very fine, minute setae arising from ventral face of elytra, longer and more distinct on elytral apex, often visible on apex in less than 100 x amplification. Microsculpture absent. Sharply impressed sutural stria present in posterior 0.66 of elytra, ending in a distance of 2–3 x the length of scutellar shield. Anapleural sutures distinct, anterior sections slightly converging craniad, not present on anterior collar of mesothorax. Anepisternum 2 glabrous, with reticulate microsculpture, with very short oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with low horizontal ridge in postero-mesal position. Metaventrite bulged mesally, completely pubescent.

Legs (Fig. 39) coloured like ventrites. Procoxa with some stiff spine-like setae near trochanteral joint. Femoral hairlines on pro- and mesofemur distinct. Profemur 2.4 times as long as wide, pubescent on proximal 0.75, with slightly oblique hairline; mesofemur pubescent on proximal 0.80 with straight to slightly convex hairline; metafemur with indistinct, almost horizontal hairline, pubescence confined to anterior half and proximal portion. Metatibia with strong spines on lateral margin; metatibial spurs strong, the longer mesal spur extending to more than halflength of tarsomere 2. Protarsomeres ventrally set with a pair of terminal spines; mesotarsomeres 1–4 with two rows of 6–7 short spines and a pair of longer terminal spines. Metatarsus shorter than metatibia; tarsomere 2 about twice as long as tarsomere 1, slightly longer than tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 48) slender. Phallobase distinctly longer than parameres, widening proximad, manubrium broadly rounded, distinctly demarcated from phallobase. Parameres slender, inflated proximally and distally, very narrow in midlength, apices broadly rounded. Median lobe distinctly shorter than parameres, corona in subapical position; apex bluntly rounded (not pointed as described by d'ORCHYMONT 1942); basal apophyses narrow, distinctly shorter than main part of median lobe, with short extension into phallobase. Base of median lobe not visibly connected with parameres.

BIONOMICS: The specimens were collected in streams, ponds and in hygropetric habitats.

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DISCUSSION: *A. minuscula* resembles *A. minima*, a fact which has already been observed by d'ORCHYMONT (1942). Both species share the very fine punctures on the head, the obsolete punctation on the pronotum, the yellow preocular patches, the similar ridge on the mesoventrite, and the similar extension of the pubescence on the metafemur. There is no doubt about the conspecifity of the specimens found in India and in Vietnam.

DISTRIBUTION: The species is widely distributed in north-eastern India (West Bengal, Orissa), southern India (Karnataka, Tamil Nadu, Kerala) and in the northern part of Vietnam. The wide distributional gaps are probably due to the low degree of exploration.

Anacaena minutalis d'ORCHYMONT, 1942

Anacaena minutalis d'ORCHYMONT 1942: 47.

TYPE LOCALITY: Konbir (village), Gumla District, Bihar, northeastern India.

TYPE MATERIAL: **Holotype** ♂ (ISNB): "Konbir / P. Cardon [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ A. d'Orchymont det. / Anacaena / minutalis m. \ Type". **Paratypes**: 2 exs. (ISNB): "Konbir / P. Cardon [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ A. d'Orchymont det. / Anacaena / minutalis m. \ Paratype"; 7 exs. (ISNB): "Konbir / P. Cardon [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde "] \ Paratype"; 1 ♀ (ISNB): "Barway / P. Cardon [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde Bengale"] \ A. d'Orchymont det. / Anacaena / minutalis m. \ Paratype"; 1 ♂ (ISNB): "Tetara / [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde / Bengale / Rec. P. Cardon"] \ A. d'Orchymont det. / Anacaena / minutalis m. \ Paratype"; 1 ♀ (ISNB): "Mandari (Beng. / P. Cardon lg. [mounted on a yellow label: "Coll. R.I.Sc.N.B. / Inde"] \ A. d'Orchymont det. / Anacaena / minutalis m. \ Paratype".

ADDITIONAL MATERIAL EXAMINED:

INDIA: Kerala: 3 exs. (NMW): Cardamom Hills, 15 km SW Munnar, Kallar Valley, 1000 m, 10°02'N 76°58'E, 6.–18.XII.1993, leg. D. Boukal & Z. Kejval "7"; 1 ex. (NMW): 5 km S Rani, 9°21'N 76°47'E, 1.I.1994, leg. D. Boukal & Z. Kejval "14"; 1 ex. (NMW): 10 km W Munnar, 1100 m, Peechadu – Mangulam rd., 10°04'N 76°58'E, large stream, ca. 5 m wide; flowing through degraded forest with cardamom plantations, steep slope, bedrock, with a small shore puddle, containing a few leaves, mud, unshaded and a slow flowing part, almost completely shaded, with roots of a shore tree, 6.I.1999, leg. D. Boukal "48"; 1 ex. (NMW): Cardamom Hills, Periyar Nat. Park, 900 m, 12.X.1991, leg. R. Schuh; **Karnataka**: 9 exs. (NMW, AEZS): Coorg Kakkabe env., Abbi Falls Rd., 900–1200 m, 12°30'N 75°45'E, wet cattle and goat pasture with water puddles, next to a small stream, ca 0.5–1 m wide, shallow (less than 10 cm), with riffles and shore vegetation, 20.XII.1998, leg. D. Boukal "8"; 2 exs. (NMW): Coorg Kakkabe env., 900–1200 m, 12°15'N 75°35'E, larger stream, channel ca. 5 m wide, with large boulders, rocky bed with some stones and gravel in riffles, silt in pools, rather shaded, flowing through a small canyon in cultivated land, 21.XII.1998, leg. D. Boukal "12"; 4 exs. (NHM): "Belgaum. N \ Andrewes Bequest / B.M.1922-221"; 1 ex. (NMW): Coorg Napoklu env., 900–1200 m, 12°20'N 75°40'E, large river; ca 20 m wide, at examined sites ca 0.5–0.7 m deep, slowly to moderately flowing, with gravel, silt, and mud, unshaded except some shore parts, channel draining cultivated land, slightly polluted with muddy deposits, 24.XII.1998, leg. D. Boukal "19"; **Tamil Nadu**: 1 ex. (NHM): "Nilgiri Hills, H.L.Andrewes \ Andrewes Bequest / B.M.1922-221 \ Anacaena pictula Rég. [handwritten]"; **West Bengal**: 10 exs. (NMW): Santiniketan, 8.II.1999, leg. D. Boukal "92".

BANGLADESH: 1 ex. (ZMUC): Sherpur, X.1977, leg. H. Salomonsen.

SRI LANKA: 1 ex. (NMW): pond between Nuwara Eliya and Nanu Oya river, ca. 1800 m a.s.l., 17.XI.1980, leg. M. Jäch "C16"; 1 ex. (ZMUC): Sinharaja, 4.XII.1979; 1 ex. (ZMUC): Inginiyagala, 14.XII.1979.

DIAGNOSIS: Body very small, evenly rounded. Clypeus, frons, and pronotum brown, clypeus with distinct preocular patches, pronotum with very large yellow pronotal margins, elytra of speckled appearance, brown with small dark brown patches; clypeus short with very indistinct antero-lateral angles; nine antennomeres; maxillary palpi moderately stout with apical infuscation; punctation on head very fine, on pronotum obsolete, on elytra coarser, without serial arrangement; mesoventrite with low horizontal median ridge; procoxae with few spine-like setae; legs brown like ventrites; metafemoral pubescence reduced to anterior margin and proximal portion, with horizontal, rather indistinct hairline; metatarsus shorter than metatibia.

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DIFFERENTIAL DIAGNOSIS: The speckled appearance is a very striking feature of this species. Apart from the dorsal colouration, *A. minutalis* is very similar to *A. minima*, differing by the comparatively larger eyes and the shape of the aedeagus. *A. minutalis* differs from *A. minuscula* mainly by the smaller body size, the presence of infuscation on maxillary palpomere 4, and by the aedeagus.

REDESCRIPTION: Total length 1.9 mm; total width 1.1 mm; E.I.: 1.15. Habitus (Fig. 6) oval, with greatest width in midlength; elytra about 3.7 x as long as pronotum in dorsal view.

Head (Figs. 14, 22): Clypeus, frons and labrum dark brown, with distinct yellow triangular preocular patches, as wide as horizontal diameter of eye or slightly wider; temporal regions, gula, cardo, stipes, submentum, and mentum darker brown, prementum, and labial palpi somewhat lighter. Punctures very fine, almost obsolete, without series of punctures along inner margin of eyes. Interstices shiny, microsculpture absent. Clypeus short in length, not excised anteriorly, with very blunt, anterior angles. Frontoclypeal suture very indistinct or absent, in most individuals present as a short black line laterally, delimiting preocular patches. Eyes spherical, not constricted, dorsal portion larger than ventral portion. Interocular distance 2.9 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres; pedicellus about twice as long as wide, antennomere 3 slightly elongate, antennomeres 4 and 5 very small. Antennal club 3.3 x as long as wide, with slightly elongate ovoid apical antennomere. Maxillary palpi not stout; palpomere 2 slightly inflated; palpomere 4 elongate, with almost symmetrical biconvex edges; apex oblique oval. Palpomeres unicoloured yellow, with indistinct apical infuscation. Mentum ca. 1.8 x as wide as long, flat, anterior margin slightly flexed dorsad; sparse setae arising from irregularly distributed fine punctures on ventral face; microsculpture absent; lateral margins distinctly projecting, densely fringed with long fine setae, with distinct anterior angles; anterior edge projecting, rounded, with distinct emargination mesally. Labial palpi moderately stout; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 31): Pronotum dark brown, with large, indistinctly demarcated yellow margins, often as wide as length of lateral pronotal edge. Punctation obsolete, microsculpture absent. Lateral margins without bead, weakly convex, with rounded anterior and posterior angles. Transverse fold present. Prosternum dark brown, slightly bulged, very slightly projecting towards gula mesally. Hypomeron lighter brown. Scutellar shield almost equilateral, dark brown, smooth, very finely punctate. Elytra not explanate, impressions absent; with very slight callosity on shoulder regions; without distinct anterior and lateral bead. Elytra brown, by darker brown spots around punctures of speckled appearance. Elytral punctures fine, shallow, distinct, equidistant, densely distributed, interstices distinctly larger than diameter of punctures. Punctures irregular on elytral disc; serially arranged punctation or coarser punctures absent. Lateral margins of elytra with very fine setae, arising from ventral face of elytra, antero-lateral elytral edge with minute spines; setae and spines visible in more than 100 x amplification. Microsculpture absent. Sharply and very finely impressed sutural stria present in posterior half, fading anteriorly, ending in a distance of 2–3 x the length of scutellar shield. Anapleural sutures distinct; anterior sections converging craniad, not present on anterior collar of mesothorax. Anepisternum glabrous like mesoventrite, with reticulate microsculpture, with short oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with a short, low, inconspicuous horizontal ridge postero-mesally. Metaventrite bulged mesally, pubescent, with a small glabrous median area.

Legs (Fig. 40) coloured like ventrites. Procoxa pubescent, without distinct spine-like setae; Femoral hairlines distinct. Profemur 2.2 times as long as wide, pro- and mesofemur pubescent on proximal 0.75, with convex hairline; pubescence of metafemur confined to anterior margin and proximal portion, with almost horizontal hairline. Metatibia with strong spines on lateral margin;

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metatibial spurs moderately strong, the longer mesal spur extending to halflength of tarsomere 2. Tarsi with long fine setae on dorsal face. Protarsus ventrally set with long setae; metatarsomeres with rows of short spines; metatarsus about as long as metatibia, tarsomere 2 slightly longer than tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 49): Phallobase wide and short, distinctly shorter than parameres, with broadly rounded manubrium, distinctly demarcated from phallobase. Parameres wide basally, continuously narrowed towards apex, apices broadly rounded, asymmetrical. Median lobe about as long as parameres; corona in subapical position; median lobe slender, almost parallel-sided in apical half, apex rounded, basal portion about as wide as one paramere, basal apophyses distinctly shorter than main part of median lobe, with distinct extension into phallobase. Base of median lobe indistinctly connected with parameres.

BIONOMICS: The representatives of this species presumably inhabit ponds, water puddles in pastures, and rock-pools of streams in mountain areas above 900 m a.s.l. They are also found in slightly polluted water bodies.

DISCUSSION: d'ORCHYMONT (1942) emphasized the affinity of *A. minima* and *A. minutalis*. Many different character states, including the very different aedeagi, however, do not point to a closer relationship of the two species.

DISTRIBUTION: The widely distributed species is found in southern and north-eastern India (Karnataka, Kerala, Tamil Nadu, Bihar, West Bengal), in Bangladesh, and Sri Lanka. Records from Nepal (HEBAUER 2002) are based on an wrong determination of *A. jaegeri.*

Anacaena setifera sp.n.

TYPE LOCALITY: Small stream near Kakkabe (village), 900–1200 m a.s.l., 12°15'N 75°35'E , Kodagu (previously Coorg) District, Karnataka, southern India.

TYPE MATERIAL: **Holotype** ♂ (NMW): "INDIA, Karnataka, Coorg Kakkabe env., 900–1200m, 12°15'N 75°35'E, 23.XII.1998, leg. D. Boukal (17)". **Paratypes**: 13 exs. (NMW, AEZS): same data as holotype.

DIAGNOSIS: Body moderately sized, evenly rounded. Clypeus, frons, pronotum and elytra brown with distinct preocular patches, with very large yellowish pronotal margins; clypeus short with indistinct antero-lateral angles; nine antennomeres; maxillary palpi moderately stout, palpomere 4 without or with very weak infuscation; punctation on head and pronotum very fine, on elytra fine, dense, unordered, without serial arrangement; elytral margin densely set with fine setae, mesoventrite with very low horizontal median ridge; procoxae with few spine-like setae; legs brown like ventrites; metafemoral pubescence reduced to anterior margin and proximal portion, metatarsus shorter than metatibia.

DIFFERENTIAL DIAGNOSIS: *Anacaena setifera* differs from the similar *A. minuscula* mainly by the unusually long setae on galea, the conpicuously dense fringe of setae on elytral margin, the denser and more irregularly distributed elytral punctation, the more reduced metafemoral pubescence, and by the aedeagus.

DESCRIPTION: Total length 2.2–2.4 mm; total width 1.3–1.4 mm; E.I.: 1.1. Habitus oval, with greatest width in midlength; elytra about 3.5 x as long as pronotum in dorsal view.

Head (Fig. 23): Clypeus, frons, and labrum brown, with large, indistinctly demarcated, brighter yellowish preocular patches; temporal regions, gula, cardo, stipes, submentum, mentum, prementum, and labial palpi unicoloured brown. Punctures very fine, widely spaced, with a series of very fine punctures present along inner margin of eyes. Interstices shiny, microsculpture

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absent. Clypeus short in length, without distinct anterior angles. Frontoclypeal suture weak, represented by a dark line. Eyes not constricted, dorsal portion weakly ovoid, distinctly larger than ventral portion. Interocular distance ca. 4.0 x as large as horizontal diameter of dorsal portion of one eye. Nine antennomeres, pedicellus 1.3 x as long as wide; antennomere 3 elongate, about as long as antennomeres 4 and 5 together. Antennal club more than three times as long as wide, with elongate apical antennomere. Galea with rows of unusually long setae. Maxillary palpi moderately stout; palpomere 2 inflated, palpomere 3 asymmetrical, with concave mesal and convex lateral edge; palpomere 4 elongate, with slightly convex lateral and mesal edges; apex oval. Palpomeres yellow, in some indiviuals palpomere 4 slightly infuscated. Mentum ca. 1.9 x as wide as long, flat, anterior margin slightly flexed dorsad; sparse setae on ventral face, mainly on anterior portion; microsculpture absent; lateral margins distinctly projecting, densely fringed with setae, with distinct anterior angles; anterior margin projecting, sinuate, with distinct antero-mesal emargination. Labial palpi moderately slender; palpomere 3 slightly longer than palpomere 2.

Thorax (Fig. 32): Pronotum brown, dark in center, with very indistinctly demarcated, large, brighter lateral margins. Punctation very fine, like on head; interstices smooth, shiny, microsculpture absent. Lateral margins with a very fine bead, weakly convex, with distinct, rounded anterior and posterior angles. Transverse fold long, sharp. Prosternum and hypomeron equally brown. Prosternum bulged, projecting towards gula mesally. Scutellar shield almost equilateral, in most individuals light brown with darker margins, often surrounded by a lighter brown adjacent area; smooth, very finely punctate. Elytra very slightly explanate postero-laterally, without impressions, without distinct callosity on shoulder regions, with fine anterior and lateral bead. Elytra light brown, with indistinct brighter areas near scutellar shield in most individuals. Punctures fine, distinctly coarser than on head and pronotum, very dense, almost equidistant, unordered; few coarser punctures in subserial short rows posteriorly. Free border of elytra densely set with fine, long setae, arising from ventral face of elytral margin. Microsculpture absent. Sharply impressed sutural stria present in posterior 0.66 to 0.75 of elytra. Anapleural sutures distinct, anterior sections slightly converging craniad, not present on anterior collar of mesothorax. Anepisternum glabrous, with reticulate microsculpture, without oblique ridge antero-laterally. Epipleura, meso- and metaventrite unicoloured brown. Mesoventrite with distinct postero-lateral "wings", slightly bulged, with very low horizontal ridge postero-mesally. Metaventrite bulged mesally, almost completely pubescent with a very small, less pubescent or glabrous central area.

Legs (Fig. 41) coloured like ventrites. Procoxa with some stiff spine-like setae near trochanteral joint. Femoral hairlines distinct. Profemur 3.0 times as long as wide, pubescent on proximal 0.75, with round to slightly oblique hairline; mesofemur almost completely pubescent except on extreme apical portion, with slightly convex hairline; metafemur with indistinct, almost horizontal hairline, pubescence confined to anterior margin and proximal portion. Metatibia with rather strong spines on lateral margin; metatibial spurs moderately strong, the longer mesal spur extending to halflength of tarsomere 2. Protarsomeres 1–4 ventrally set with setae; mesotarsomeres 1–4 with very weak terminal spine-like setae. Metatarsus shorter than metatibia; tarsomere 2 more than twice as long as tarsomere 1, distinctly longer than tarsomere 5.

Abdominal ventrites dark brown, entirely covered with dense hydrofuge pubescence.

Aedeagus (Fig. 50): Phallobase about as long as parameres, almost parallel-sided, manubrium rounded, distinctly demarcated from phallobase. Parameres slender, inflated proximally, rather narrow in midlength, apices very weakly sclerotized, broadly rounded. Median lobe distinctly shorter than parameres; corona in apical position; apex broadly rounded; basal apophyses

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moderately narrow, shorter than main part of median lobe, slightly arcuate, with short extension into phallobase. Base of median lobe not visibly connected with parameres.

BIONOMICS: The individuals of this species were found in a small stream, less than 0.5 m wide, a few cm deep, in backwater pools with stones, silt, gravel, pebbles in small riffles, and leaf deposits. The collecting locality was rather shaded, the stream was draining cardamom plantations, and included a very small spring with very small discharge, partly shaded, with gravel, silt, filled with leaves and decaying banana tree trunk chips, ca 2–3 m long before joining the stream (personal communication by D. Boukal).

DISCUSSION: *A. setifera* resembles most *A. minuscula*. The very long setae on galea, the fine, but distinctly visible setae on elytral margin and the comparatively very short median lobe of the aedeagus justify a specific rank.

ETYMOLOGY: The epithet refers to the conspicuous setae on the elytral margins.

DISTRIBUTION: Southern India (Karnataka).

Key to the species of *Anacaena* from the Indian Subcontinent

1 Mesoventrite with distinct protuberance; metafemur with pubescence on more than half of the ventral face. 2

- Mesoventrite with low horizontal ridge; metafemur with extended or with reduced pubescence. 4

2 Metafemoral pubescence reduced to proximal 0.66 (Fig. 35); pronotum and elytra dark brown, mentum flat (Fig. 17); protuberance on mesoventrite acutely pointed. ..... ***jaegeri***

- Metafemoral pubescence extended, on proximal 0.75 (Figs. 36, 37); pronotum and elytra light or dark brown, mentum flat or excavated (Figs. 18, 19); protuberance on mesoventrite acutely pointed or rounded. 3

3 Pronotum and elytra dark brown; ventral face of mentum excavated (Fig. 18); protuberance on mesoventrite acutely pointed. ..... ***laevis***

- Pronotum and elytra light brown; ventral face of mentum flat, not excavated (Fig. 19); protuberance on mesoventrite broadly rounded. ..... ***laevoides***

4 Metafemur with pubescence on more than half of the ventral face (Fig. 33); eight antennomeres. ..... ***advena***

- Metafemur with pubescence on anterior half (Fig. 39) or reduced to anterior margin (Figs. 34, 38, 40, 41); nine antennomeres. 5

5 Elytra speckled with small darker spots; maxillary palpomere 4 with apical infuscation. ... ***minutalis***

- Elytra unicoloured brown or with larger indistinctly demarcated brighter areas; maxillary palpomere 4 with or without apical infuscation. 6

6 Maxillary palpomeres with distinct apical infuscation; setae on elytral borders not visible ... ***minima***

- Maxillary palpomeres without or with very indistinct apical infuscation; setae on elytral borders visible apically or in total length. 7

7 Clypeus with distinct, brighter preocular areas (“preocular patches“); elytral punctures widely separated, partly arranged subserially; setae on elytral borders confined to apex; metafemur pubescent on anterior half (Fig. 39). ..... ***minuscula***

- Clypeus with “preocular patches“ or whole clypeus indistinctly brighter than frons; elytral punctures widely separated or densely distributed, completely unordered or partly arranged

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subserially; elytral borders entirely set with long fine setae; metafemoral pubescence reduced to anterior margin and proximal portion (Figs. 34, 41). 8

8 Clypeus indistinctly brighter than frons; elytral punctures widely separated, partly arranged subserially. ..... ***boukali***

\- Clypeus with "preocular patches"; elytral punctures dense, completely unordered..... ***setifera***

Discussion

The Indian Subcontinent comprises Pakistan, India, Nepal, Bhutan, Bangladesh and Sri Lanka. It reaches from the Himalayan mountain ranges in the north to the tropical island of Sri Lanka in the South. In its larger part it belongs to the Oriental Region. In the northern part of India, Pakistan, Nepal and Bhutan the Palearctic and the Oriental Region overlap. Most of the *Anacaena* species can be assigned to the Oriental Region but some species do not adhere to the borders of these biogeographical regions, like *A. jaegeri*, *A. laevis*, and *A. laevoides*. A startling result of the present study is the apparent absence of representatives of *Anacaena* in large areas of the Indian subcontinent: there is only one record from Bangladesh and no records from Pakistan and Bhutan. Great distributional gaps can also be observed in India: there are no records from Uttar Pradesh, Haryana, Punjab, Rajastan, Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Sikkim, Assam, Tripura, Mizoram, Arunachal Pradesh, Nagaland, and Manipur. This most likely reflects the poor state of investigation in this region rather than a real absence of representatives of this genus. The West Palearctic species, *A. limbata* (F., 1792) and *A. lutescens* (STEPHENS, 1829), occurring in Iran, are not known from the Indian Subcontinent. Three species are rather widely distributed in the region examined (*A. laevis* in the northern parts, *A. minuscula* and *A. minutalis* in the north-eastern and southern parts). Apart from doubtful records of *A. advena* from Russia and Japan, only one species (*A. minuscula*) exceeds the borders of the region and occurs in Vietnam. Six species show a rather restricted geographical distribution. It can therefore be expected that many more new species of *Anacaena* will be detected in this region.

Little is known about the habitats of most of the *Anacaena* species of the Indian Subcontinent. Eight species are aquatic. The bionomics of one species (*A. laevoides*) are entirely unknown.

Morphological affinities (supposed synapomorphies) between *A. boukali* + *A. setifera* and between *A. laevis* + *A. laevoides* suggest a closer relationship (monophyly) of these species. Apart from these groupings the species studied herein do not share synapomorphies which would point to a monophyletic origin of the species of *Anacaena* of the Indian Subcontinent.

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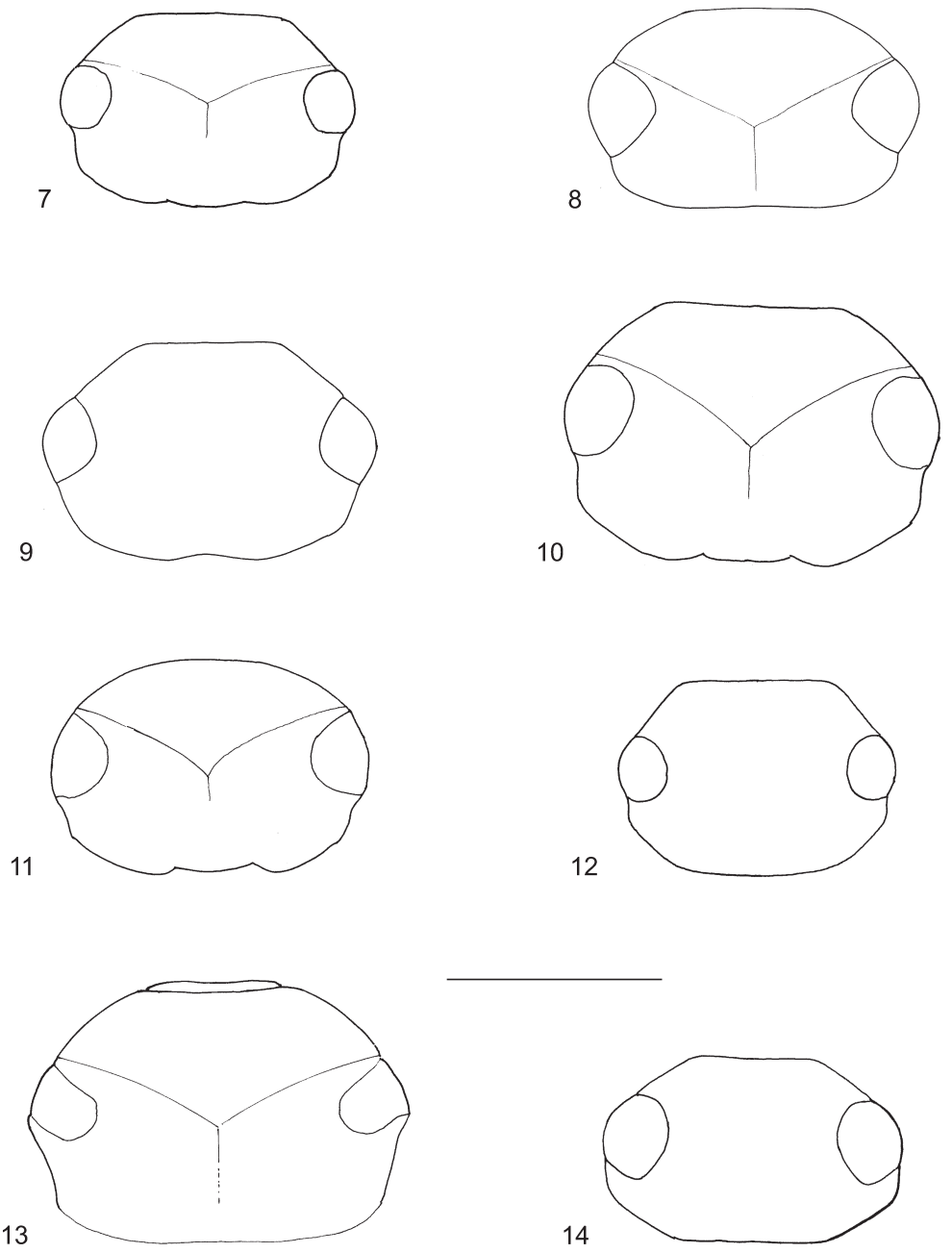

Figs. 7–14: Head, dorsal view: 7) *Anacaena advena*, 8) *A. boukali*, 9) *A. jaegeri*, 10) *A. laevis*, 11) *A. laevoides*, 12) *A. minima*, 13) *A. minuscula*, 14) *A. minutalis*. Scale bar = 0.5 mm.

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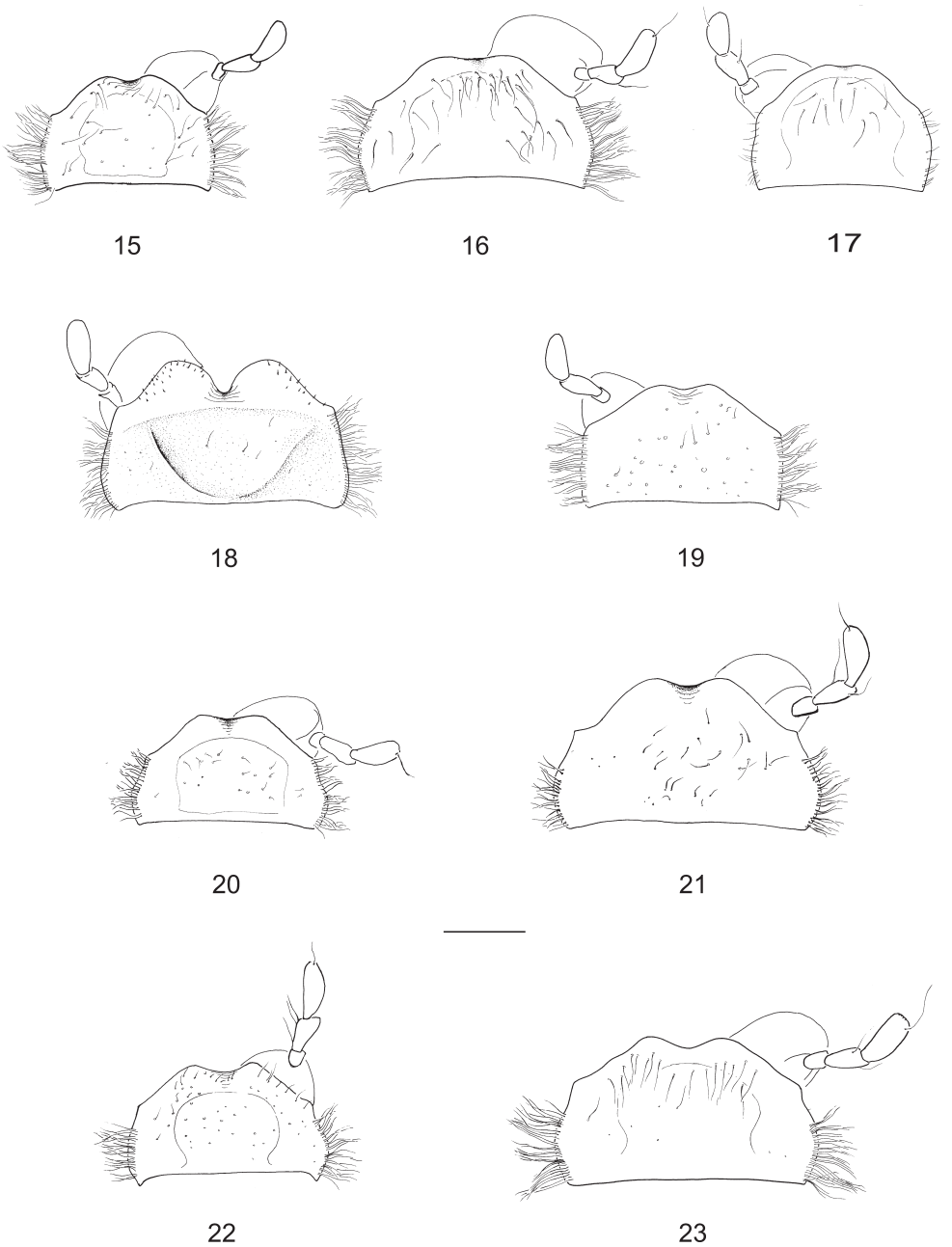

Figs. 15–23: Mentum and prementum, ventral face: 15) *Anacaena advena*, 16) *A. boukali*, 17) *A. jaegeri*, 18) *A. laevis*, 19) *A. laevoides*, 20) *A. minima*, 21) *A. minuscula*, 22) *A. minutalis*, 23) *A. setifera*. Scale bar = 0.1 mm.

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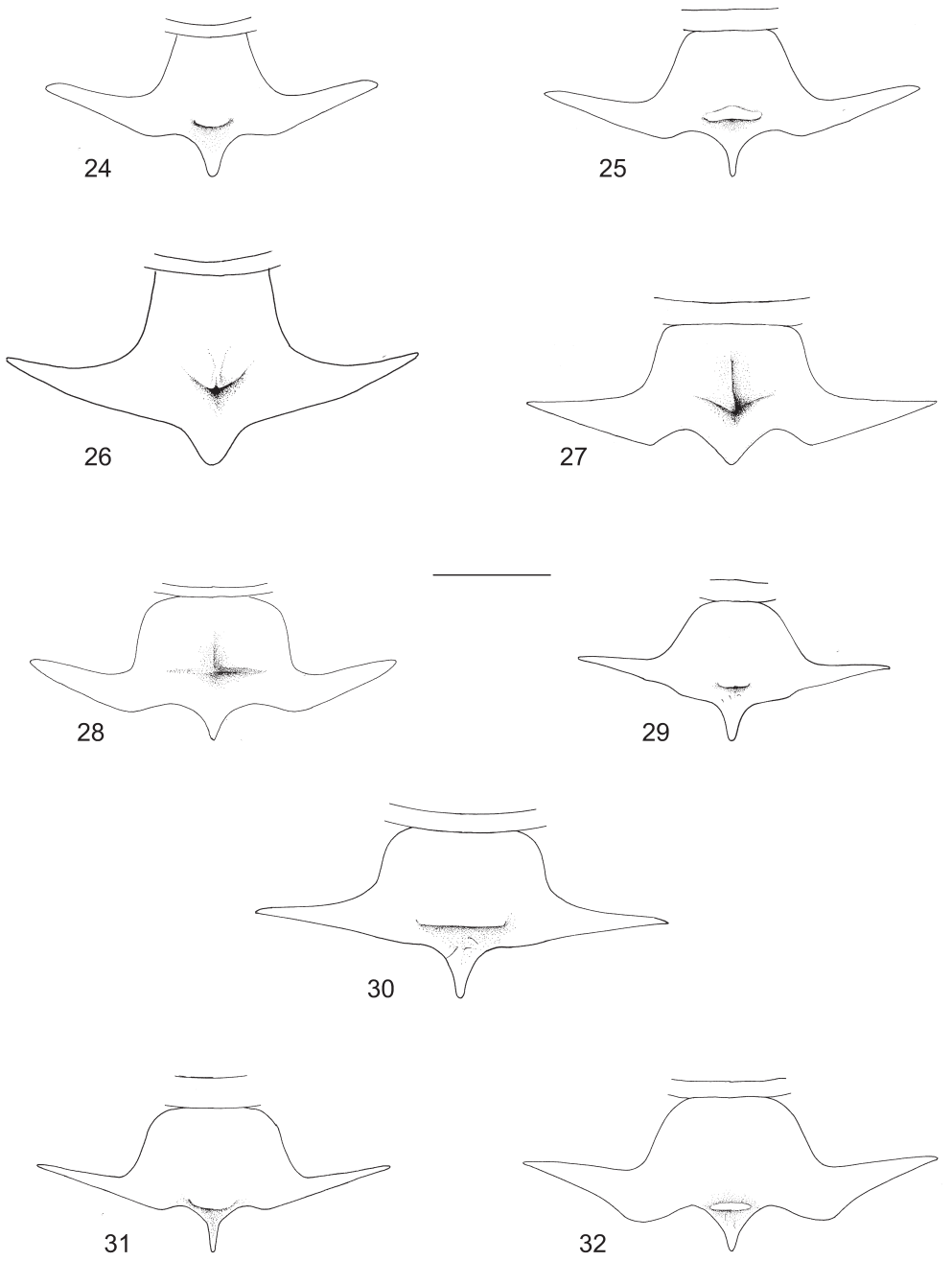

Figs. 24–32: Mesoventrites: 24) *Anacaena advena*, 25) *A. boukali*, 26) *A. jaegeri*, 27) *A. laevis*, 28) *A. laevoides*, 29) *A. minima*, 30) *A. minuscula*, 31) *A. minutalis*, 32) *A. setifera*. Scale bar = 0.2 mm.

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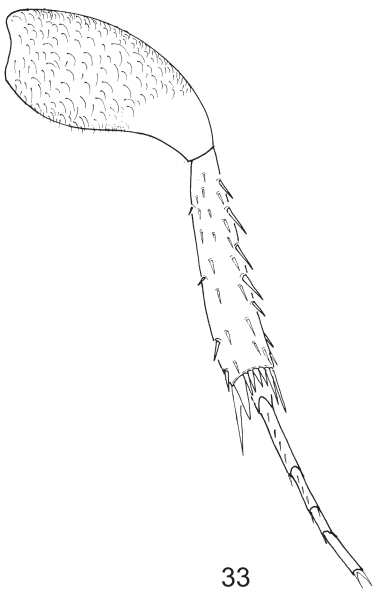

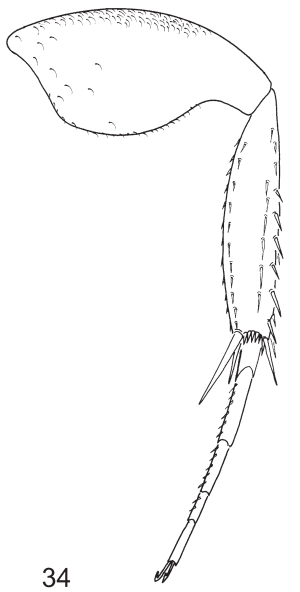

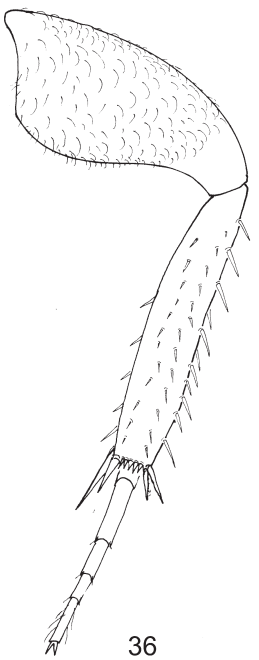

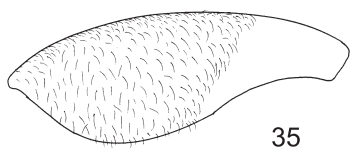

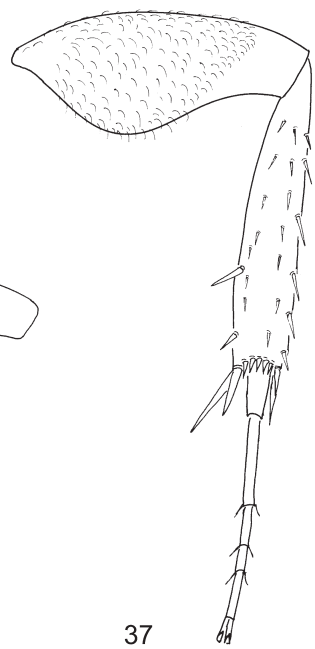

Figs. 33–37: hind leg, ventral face: 33) *Anacaena advena*, 34) *A. boukali*, 35) *A. jaegeri*, 36) *A. laevis*, 37) *A. laevoides*, Scale bar = 0.2 mm.

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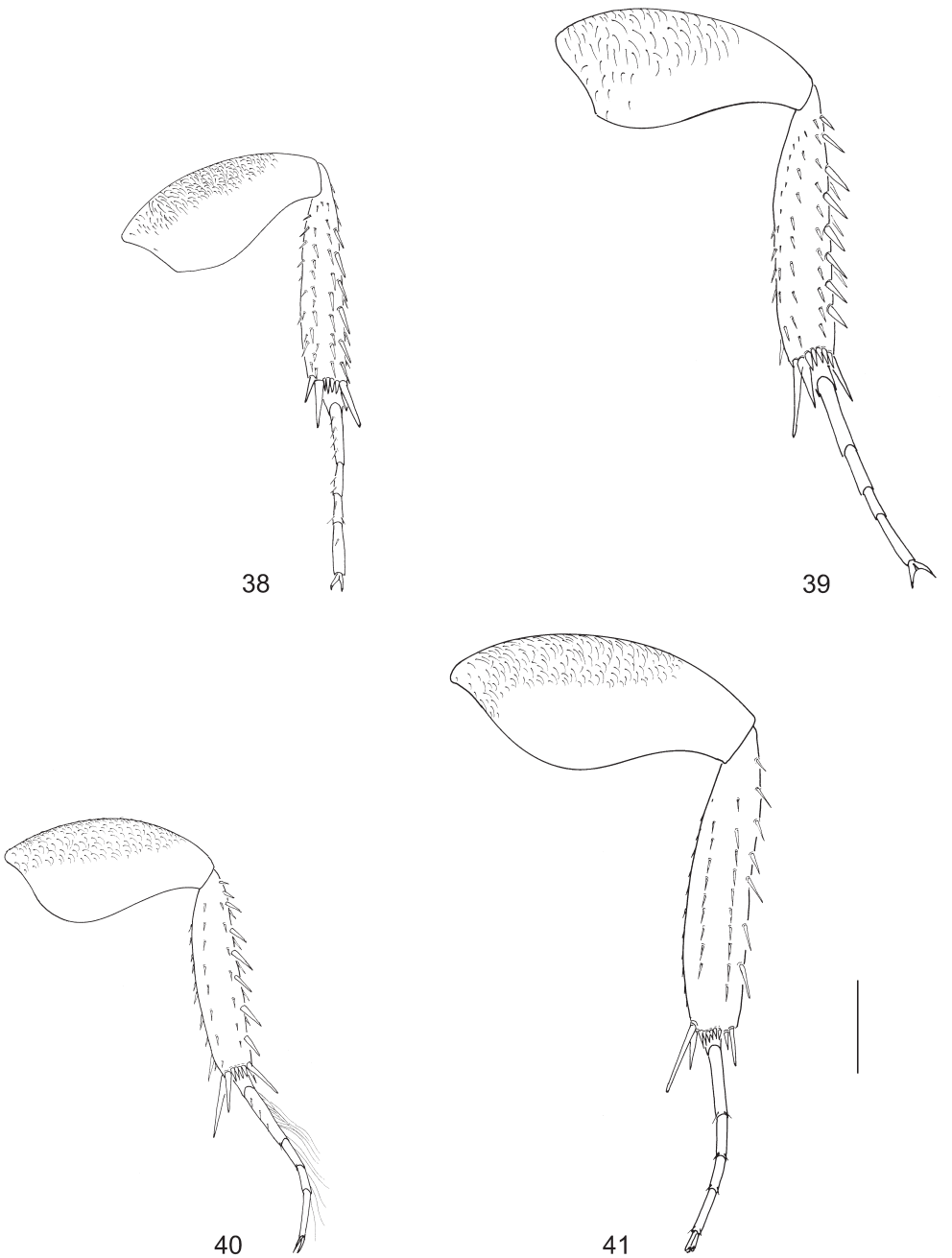

Figs. 38–41: hind leg, ventral face: 38) *Anacaena minima*, 39) *A. minuscula*, 40) *A. minutalis*, 41) *A. setifera*. Scale bar = 0.2 mm.

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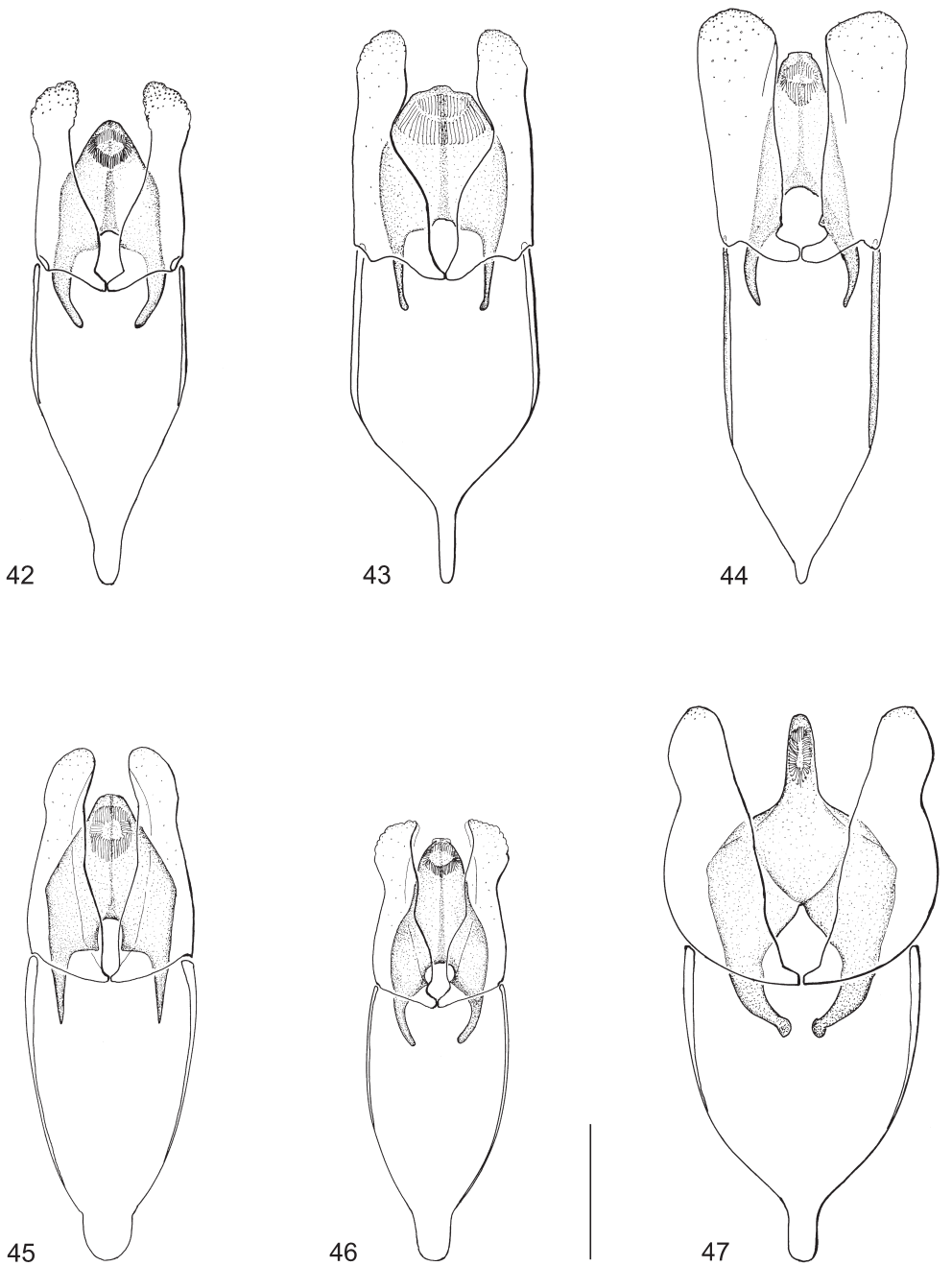

Figs. 42–47: Aedeagus, dorsal view: 42) *Anacaena advena*, 43) *A. boukali*, 44) *A. jaegeri*, 45) *A. laevis*, 46) *A. laevoides*, 47) *A. minima*. Scale bar = 0.1 mm.

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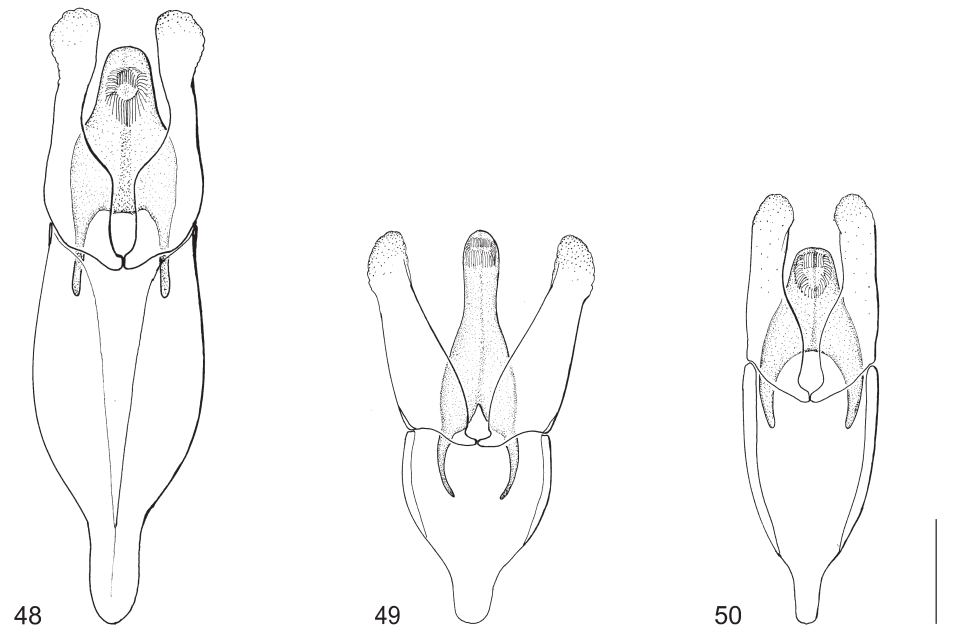

Figs. 48–50: Aedeagus, dorsal view: 48) *Anacaena minuscula*, 49) *A. minutalis*, 50) *A. setifera*. Scale bar = 0.1 mm.

Zusammenfassung

Die fünf vom Indischen Subkontinent bekannten und vier neue Arten der Gattung *Anacaena*: *A. boukali*, *A. jaegeri*, *A. laevoides* und *A. setifera* werden beschrieben. Die Aedeagi aller Arten und zahlreiche diagnostisch wichtige morphologische Details werden abgebildet. Ein Schlüssel zu den *Anacaena*-Arten des Indischen Subkontinents wird angefügt.

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