

Two new species of slant-faced grasshopper genus *Acrida* (Acrididae: Acridinae) from India

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Abstract

Two new species of genus *Acrida* viz. *A. raipurensis* sp. n. and *A. bhoramdevi* sp. n. are described from Central India and compared with known Asian species. Keys to the genus *Acrida* known from the Asian countries is also provided.

Keywords: *Acridoidea, taxonomy, new species, Raipur, Kabirdham.*

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Introduction

The genus *Acrida* is one of the most diverse genus of Orthoptera erected by Linnaeus in 1758 for Acridinae species *Gryllus turritus* and *G. nasutus*. Subsequently, Fabricius (1775) used the new name *Truxalis* for these two species, which was accepted by many workers. Burr (1902) published 21 species of *Acrida* genus of which, 6 were new. Later, Dirsh (1949) revised the genus *Acrida* from Western Palaearctic. Dirsh (1954) reviewed the genus *Acrida* and reported 23 species including 3 species new to science. Steinmann (1963) described 12 species of the genus *Acrida* from Africa and Asia. Presently, forty species (Eades *et al.*, 2017) are globally known, 17 species from Asia, 19 species from Africa, 1 species from Australian and 3 species and subspecies from Europe. In India only three species are known (Shishodia *et al.*, 2010). In the present paper, two new species viz. *Acrida raipurensis* sp. n. and *A. bhoramdevi* sp. n. are described.

Materials and Methods

Study area:

The survey was undertaken in Chhattisgarh state covering two protected areas i.e. Barnawapara Wildlife Sanctuary (BAWLS) and Bhoramdev Wildlife Sanctuary (BHWLS) with a covered area of 244.66 sq. km and 163.59 sq. km

respectively. The specimens were collected by sweeping over grassland and other vegetation by using insect net and killed by the benzene vapour. The specimens were preserved and pinned. The figures are captured using Nikon D 300S with 105 macro lens. The specimens were studied under Leica stereo-zoom Microscope (Leica M205 A). All the measurements are given in millimeters. The type specimens are deposited in the Central Entomological Laboratory (CEL) of the Zoological Survey of India, Kolkata.

Taxonomy

Order ORTHOPTERA Olivier, 1789
Suborder CAELIFERA Ander, 1936
Superfamily ACRIDOIDEA Macleay, 1821
Family ACRIDIDAE Macleay, 1821
Subfamily ACRIDINAE Macleay, 1821
Tribe ACRIDINI Macleay, 1821
Genus *Acrida* Linnaeus, 1758

Acrida raipurensis Gupta & Chandra sp. n.
(Figs.1-3)

[urn:lsid:zoobank.org:act:FBA984B6-491B-42F6-BD94-4E3C96405E01](https://zoobank.org/act:FBA984B6-491B-42F6-BD94-4E3C96405E01)

Material examined (5 specimens).

Holotype: (1/5) 1♂, Chhattisgarh, Raipur district, Devgaon village, 21°22'668''N, 82°24'837''E, 294 m, 20.vi.2013, coll. S. K. Gupta, Reg. No. 14959/H5.

Paratypes: (2-5/5): 1♂+3♀, same localities as holotype, Reg. No. 14960-63/H5.

Diagnosis: The new species is similar to *A. turrita*, but differs by a combination of following characters: mid carina of fastigium of vertex absent, antenna shorter than head and pronotum together, fastigium of vertex with long rounded apex, frons oblique, frontal ridge considerable depressed, broad, sulcate with lateral carinulae obtusely below median ocellus, subgenital plate broad, with obtuse apex and basal part with a obtusely long projection, in profile.

Description (Male): Body large in size and elongated (Fig. 1A,B), head considerably elongated, preocellar section (top of head), when viewed from above short, strongly obtuse, anterior margin in profile slightly concave, longer than pronotum in dorsal view (Fig. 2A). Fastigium of vertex slightly concave with lateral carinae slightly elevated (Fig. 2D). Vertex flat slightly concave without median carina. Eyes elongated, located near above middle of anterior part of head. Antennae ensiform, 17th segments, slightly shorter or subequal to head and pronotum together, length of middle segments 1.8 times its width. Frontal ridge depressed only anteriorly up to antennal grooves (Fig. 1C) after antennal grooves constriction then widened up to middle ocelli and below middle ocelli not reaching up to clypeus (Fig. 2C). Frontal ridge sub obsolete at clypeo-frontal suture.

Thorax: Pronotum 1.9 times as long as wide, disc with one transverse sulci, surface of the pronotum usually punctate, anterior margin of pronotum straight, posterior margin curved. Median carina slightly tectiform, lateral carinae parallel, straight in prozona, in metazona lateral carinae slightly incurved to posterior region, prozona shorter than metazona, transverse sulcus before the middle of pronotal disc; posterior margin of metazona obtusangulate (Fig. 2E). Mesosternal lobe shorter than its width (Fig. 2B).

Tegmen: Well developed, narrow, elongated, apex acute and exceeding tip of hind knee, hind wings developed and slightly shorter than tegmina.

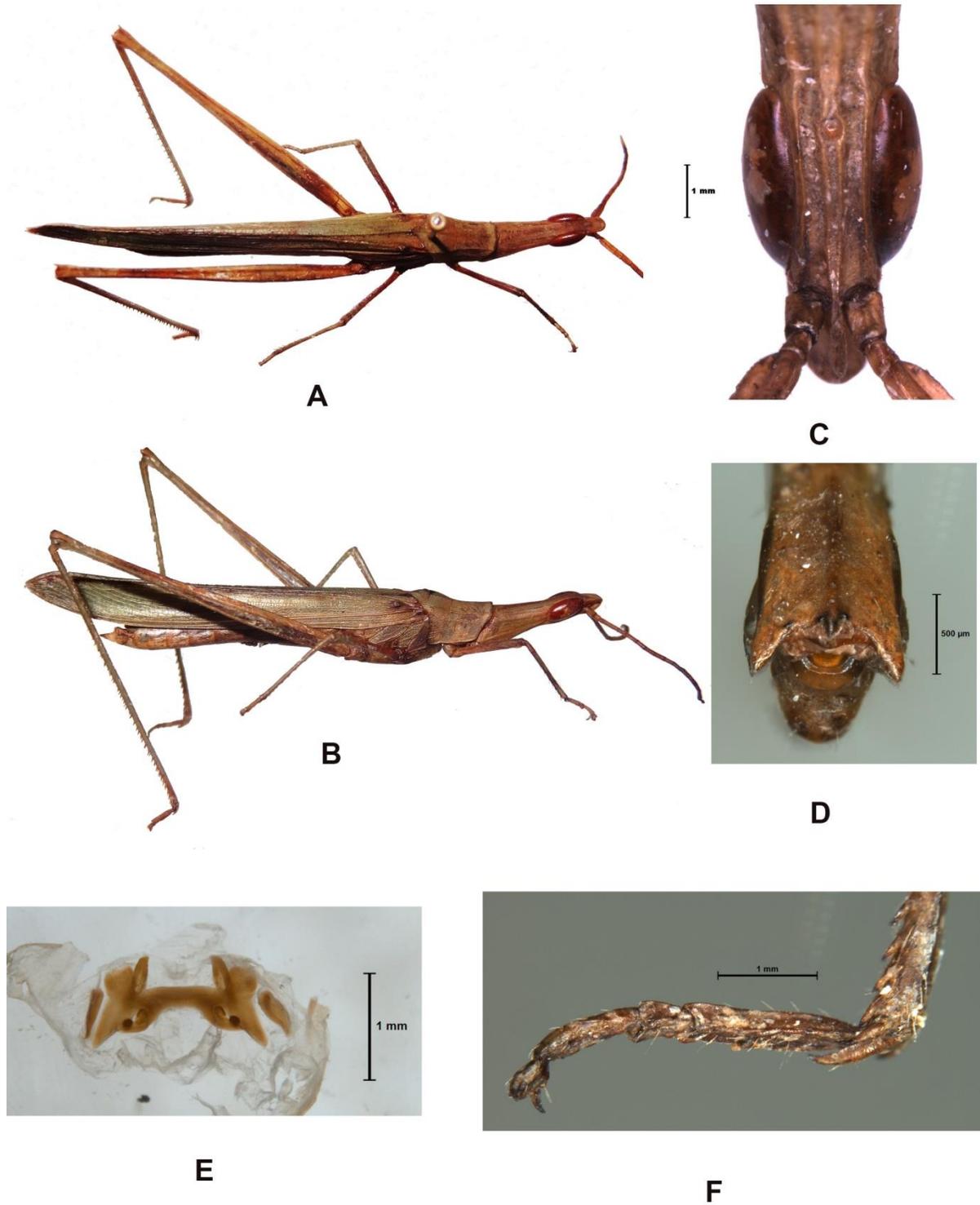
Legs: Hind femora long, tip of hind femora with a spine at the apex of hind knee. Hind tibiae slender with outer 31 small spines and inner 29 at dorsal margin; apical spine present at both sides (Fig. 1D). Apical spurs of hind tibiae more than 1.7 times as long as 2nd spurs, tip obtusely, slightly curved (Fig. 2F). First tarsal segment 3.6 times longer than second tarsal segment and slightly longer than third tarsal segment (Fig. 1F). Supra-anal plate triangular. Cerci longer than supra-anal plate. Subgenital plate broad, with obtuse apex and basal part with a obtusely long projection, in profile. Epiphallus bridge shaped (Fig. 1E); ancorae large, lophi lobiform and bilobate; lateral plate large.

Colour: Body greenish to yellowish. Antenna brown blackish, wings hyaline, tegmina and hind tibiae light green. Abdomen and subgenital plate brown with light yellowish colour.

Comparative notes: The new species differs from *Acrida turrita* by absence of mid carina on fastigium of vertex. Anterior region of fastigium strongly obtuse. Mesosternal lobe shorter than its width. In ventral region, subgenital tip obtuse. Frontal ridge anteriorly depressed with lateral carinae slightly narrow between antennae and parallel, widened up to median ocelli, below median ocelli obliterated. Antenna shorter than head and pronotum together. Transverse sulcus before the middle of pronotal disc; inner apical spurs of hind tibiae straight, tip obtusely, expanded. Subgenital plate broad, with obtuse apex and basal part with large projection, in profile. Male epiphallus differs from Dirsh, 1956, page no. 279, plate no. 53 fig. 4.

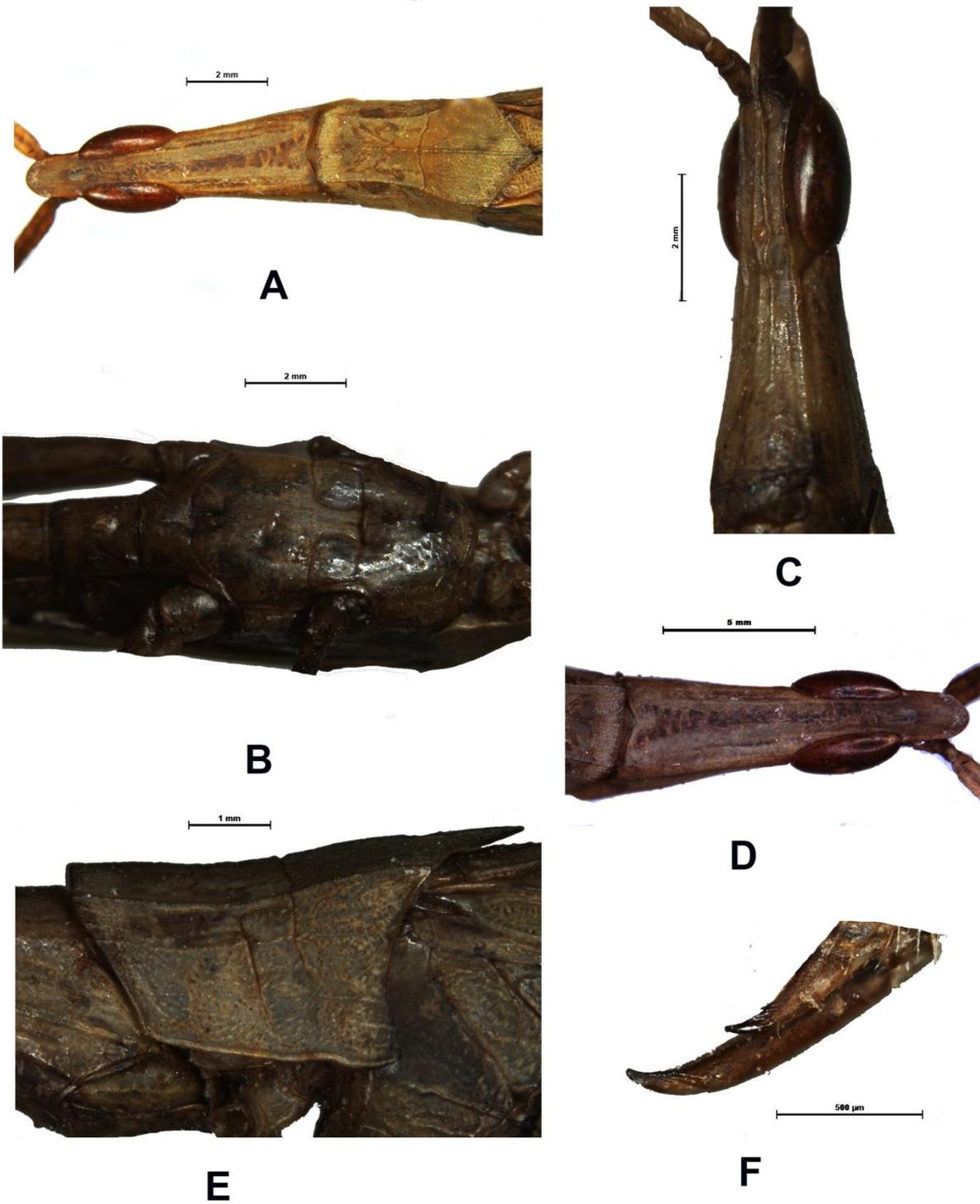
Measurements. Male: Body length 42.87; head length 9.820, width 3.468; antenna length 15.751, scape length 0.648, mid segment length 0.974, width 0.529; compound eye length 3.258, width 0.888; pronotum length 7.911, width 4.089; prozona length 3.955, metazona length 4.662; vertex 1.229; fastigium of vertex 1.538; mesosternal lobe length 1.447, width 1.693; tegmina length 41.132; subgenital plate length

Figures 1



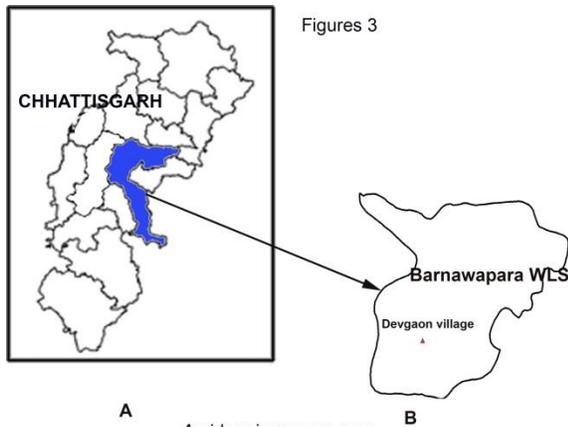
FIGURES 1A-F: *Acrida raipurensis* sp. n. male, A, dorsal view; B, lateral view; C, head showing frontal region (ventral view); D, Tip of hind femora with spine at the apex of hind knee (dorsal view); E, epiphallus; F, tarsal segments.

Figures 2



FIGURES 2A-F: *Acrida raipurensis* sp. n. A, Head and pronotum, dorsal view; B, mesosternal lobe; C, head showing frontal region (ventral view); D, fastigium of vertex (dorsal view); E, pronotum (lateral view); F, apical inner spurs.

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FIGURES 3A-B. Distribution map of *Acrida raipurensis* sp. n. A, coloured area denotes Raipur district; B, Barnawapara Wildlife Sanctuary; triangle area denotes collection localities.

3.093, width 1.126, cerci length 1.352, width 0.372; fore leg: femur length 7.813, width 0.824; tibial length 5.28, width 0.648; tarsus length I 0.929, II 0.351; III 0.412; claws Ist length 1.536; mid leg: femur length 7.533, width 0.678, tibial length 8.905, width 0.500; tarsus length, I 1.486, II 0.404, III 1.363; hind leg: femur length 31.674, width 1.843; tibiae length 29.856, width 0.679; tarsus length I 2.880, II 0.691, III 1.751.

Female: Body length 55.14.

Etymology: The species has been named after the type locality.

Acrida bhoramdevi Gupta & Chandra sp. n.
(Figs. 4-6)

[urn:lsid:zoobank.org:act:7AC688B1-10CC-490B-AB7E-B73A56F49847](https://doi.org/10.21203/rs.3.rs-1000000/v1)

Material examined (6 specimens).

Holotype: (1/6) 1♂, Chhattisgarh; Kabirdham, Bhoramdev WLS, Bodalpani forest, 22°01'777'' N, 82°89'788'' E, 722 m, 02.xii.2011, coll. S. K. Gupta & party, Reg. No. 14907/H5.

Paratypes (2-6/6): 1♂+1♀, same localities as holotype, Reg. No. 14908-09/H5; 1♀, 2♂, Chhattisgarh; Kabirdham, Bhoramdev WLS, Rajadhar forest, 22°13'611'' N, 81°02'902'' E, 742 m, 01.xii.2011, coll. S. K. Gupta & party, Reg. No. 14910-11-12/H5.

Diagnosis: Head elongated, antenna subequal or shorter than head and pronotum together. Fastigium of vertex large with apex subobtuse, lateral carina of pronotum, transverse sulcus before the middle of pronotum. Lateral carinae of pronotum in prozona, incurved, in metazona strongly excurved and divergent.

Description: Male: Body medium sized and elongated (Fig. 4A,B); head elongate, basal part wide, antennae ensiform, 17 segments, length of middle segments 1.2 times its width, shorter than head and pronotum together (Fig. 5A). Eyes elongated, head slightly longer than pronotum, acutely conical; fastigium of vertex wide, protruding, concave with parabolic apex and apparent carinula of vertex (Fig. 5B); frons, moderately incurved (Fig. 5D); Frontal ridge anteriorly angulate after depressed narrowly (Fig. 4C), sulcate, with lateral sides slightly constriction just below antennal grooves, after broad, gradually divergent forward and extend up to clypeus. Interocular space wider than frontal ridge.

Pronotum: (Fig. 5C) Pronotum, 2 times longer than wide, flat with single transverse sulcus, median and lateral carinae distinctly coarse and scabrous. Prozona shorter than metazona. Lateral carinae of pronotum in prozona, incurved, in metazona strongly excurved and divergent. Transverse sulcus before the middle of pronotum; posterior margin of metazona obtusely angular.

Tegmen: produced well beyond the hind knee, with apical part slightly parabolic (Fig. 5F). Wings slightly shorter than tegmen with apex obtuse. Lateral lobe of hind knee, short and acute.

Legs: Mesosternal interspace open, mesosternal lobe much wider than long, hind femora and tibiae elongated; hind femora 1.2 times longer than abdomen, tip of hind femora with small spine at the apex of hind knee (Fig. 5G); hind tibiae with 26 inner and 25 outer spines, inner and outer apical spurs distinct, one pair outer apical spurs and one pair inner apical spurs; outer apical spurs equal length but inner 2nd apical spur more than twice longer than 1st apical spur (Fig. 5E). First tarsal segment 2.8 times longer than second tarsal segment and 1.5 times longer than third tarsal segment. Supra-anal

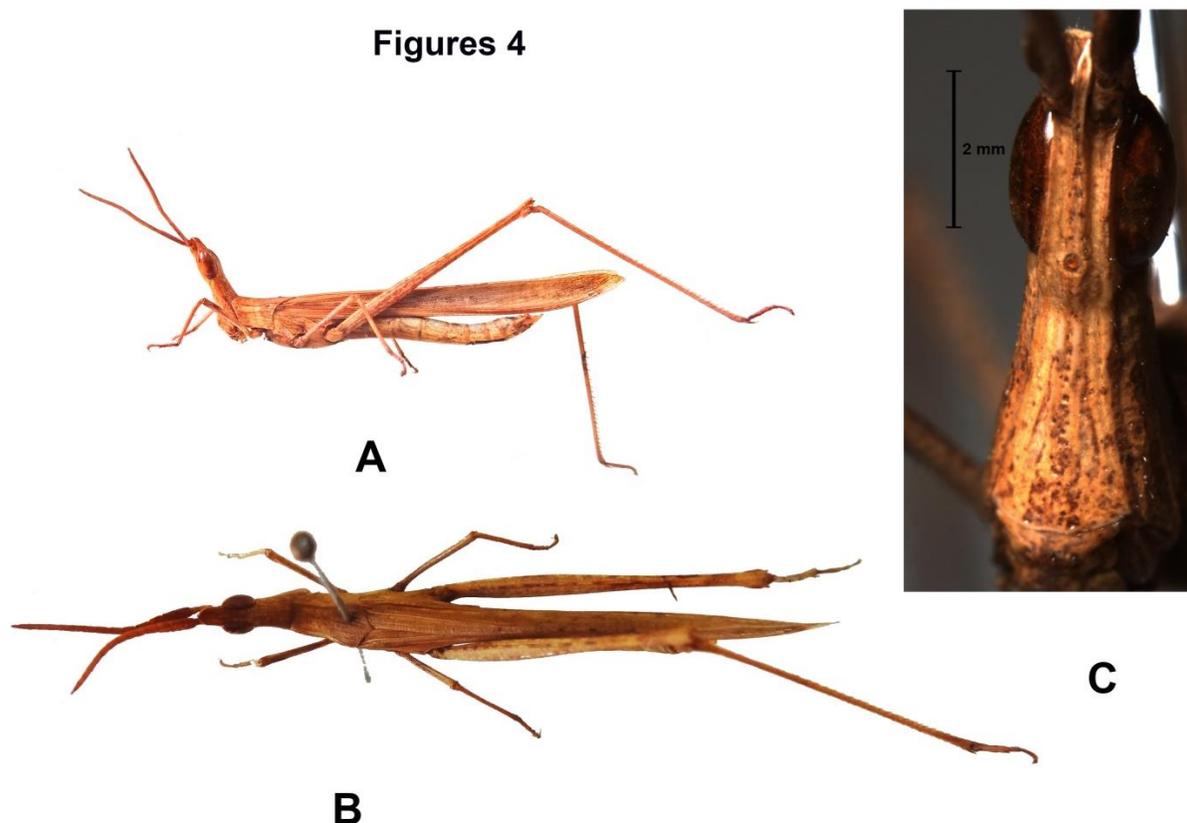
plate 2 times longer than broad. Subgenital plate 1.6 times longer than broad, with obtuse apex and with large obtuse projection in the basal part, with white long hairs (Fig 5I). Cerci slender, blunt, rounded tip, long hairs. Epiphallus with broad bridge, ancorae large lophi small and bilobate. (Fig. 5H).

Female: Very similar to male but larger in size. Supra-anal plate obtuse angular; body much longer and robust than male; subgenital

plate conical, ovipositor valve short, slightly curved.

Colour: Body straw yellow, faint with small black, with brown striped head, pronotum and tegmina. Head and pronotum with blackish-brown dots or granules. Antennae with alternating light and dark brown bands. Abdomen and subgenital plate brown with light yellowish, and 6, 7, 8 sternite ventral margin dark brown coloured. Tip of spines black.

Figures 4

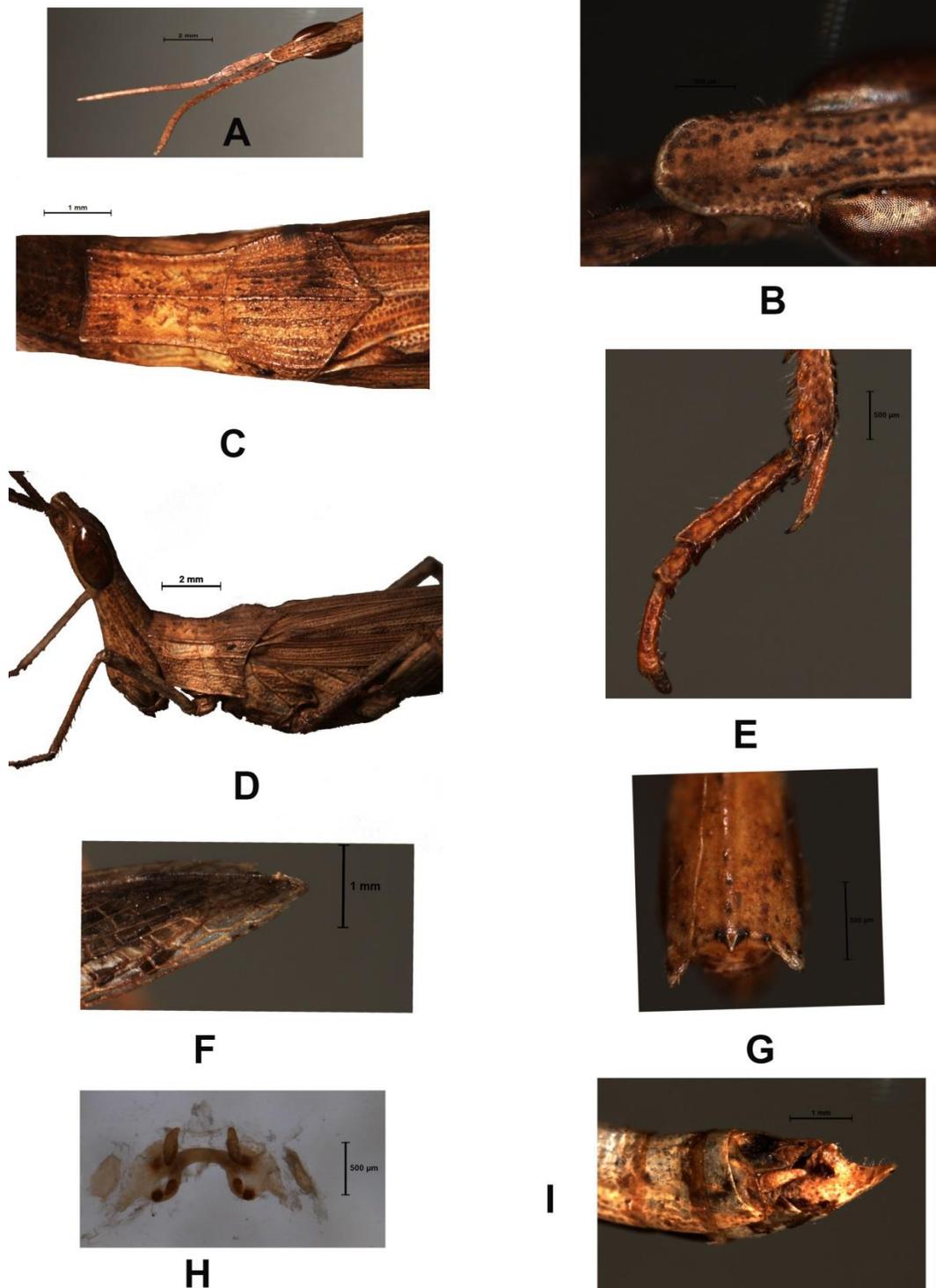


FIGURES 4A-C: *Acrida bhoramdevi* sp. n. male, A, lateral view; B, dorsal view; C, head showing frontal region (ventral view)

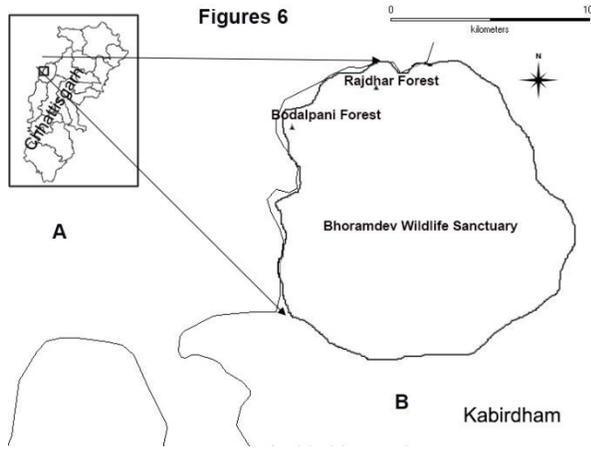
Comparative notes: The new species is similar to *Acrida exaltata*, but differs by slightly shorter body length; slender, dry grass colour, head longer than pronotum. Prozona shorter than metazona. Posterior margin of metazona obtusangular with obtuse apex. Tegmen produced well beyond the hind knee. Tip of hind

femora with small spine at the apex of hind knee. Apical spur of hind tibiae more than twice as long as 2nd spur, tip slightly acute, straight. Mesosternal lobe much wider than long. Subgenital plate broad, with obtuse apex and basal part with large projection, in profile.

Figures 5



FIGURES 5A-I: *Acrida bhoramdevi* sp. n. A, Antenna (dorsal view); B, Fastigium of vertex (dorsal view); C, pronotum (dorsal view); D, head and Pronotum; E, hind apical inner spurs; F, tegmen apex; G, Tip of hind femora with small spine at the apex of hind knee (dorsal view); H, Epiphallus ; I, subgenital plate.



FIGURES 6A-B. Distribution map of *Acrida bhoramdevi* sp. n. A, Chhattisgarh; sphere area denotes Kabirdham district; B, Bhoramdev Wildlife Sanctuary; triangle area denotes collection localities.

Measurements: Male: Body length 27.546, head length 5.562, width 1.241; antenna length 7.488, scape length 0.583, width 0.462, mid segment length 0.502, width 0.410; compound eye length 2.073, width 0.694; pronotum length 4.326; width 2.01; prozona length 1.984, width 1.426; metazona length 2.335, width 2.171; interocular space 0.814, vertex 0.674; fastigium of vertex 0.787; pronotum height (lateral view) 1.713; mesosternal lobe length 0.850, width 0.937; metasternal lobe length 0.675, width 2.164; tegmina length 25.088; abdomen length 13.683, supra-anal plate length 1.174; width 0.506; subgenital plate length 1.658, width 1.00, cerci length 0.762, width 0.297; fore leg: femur length 2.554, width 0.378; tibiae length 2.714, width 0.257; tarsus length I 0.660, II 0.293; III 0.926; claws Ist length 0.313; mid leg: femur length 4.459, width 0.393; tibiae length 5.072, width 0.295; length tarsus I 0.783, II 0.252, III 0.726; hind leg: femur length 16.398, width 1.052; tibiae length 15.371, width 0.248; length tarsus I 1.524, II 0.531, III 0.959.

Female: Body length 43.42.

Etymology: The species has been named after the Bhoramdev Wildlife Sanctuary (type locality).

**Key to the known Asian species of genus
Acrida Linnaeus, 1758**

1. Head strongly elongated, from above and in profile, narrow in the basal part, combined length of prozona and metazona of dorsal plate of pronotum twice as long as wide17
 - Head slightly elongated, from above and in profile, robust with broad in the basal part, combined length of pro- and metazona of dorsal plate of pronotum without twice as long as wide.....2
2. Elytron very strongly elongated and narrowed; wing very narrow, considerably shorter than elytron, dull, semipellucid.....
 -*A. lineata* (Thunberg)
 - Elytron less elongated and border; wing comparatively broader, insignificantly shorter than elytron lustrous pellucid.....3
3. The projection on the upper margin of the subgenital plate, in profile, comparatively small.....4
 - The projection on the upper margin of the male subgenital plate, in profile, very large, finger-shaped.....*A. indica* Dirsh
4. Elytron with subacute apex. Lateral carinae of pronotum in prozona straight and slightly convergent towards head, in metazona slightly excurved. Large and robust.....
 -*A. cinerea* (Thunberg)
 - Elytron with broadly parabolic apex. Lateral carinae of pronotum almost straight and almost parallel in their whole length.....5
5. Lateral carina of pronotum inflated in prozona. Projection on upper margin of male subgenital plate apically blunt male 32-38mm, female 54-62mm.....
 -*A. anatolica* Dirsh
 - Lateral carina of pronotum visibly arcuate in metazona. Projection on upper margin of male subgenital plate apically truncate male (31-53), female 51-80mm.....6
6. Subgenital plate short; apex short, blunt.....*A. formosana* Steinmann
 - Subgenital plate long, apex slightly large.....7
7. Inner margin of triangular plate at tympanal aperture straight, its corner rounded. Upper margin of male subgenital plate straight, eventually slightly bent. Metazona (of a

Two new species of slant-faced grasshopper genus *Acrida* (Acrididae: Acridinae) from India

- lobate shape) of female wide, even its smallest width greater than long.....11
- Inner margin of triangular plate at tympanal aperture straight, its corner acute-angled, or sinuous and broadly rounded. Lobe-shaped female metazona narrow, its smallest width equalling its length. Upper margin of male subgenital plate strongly concave or convex; plate either bending upward or deflected.....8
8. Male subgenital plate bending upward; its upper margin strongly concave.....9
- Male subgenital plate slightly or strongly deflected; its upper margin convex.....11
9. Inner margin of triangular plate at tympanal aperture sinous, its corner broadly rounded*A. granulata* **Mishchenko**
- Inner margin of triangular plate at tympanal aperture straight, its corner acute angle.....*A. incallida* **Mishchenko**
10. Anterior margin of lateral lobe of pronotum broken (well discernible when viewed laterally), its posterior margin arcuately incised. Basal joints of antennae wide. Apex of male subgenital plate slightly deflected, tooth shaped projection on its upper margin thumb-shaped; lower margin of plate slightly concave, almost straight.....*A. shanghaiica* **Steinmann**
- Anterior margin of lateral lobe of pronotum slightly broken (when viewed laterally), its posterior margin brokenly incised. Basal joints of antennae narrow. Apex of male subgenital plate strongly deflected, fang like; tooth-shaped projection on its upper margin anvil-shaped; lower margin of plate strongly sinous..... *A. hsiai* **Steinmann**
11. Lateral carina of pronotum sinuously decurrent. Upper and lower margins of male subgenital plate subtending an angle of about 30°; apex of plate slightly curved. Lobe-shaped metazona of female pronotum exceedingly wide, its smallest width greater than its length.....*A. kozlovi* **Mishchenko**
- Lateral carinae of pronotum straight. Upper and lower margins of male subgenital plate subtending an angle of about 45°; apex of plate blunt. Lobe-shaped metazone of female pronotum wide, but as wide as long only at its widest portion.....12
12. Angular projection on upper margin of male subgenital plate low, apex of basal plate 3.5-4 times as great as length of protruding portion. Lateral ribs of pronotum high, lobately extending from plane of segment; posterior corner slightly elongated....*A. montana* **Steinmann**
- Angular projection on upper margin of male subgenital plate high.....13
13. Tibia 1 and 2 partly, tibia 3 entirely, red. Anterior margin of lateral lobe (deflected laterally) of pronotum straight (when viewed laterally), its posterior margin concave, not incised. Projection on upper margin of male subgenital plate blunt, flat, saddle-shaped.....*A. rufipes* **Steinmann**
- Legs yellow to yellowish red. Anterior margin of lateral lobe of pronotum considerably or slightly broken (when viewed laterally), posterior margin arcuately or brokenly incised. Projection on upper margin of male subgenital plate tooth shaped, high; projection dactyloid or anvil-shaped.....14
14. Male subgenital plate long, narrow; a minute, reclinate, semicircular protuberance on a rounded, triangular, blunt peg situated on upper margin of plate. Central projection on posterior margin of abdominal subgenital plate of female slightly longer than lateral ones.....*A. tjamuica* **Steinmann**
- Male subgenital plate short.....15
15. Male subgenital plate, in profile with a large projection on the upper margin.....*A. willemsei* **Dirsh**
- Male subgenital plate, in profile with a small projection on the upper margin 16
16. Pronotum, lateral carinae without a black line.....18
- Pronotum, lateral carinae within a black line*A. gigantea* (**Herbst**)
17. Mid carinae present on fastigium of vertex.....*A. turrita* (**Linnaeus**)
- Mid carinae absent on fastigium of vertex.....*A. raipurensis* **sp. n.**
18. Posterior margin of metazona obtuse angulate, abdominal tergites yellowish.....*A. bhoramdevi* **sp. n.**
- Posterior margin of metazona acute angulate, abdominal tergites reddish or pinkish*A. exaltata* (**Walker**)

Conclusion and Discussion

The difference between *A. raipurensis* **sp. n.** with *A. turrita* and *A. bhoramdevi* **sp. n.**

with *A. exaltata* were analyzed. The difference was found in 1) fastigium of vertex, 2) frontal ridge, facial carina, 3) pronotal morphology, 4) shape and size of apical spurs of hind tibiae, 5) subgenital plate, 6) cerci and 7) hind femoral tip.

The colour pattern and morphometry of the body varies between *A. raipurensis* **sp. n.** and *A. bhoramdevi* **sp. n.** The colour of *A. raipurensis* **sp. n.** is light green, while *A. turrita* is dark green. *A. bhoramdevi* **sp. n.** is straw yellow colour, while, *A. exaltata* is green. According to Dirsh, (1954), the body length *A. turrita* is 40.4 to 57.8, pronotum length 6.2-8.8; tegmen length 33.4-50.5; hind femur length 24.4-35.3, while the specimens of *A. raipurensis* **sp. n.** body length 42.87; pronotum length 7.911; tegmina length 41.132; femur length 31.674. According to Dirsh, (1954) *A. exaltata* (male) body length 28.5-37.0; pronotum length 5.0-6.0; tegmen length 23.5-34.0; hind femur 18.5-22.0; while *A. bhoramdevi* **sp. n.** body length 27.546; pronotum length 4.326; tegmina length 25.088; femur length 16.398.

Comparatively the size of *A. raipurensis* **sp. n.** is large, slender, greenish, head longer than pronotum, strongly elongated, dark greenish, head and pronotum subequal in *A. turrita*; subgenital plate broad, with obtuse apex and basal part with large projection in case of *A. raipurensis* **sp. n.**, while subgenital plate elongated with long acute angulate apex with strongly subacute projection in upper basal half in *A. turrita*. Hence the new species of *Acrida* i.e. *A. raipurensis* **sp. n.** is described as new to science.

Compared the morphological characters like tip of hind femora with small spine at the apex of hind knee in *A. bhoramdevi* **sp. n.** with the tip of hind femora with large spine at the apex of hind knee in *A. exaltata*. Body medium sized, slender, straw yellow colour, head longer than pronotum in *A. bhoramdevi* **sp. n.** while body medium, slender, greenish, head and pronotum of equal length in *A. exaltata*; prozona shorter than metazona in *A. bhoramdevi* **sp. n.** while prozona longer than metazona in *A. exaltata*; posterior margin of metazona obtuse angular with obtuse apex in *A. bhoramdevi* **sp. n.** while posterior margin of metazona acute angular with pointed apex in *Acrida exaltata*.

Thus *Acrida bhoramdevi* **sp. n.** is considered to be a separate species new to science.

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