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A Review of the four Genera of Tetrigidae (Caelifera: Orthoptera) with four new records from Sindh Pakistan

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Abstract:

Twelve species of the family Tetrigidae were reviewed and four species, namely *Hedotettix angustatus* Hancock 1909, *Euparatettix indicus* (Bolivar 1887), *Paratettix cingalensis* (Walker 1871) and *P. asbenensis* Chopard 1950 are recorded as new country and state records. An attempt has been made to reveal the taxonomic status of Tetrigidae in Sindh by identification based on morphological characters, photographs, line drawings and measurements of different parameters to produce a taxonomic key to the species of Sindh.

Keywords

Grouse locusts, images, *Lamellitettigodes*, taxonomic key.

Introduction

Pygmy grasshoppers (Orthoptera: Tetrigidae) are commonly called pygmy locusts or grouse locusts; they are small in size ~ 15 mm long, the body is brown, gray or moss-green and they are related to true grasshoppers, in having the forewings either small, reduced or absent (Britannica 2017). Tetrigidae is small group of insects, which includes 1760 species belongs to 262 genera and are distributed worldwide. They are characterized by having an elongated pronotum, which covers the whole dorsal surface of the body: it may be considered as a functional analogous structure to the tegmen (elytra) and usually covers the hindwings and protects the body from injuries. In Tetrigidae the tegmen is reduced to small, sclerotized plates on both sides of the mesothorax (Diveries 2014). The family belongs to an ancient group of Orthoptera possessing a uniform body structure and relatively small in size. Tetrigidae may inhabit humid habitats and some are semi-aquatic (Podgornaya 1983; Paranjape et al. 1987).

Tetrigidae have an inconspicuous appearance and lack audible sound-producing structures. Not much is known about their life cycles. While in Europe, the fauna of Tetrigidae is relatively the best described with several studies (Hockrich et al. 2000). Tetrigidae is one of the least studied insects of Orthoptera and information regarding their genome is totally unknown (Deng et al. 2008). The antennae of ground hoppers are composed of the 13 segments that basically differ in morphology, shape and in the spatial distribution of four different types of sensilla, coeloconic, placoid, basiconic, and bohm (Katrina et al. 2016). Color polymorphism may restrict the success of predators who search for their prey visually (Einat et al. 2014).

The highest biodiversity of Tetrigidae is found in tropical forests. Some species are arboreal in nature and live among leaves of the trees or in the canopy while others live on the forest floor or in the leaf litter. Occasionally they are found in dry habitats, woodlands, rice fields and in sandy areas with lichen. These grasshoppers especially eat roots of plants, seedlings, mosses, fungi, algae and cause considerable damage to crops. Tetrigidae are abundant throughout Sindh and most cultivated crops of Pakistan are being damaged by the different species and the fauna of Tetrigidae is insufficiently known. Therefore, it was felt necessary to review the family Tetrigidae from Pakistan. Descriptions, line drawings, measurements, bionomics, ecology and illustrations of all 12 species are provided, culminating in a taxonomic key. In this manuscript we present four new records from Pakistan, which begin to fill the gaps in our knowledge of the Tetrigidae of Pakistan.

Materials and methods

All specimens were collected from different agricultural crops in various districts of Sindh. Material was brought to Entomology and Bio-control Research Laboratory **(EBCRL)**, Department of Zoology, University of Sindh, Jamshoro. Methodology for euthanasia was adapted from Vickery and Kevan (1983) and Riffat and Wagan (2015) with slight modifications: specimens were killed by using potassium cyanide or chloroform in standard entomological killing bottles for 5–10 minutes. Samples were not left longer because their colors could change. Pinning of samples was done quickly after killing. An insect pin was inserted on the pronotum posterior to the transverse sulcus, slightly to the right of the median carina. The head was directed slightly downwards on the stretching board. The left wings were set with the long axis of the body nearly at a right angle to the pin. The posterior legs were bent beneath the body to minimize the possibility of breakage and to occupy a smaller area. The abdomen was dropped below the wings so as to not be obscured by the hind legs.

Fully dried specimens were preserved in insect cabinets with labels providing collection date, habitat, locality and collector's name. Naphthalene balls (C10H8) were placed in boxes to prevent the attack of ants and other insects. Specimens were identified through the bibliographies given by Riffat and Wagan (2015) and Orthoptera Species File (OSF; Cigliano et al. 2020) was consulted.

Photographs of the various species were prepared. Line drawings were made with a camera lucida fitted on a microscope (Ernst Leitz Wetzlar Germany 545187) and these were improved with the help of the software Adobe illustrator CC-2015 and Adobe Photoshop CS. Measurements of various body parts were calculated in millimeters (mm) using the microscope (Oculas), 10 × 10 graph paper, compass, divider and ruler. Abbreviations used in the text are as follows.

LH Length of head;

WH Width of head;

LP Length of pronotum;

WP Width of pronotum;

LF Length of femur;

WF Width of femur;

LT Length of tibia;

WT Width of tibia;

TBL Total body length;

TN Tag Number;

SEMJ Sindh Entomological Museum Jamshoro.

Species distributions were mapped using latitude and longitude information for available sites of collection. The material has been deposited in Sindh Entomological Museum Jamshoro (SEMJ), Department of Zoology, University of Sindh, Jamshoro, Pakistan with the registration TN: 802 SEM.

Results & Discussion

Taxonomic account

Family Tetrigidae

Subfamily Tetriginae

Tribe Tetrigini

Genus *Hedotettix* Bolivar, 1887

Hedotettix angustatus Hancock, 1909

Figures 1-9, Table 1

Hedotettix angustatus Hancock, J.L. 1909 [1908]. Trans. Entomol. Soc. London 422-423.
Hedotettix angustatus Günther, K. 1941. Stett. Entomol. Z. 102: 159-160.
Hedotettix angustatus Blackith, R.E. 1992. Tetrigidae (Insecta; Orthoptera) of Southeast Asia, Annotated catalogue with partially translated keys and bibliography Ashford Co., Ireland: JAPAGA, Rockbottom. 248

Material examined. Pakistan- **Sindh prov.**• 02♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 04♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 01♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 02♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 01♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 05♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°, 02♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body small 16 mm. Pale golden with black-brown bands on different parts of the body (Fig. 1 A). Head smaller than other species and slightly depressed towards the pronotum. Eyes small, oval in shape and inwardly compressed. Antennae filiform with 12 or 13 segments. Fastigium of vertex small, obviously narrowed at anterior edge (Fig. 4, 5 A). Pronotum pale gold, long, curved, contains two black bands at anterior proximity and narrow, compressed as it grows down towards posterior end. Rough texture of the pronotum with brown dots on the whole surface. Median carina raised and more elevated anteriorly (Fig. 6, 7 A). Tegmen oval in shape. Femur contains dark bands on the dorsal side, inner side is pale golden but clear (Fig. 8 A). Tibia contains 10 or 11 spines. Cerci small and pointed. Subgenital plate is curved and rounded at the apex. Ovipositor is scissor-shaped, pointed but curved downwards at the margins and both margins serrated (Fig. 9 A).

Female. (mm) LH 0.778 ± 0.01788, WH 1.4 ± 0.07071, LP 11.2 ± 0.83666, WP 2.14 ± 0.05477, LF 4.554 ± 0.00547, WF 1.34 ± 0.08944, LT 3.77 ± 0.13038, WP 0.26 ± 0.00707, TBL 16 ± 0.70710.

Ecology. Specimens have been collected from the sides of water bodies of irrigated fields.

Global distribution. Malaysia, Southeast Asia, Pakistan (Cigliano et al. 2021).

Remarks: Previously, this species was reported by Gunther (1941) and Blackith (1992) from Southeast Asia. At present we record *Hedotettix angustatus* for the first time from different regions of Pakistan on agricultural fields and vegetations. It differs from *Hedotettix rusticus* have more prominent two black bands anteriorly.

***Hedotettix punctatus* Hancock, 1909**

Figures 1-9, Table 1

Hedotettix punctatus Günther, K. 1941. Stett. Entomol. Z. 102: 163.
Hedotettix punctatus Shishodia. 1991. Rec. Zool. Survey India 89(1-4): 101-104.
Hedotettix punctatus Wagan, M.S. and D.K.M. Kevan. 1992. Tropical Zoology 5(2):190
Hedotettix punctatus Gupta, S.K., J. Shi and K. Chandra. 2016. Zootaxa 4173(5):472
Hedotettix punctatus Gupta, S.K. and K. Chandra. 2017. Biodiversity Journal 8(2): 745.

Material examined. Pakistan- **Sindh prov.**• 02♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°.

Description. Body small, dusty brownish grey in color (Fig. 1 B). Head small. Eyes oval in shape, dark brown in color and bulging outward. Fastigium of vertex small, narrower than *H. costatus* at the anterior extremity. Antenna filiform with 13 or 14 segments. Pronotum long and tapered, pale, contains two black curved patches/marks on each side of the pronotum at the anterior end of pronotum (Fig. 6, 7 B). Femur dusty brownish, contains rough irregular patches and dots on complete surface (Fig. 8 B). Tibia contains 7 or 8 pairs of spines. Cerci pointed. Subgenital plate curved and rounded at the apex. Ovipositor valve leaf-like, pointed anteriorly, both margins serrated (Fig. 9 B).

Female (mm) LP 12, WP 2.62, LF 5.95, WF 1.92, LT 4.55, WT 0.26.

Ecology. This specimen has been collected from grasses along the sides of water bodies.

Global distribution. India, China, Pakistan (Cigliano et al. 2021).

Remarks. Wagan and Kevan (1992) worked on various developmental degrees of hindwings and heights of the pronotal crest in central Indian specimens. Gupta and Chandra (2017) also reported this species from India. We have recorded this species from Sindh Pakistan, with a distinguishable character of the pronotum which is long, tapered, and pale with two black curved patches/marks on each side anteriorly.

***Hedotettix gracilis* (Haan, 1843)**

Figures 1-9, Table 1

Acridium (*Tetrix*) *gracile* Haan. 1843. Temminck [Ed.] Verhandelingen over de Natuurlijke Geschiedenis der Nederlansche Overzeesche Bezittingen 19/20: 167, 169.
Hedotettix gracilis Bolívar, I. 1902[1901]. Ann. Soc. ent. Fr. 70: 586.
Hedotettix gracilis Liang, G. and Z. Zheng. 1998. Fauna Sinica, Insecta 12: 143, 251.
Hedotettix gracilis Zheng, Z. and G. Jiang. 2003. J. Shaanxi Normal University Nat. Sci. Ed. 31(3): 99.
Hedotettix gracilis Gupta, S.K. and K. Chandra. 2017. Biodiversity Journal 8(2): 745.

Hedotettix gracilis Sultana, G. Jiang, Saiqa Sanam and M.S. Wagan. 2017. Journal of Entomology and Zoology Studies 5(5): 942.
Hedotettix gracilis Maitlo and Panhwar. 2021. Journal of Entomology and Zoology Studies 9(1): 33.

Material Examined. Pakistan- **Sindh prov.**• 10♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 07♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 07♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 08♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 03♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 04♀; Saiqa; 27 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 08♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°, 06♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body elongate, variable in color, mostly dusty brown (Fig. 1 C). Head small and fastigium of vertex broad as compared to that of *H. lineifera*. Antennae filiform and 14-segmented. Median carina not very compressed, lateral ocelli very elevated and obvious from above (Figs. 4, 5 B). Pronotum rigid and wrinkled without color pattern but with small spots behind shoulder. Median carina compressed (Figs. 6, 7 C). Tegmina oval and rounded at the apex. Wings hyaline. Hind femur brown with serrated carina. Spines, 8-11 present on hind tibiae (Fig. 8 C). Cerci small, subgenital plate conical at apex and margins curved inward before apex. Ovipositor valves are spine-like projections with pointed and curved apices (Fig. 9 C).

Female. (mm) LH 0.71 ± 0.15, WH 1.15 ± 0.07, LP 13.2 ± 1.3, WP 3.15 ± 0.35, LF 4.97 ± 0.45, WF 1.65 ± 0.17, LT 3.92 ± 0.87, WT 0.31 ± 0.05, TBL 10.2 ± 4.4.

Ecology. Specimens were collected from old rice fields, especially in swamps.

Global Distribution. India, Pakistan, Myanmar, Thailand, Vietnam, Malesia, China, Sri Lanka, Hong Kong (Cigliano et al. 2021).

Remarks. Wagan (1988) during the year collected specimens from different localities of Sindh, i.e., Nawab Shah, Jamshoro and Miani Forest. Majeed et al. (2002) reported this species from the Thal area of Punjab, Pakistan. During the present study we have recorded only females from various areas of Sindh.

***Hedotettix lineifera* (Walker, 1871)**

Figures 1-9, Table 1

Tettix lineifera Walker, F. 1871. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum 5: 824.
Acrydium lineiferum Kirby, W.F. 1910. A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae) 3(2): 45.
Acrydium mundum Hancock, J.L. 1915. Rec. Ind. Mus. 11: 115.
Hedotettix gracilis Wagan, M.S. and D.K.M. Kevan. 1992. Tropical Zoology 5(2): 188.
Hedotettix lineifera Sultana, G. Jiang, Saiqa Sanam and M.S. Wagan. 2017. Journal of Entomology and Zoology Studies 5(5): 943.

Material Examined. Pakistan- **Sindh prov.**• 02♂, 03♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 01♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 01♂, 02♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 02♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 0♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 01♂, 02♀; Saiqa; 27 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 02♂, 01♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°.

Description. Body rigid, wrinkled, small. Female similar to male but slightly longer and stouter. (Fig. 1 D, E). Head small, fastigium of vertex narrow and carrying prominent median carina, frontal ridge deeply sulcate above lateral ocelli. Antennae filiform and 13 segmented, lateral ocelli not very elevated (Figs. 4, 5 C, D). Pronotum contains compressed and undulating median carina. Dorsal carina incomplete in region of thorax. Straight white line runs longitudinally along length of dorsal surface (Figs. 6, 7 D, E). Tegmina short, obtusely rounded at margin. Wings hyaline. Hind femur broad towards base and outer surface convex. Median carina serrated, interrupted before reaching knee (Fig. 8 D, E). Hind tibia thin ~ 8-10 spines present, first segment of tarsi longer than remaining segments. Cerci small and pointed. Subgenital plate long and curved. Ovipositor valves long and serrated with curved margins (Fig. 9 D).

Male. (mm) LH 0.58 ± 0.04 9, WH 1.16 ± 0.09, LP 11.6 ± 0.5, WP 2.27 ± 0.17, LF 1.58 ± 0.02, WF 0.53 ± 0, LT 1.10 ± 0.09, WT 0.18 ± 3.39, TBL 0.8 ± 13.9. **Female.** (mm) LH 0.7 ± 0.09, WH 1.26 ± 0.1, LP 12.6 ± 2.0, WP 3.15 ± 0.06, LF 5.7 ± 0.53, WF 1.92 ± 0.17, LT 4.78 ± 0.53, WT 0.32 ± 0.05, TBL 11.3 ± 4.1.

Ecology. Specimens were collected from roots of plants and grasses and along the banks of the River Indus.

Global Distribution. India, Pakistan (Cigliano et al. 2021).

Remarks. Both sides of the pronotum of *Hedotettix lineifera* (in male and female) bear a longitudinal line on the outer surface. This is a diagnostic character for this species.

***Hedotettix attenuatus* Hancock, 1904**

Figures 1-9, Table 1

Hedotettix attenuatus Kirby, W.F. 1910. A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae) 3(2): 50.
Hedotettix attenuatus Shishodia. 1991. Rec. Zool. Surv. India, Misc. Pub., Occas. Paper 140: 162.
Hedotettix attenuatus Ingrisch. 2001. Spixiana (Munich) 24(2): 149.
Hedotettix attenuatus Shishodia, K. Chandra and S.K. Gupta. 2010. Rec. Zool. Surv. India, Misc. Pub., Occas. Paper 314: 167.
Hedotettix attenuatus Storozhenko and Dawwrueng. 2015. Zootaxa 4052(5): 530.
Hedotettix attenuatus Gupta, S.K. and K. Chandra. 2017. Biodiversity Journal 8(2): 745.
Hedotettix attenuatus Sultana, G. Jiang, Saiqa Sanam and M.S. Wagan. 2017. Journal of Entomology and Zoology Studies 5(5): 945.
Hedotettix attenuatus Storozhenko. 2018. Far Eastern Entomologist 362: 18.

Material Examined. Pakistan-**Sindh prov**.• 04♂; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 01♂; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°.

Description. Body small in size, dusty grey with yellowish patches (Fig. 1 F). Antennae filiform, 13 or 14 segments, placed before the lower extremities of the eyes. Head small, eyes raised high above level of pronotum. Fastigium of vertex narrow and somewhat curved with obscure median carina anteriorly (Figs. 4, 5 E). Pronotum rigid, wrinkled, with variable color pattern. Median carina of pronotum not very compressed (Figs. 6, 7 F). Tegmina elongated, rounded at the apex. Wings fully developed, hyaline. Hind femur pale brown with yellowish patches, median carina serrated. Eight or nine spines present on hind tibiae (Fig. 8 F). Cerci small, narrow and pointed at the apex. Subgenital plate long and curved.

Male. (mm) LH 0.66 ± 0.05, WH 1.53 ± 0.05, LP 12.6 ± 1.52, WP 2.53 ± 0.07, LF 5.42 ± 0.62, WF 1.47 ± 0.08, LT 3.59 ± 0.56, WT 0.28 ± 0.05, TBL 16 ± 01.

Ecology. These specimens were collected from the roots of the plants and mango orchids and near the sugarcane and rice fields.

Global Distribution. Pakistan, India, Nepal, Sri Lanka, Thailand, Cambodia (Cigliano et al. 2021).

Remarks. Deng (2016) worked on the taxonomy of Tetrigoidea from China, recording three new species. Majeed et al. (2002) reported this species for the first time from Punjab, Pakistan. During this study we report *Hedotettix attenuatus* (male) for the first time from Sindh, Pakistan.

Genus *Lamellitettigodes* Gunther, 1939

Lamellitettigodes sagittatus (Bolívar, 1887)

Figures 1-9, Table 1

Paratettix sagittatus Bolívar, I. 1887. Ann. Soc. Entom. Belgique 31: 188, 280.
Xistra sagittata Bruner, L. 1915. Univ. Stud., Lincoln (NE) 15(2): 247 [53].
Xistra sagittate Willemse, C. 1930. Tijdschr. v. Entomologie 73: 29-31
Euparatettix sagittatus Günther, K. 1937. Revue Suisse de Zool. 44: 133.
Euparatettix sagittata Günther, K. 1941. Stett. Entomol. Z. 102: 155-156.
Euparatettix sagittatus Zheng, Z., H. Zeng and X. Ou. 2011. Acta Zootaxonomica Sin. 36(2): 385.
Lamellitettigodes sagittatus Tumbrinck. 2019. Jour. Orth. Res. 28(2): 172.
Lamellitettigodes sagittatus Lu, Y.-Z. and L. Zha. 2020. Zootaxa 4851(2): 342.

Material examined. Pakistan- **Sindh prov**.• 07♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 04♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 02♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 04♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 05♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 01♀; Saiqa; 27 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 07♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°. 05♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body long and variable in color from black to brown (Fig. 2. A). Antennae filiform 11-13 segments. Head small but slightly raised above level of pronotum (Figs 4, 5 F). Eyes oval and placed slightly outwards. Fastigium of vertex narrow and compressed. Pronotum has two dark black bands on dorsal surface in region of thorax. Median carina prominent. A dark brown line runs longitudinally along length of pronotum (Figs. 6, 7 G). Tegmina small, obtusely rounded. Wings fully developed. Hind femur short and thick with serrated margins (Fig. 8 G). Cerci short with pointed apices. Subgenital plate curved and rounded at apex. Valves of ovipositor leaf-like with serrated margins. (Fig. 9 E).

Female. (mm) LH 1.03 ± 0.18, WH 1.17 ± 0.109, LP 13.4 ± 1.8, WP 3.29 ± 0.23, LF 6.02 ± 0.57, WF 1.8 ± 0.26, LT 4.9 ± 0.42, WT 0.37 ± 0.036, TBL 11.8 ± 3.5.

Ecology. This species was collected from fruit orchids.

Global Distribution. Malaysia, Philippines, Pakistan, China (Cigliano et al. 2021).

Remarks. Deng (2016) described this species from China. We record this species for first time from Sindh, Pakistan.

***Euparatettix indicus* (Bolivar,1887)**

Figures 1-9, Table 1

Paratettix indicus Bolívar, I. 1887. Ann. Soc. Entom. Belgique 31: 281.
Paratettix indicus Hancock, J.L. 1907.Genera Insectorum 48: 56.
Euparatettix indicus Hancock, J.L. 1907. Trans. Entomol. Soc. London 1907: 238.
Paratettix indicus Paris. 1994[1993]. Eos 69: 240.
Euparatettix indicus Liang, G. and Z. Zheng. 1998. Fauna Sinica, Insecta 12: 214.
Euparatettix indicus Zheng, Z., H. Zeng and X. Ou. 2011. Acta Zootaxonomica Sin. 36(2): 385.

Material Examined. Pakistan-**Sindh prov**. 02♂; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 01♂; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°.

Description. Body is yellowish smooth, slender and moderate in size (Fig. 2 B). Antennae filiform, 12 or 13 segments. Head small, fastigium of vertex narrow but flattened at apex. Eyes prominently raised above head level (Figs. 4, 5 G). Pronotum bears yellowish line along entire dorsal surface. Median carina raised anteriorly but depressed and obscure at posterior part of the pronotum (Figs. 6, 7 H). Tegmina elongated with rounded apices. Wings fully developed. Hind femur small and slender and hind tibiae pale with eight or nine spines (Fig. 8 H). Cerci small. Subgenital plate compressed with rounded apex.

Male. (mm) LH 0.756 ± 0.05128, WH 1.38 ± 0.08366, LP 11.6 ± 0.54772, WP 2.12 ± 0.04472, LF 4.554 ± 0.00545, WF 1.32 ± 0.08366, LT3.73 ± 0.10954, WT 0.258 ± 0.00447, TBL 16.4 ± 1.14017.

Ecology. Specimens mostly occur in rice and sugarcane fields, at the boundary of a water pool and the stones with thick mosses and algae growing on them.

Global Distribution. China, Pakistan (Cigliano et al. 2021).

Remarks. This is a new record from Sindh, Pakistan. Previously, this species was recorded by Saeed et al. (2000) from Rawalpindi, Pakistan. We collected this species from rice and sugarcane fields.

Genus *Paratettix* Bolivar, 1887

301 ***Paratettix variabilis* (Bolivar, 1887)**

302 Figures 1-9, Table 1

303 *Euparatettix variabilis* Hancock, J.L. 1915. Rec. Ind. Mus. 11: 126.
304 *Paratettix variabilis* Bruner, L. 1915. Univ. Stud., Lincoln (NE) 15(2): 248 [54].
305 *Euparatettix variabilis* Hebard. 1930[1929]. Revue Suisse de Zool. 36: 286.
306 *Euparatettix histricus* Günther, K. 1937. Revue Suisse de Zool. 44: 133.
307 *Euparatettix variabilis* Sandrasagara. 1949[1950]. Rec. Ind. Mus. 47: 141.
308 *Euparatettix variabilis* Shishodia, K. Chandra and S.K. Gupta. 2010. Rec. Zool. Surv. India, Misc.
309 Pub., Occas. Paper 314: 178.
310 *Paratettix variabilis* Tumbrinck. 2015. Biodiversität und Naturausstattung im Himalaya 280-281.
311 *Euparatettix varibilis* Deng, W.-A., Z. Zheng, Xiaodong Li, Minping Lin, S.-Z. Wei, B.-D. Yuan and
312 L.-L. Lin. 2015. Zootaxa 3925(2): 174.
313 *Paratettix variabilis* Storozhenko. 2018. Far Eastern Entomologist 362: 18.

314 **Material examined.** Pakistan- **Sindh prov.**• 06♂, 08♀; Saiqa; 10 Oct. 2020; Mirpurkhas N
315 25.5065°, E 69.0136°, 02♂, 07♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 01♂, 03♀;
316 Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 03♀; Saiqa; 15 Oct. 2020; Mithi N
317 24.7436°, E 69.8061°, 01♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 03♀; Saiqa; 27
318 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 02♂, 04♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E
319 68.2743°. 05♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

320 **Description.** Body small, slender, brownish and slightly ridged and wrinkled (Fig. 2 C, D). Female
321 similar to male but slightly larger. Antennae filiform with 12 or 13 segments, inserted between the
322 lower margins of the eyes. Head small but raised above level of pronotum. Eyes prominently raised
323 and fastigium of vertex narrow with depressed median carina (Figs 4, 5 H, I). Pronotum broad
324 anteriorly but gradually narrows towards the posterior end of the pronotum. A black band also found
325 along anterior margin of the pronotum, but a yellow band present within the sides (Figs 6, 7 I, J).
326 Tegmina small and oval. Wings extend beyond level of pronotum. Hind femur small and slender with
327 dark marks and serrated carina (Fig. 9 I, J). Hind tibia pale with two dark spaces. Ten or eleven
328 spines present on the external side of tibia. Third tarsal segment longer than remainder with acute
329 pulvilli. Cerci small. Subgenital plate compressed and curved with rounded apex. Valves of ovipositor
330 leaf-like but slightly curved toward the apex, having serrated margins (Fig 9 F).

331 **Male.** (mm) LH 0.75 ± 0.27, WH 1.01 ± 0.13, LP 12 ± 15, WP 2.39 ± 0.36, LF 1.87 ± 0.19, WF 0.52
332 ± 0.005, LT 1.4 ± 0.09, WT 0.35 ± 6.79, TBL 7.6 ± 0.5. **Female.** (mm) LH0.76 ± 0.26, WH 1.06 ±

0.035, LP 14 ± 12.2, WP 2.85 ± 0.50, LF 5.03 ± 0.67, WF 1.74 ± 0.21, LT 3.85 ± 1.16, WT 0.38 ± 0.13, TBL 13 ± 06.

Ecology. These specimens were collected from the wild plantation growing near water bodies and from the surface of a ponds where mosses and green algae were growing profusely on the surfaces.

Global Distribution. Pakistan, Sri Lanka, Bangladesh, Myanmar, Nepal, India, Malesia, China (Cigliano et al. 2021).

Remarks. Majeed et al. (2002) reported this species from Thal area of Punjab, Pakistan. Zheng (2005) studied fauna of the Tetrigoidea from western China. We collected this species from a wild plantation growing near water bodies.

***Paratettix meridonialis* (Rambur, 1838)**

Figures 1-9, Table 1

Tetrix meridionalis Rambur. 1838. Faune entomologique de l'Andalousie 2:65
Tettix meridionalis Bolívar, I. 1876. An. Soc. Espan. Hist. Nat. 5:369
Paratettix meridionalis Bolívar, I. 1887. Ann. Soc. Entom. Belgique 31:275
Paratettix meridionalis Massa, Fontana, Buzzetti, Kleukers and Odé. 2012. Fauna d'Italia. Orthoptera 48:365
Paratettix meridionalis Lemonnier-Darcemont, Puskás and Darcemont. 2015. Articulata 30:63-80
Paratettix meridionalis Tlili, Abdellaoui, Chintauan-Marquier, Ben Chouikha, Moussi, Ammar and Desutter-Grandcolas. 2020. Zoosystema 42(31):710

Material Examined. Pakistan- **Sindh prov.•** 01♀; Saiqa; 12 Sep. 2021; Mirpurkhas N 25.5065°, E 69.0136°.

Description. Body small, dusty colored with asymmetrical, brown-black bands on whole body surface (Fig. 3 A). Head small, depressed as in *Paratettix angustatus* and *Paratettix maxicanus*. Eyes oval, greyish, protruding outwards. Fastigium of vertex narrower at anterior proximity, sulcus little prominent (Fig. 4, 5 I). Antennae filiform, 13 or 14 segments. Tegmen oval. Pronotum: median carina raised and prominent dorsally, anterior end of pronotum has a black circular patch centrally, two semi-curved black patches on each dorsal side and an x-shaped impression in the center of these three black patches; four or five more patches along the remaining length of the pronotum (Figs. 6, 7 K). Femur with two black patches (Fig. 8 K). Cerci small, narrow and pointed at apex. Subgenital plate curved. Ovipositor valves with scissor-shaped margins pointed and curved outward (Fig. 9 G).

Female. (mm) LH 0.7, WH 1.57, LP 15, WP 3.5, LF 5.6 WF 2.1, LT 5.25, WT 0.26, TBL 16.

Ecology. The specimens were collected from margins of moist grasses and at the boundary of a water pool and the stones with thick mosses.

Global distribution. Spain, Turkey, Libya, Italy, Morocco, Saudi Arabia, Portugal, Palestine, Jordan, Turkmenistan, Tunisia, Pakistan (Cigliano et al. 2021).

Remarks. Arne and Christian (2008-2012) worked on this species from Jordan. We report this species from Mirpurkhas, Sindh, Pakistan.

***Paratettix cingalensis* (Walker, 1871)**

Figures 1-9, Table 1

Tettix cingalensis Walker, F. 1871. Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum 5: 827.
Euparatettix cingalensis Kirby, W.F. 1910. A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae) 3(2): 31.

Material Examined. PAKISTAN- **Sindh prov**.• 03♂, 06♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 03♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 01♂, 02♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 01♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 01♀; Saiqa; 27 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 06♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°. 01♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body stout, dusty grey in color. Female similar to male but stouter, longer (Fig. 3 B, C). Head small with flattened fastigium of vertex. Antennae filiform, 11-13 segmentes. Eyes slightly raised above level of pronotum (Figs. 4, 5 K, L). Pronotum stout anteriorly but narrows towards the posterior end, two dark spots present along median carina within dorsal surface of thorax (Figs. 6, 7 L, M). Tegmina elongated and obtusely rounded at apex. Hind femur thick and serrated, containing few black dots (Figs. 8 L, M). Hind tibia contains eight or nine spines. Cerci small. Subgenital plate narrow and curved. Valves of ovipositor leaf-like and serrated (Fig. 9 H).

Male. (mm) LH 0.69 ± 0.175, WH 1.37 ± 0.05, LP 11.3 ± 0.5, WP 2.00 ± 0.15, LF 4.55 ± 0.35, WF 1.57 ± 0.17, LT 4.34 ± 0.27, WT 0.29 ± 0.05, TBL 14.6 ± 0.5. **Female.** (mm) LH 0.75 ± 0.13, WH

1.54 ± 0.05, LP 12.6 ± 2.8, WP 2.68 ± 0.36, LF 5.18 ± 0.40, WF 1.74 ± 0.175, LT 4.49 ± 0.56, WT 0.32 ± 0.05, TBL 17 ± 1.

Ecology. The specimens were collected from the margins of water ponds.

Global Distribution. Sri Lanka, Nepal, India, Pakistan (Cigliano et al. 2021).

Remarks. Previously, the presence of this species was confirmed by Wagan (1992) from different localities of Sindh, i.e., Nawab Shah, Jamshoro and Miani Forest. Shishodia et al. (2010) prepared an annotated checklist of Orthoptera (Insecta) from India. Sunil and Kailash (2017) also reported this species from India.

***Paratettix nigrescens* Sjostedt, 1921**

Figures 1-9, Table 1

Material Examined. Pakistan- **Sindh prov.**• 07♂; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 02♂; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 01♂; Saiqa; 30 Sep. 2020; Hyderabad N 25.396 0°, E 68.3578°, 04♂; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 01♂; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 02♂; Saiqa; 27 Oct. 2021; Sukkur N 27.7244°, E 68.8228°, 05♂; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°. 01♂; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body slightly stout, variable in color and color pattern from dusty grey to black (Fig. 3 D). Antennae filiform 11 or 12 segments and inserted between lower margins of eyes. Head small, oblique in profile and raised above level of pronotum. Fastigium of vertex of head narrow with depressed median carina (Figs. 4, 5 M). Pronotum contains dark black triangular marks. Median carina of pronotum not much compressed or depressed on dorsal surface (Figs. 6, 7 N). Tegmina small with rounded apices. Wings fully developed and hyaline. Hind femur small with broad dark spots along the entire surface (Fig.8 N). Hind tibia pale with two dark spaces on sides and contains 9-11 spines. Cerci are small. Subgenital plate long and curved but very compressed at apex.

Male. (mm) LH 0.72 ± 0.11, WH 1.17 ± 0.08, LP 12 ± 00, WP 2.55 ± 0.19, LF 4.2 ± 1.21, WF 1.57 ± 0.20, LT 3.4 ± 0.17, WT 0.32 ± 0.04, TBL 18 ± 0.

Ecology. The specimens were collected from the sugarcane fields and from the outer walls of a water pond.

Global Distribution. Australia, New Guinea, Queensland, Cameroon, Caledonia, Pakistan (Cigliano et al. 2021).

Remarks. Saeed et al. (2000) described Tetriginae of Rawalpindi Division, Pakistan. Majeed et al. (2002) also recorded this species from the Thal area of Punjab, Pakistan.

***Paratettix asbanensis* Chopard, 1950**

Figure 1-9, Table 1

Paratettix asbenensis Chopard. 1950. Mem. Inst. franc. Afr. Noire 10: 136.

Paratettix asbenensis Günther, K. 1979. Beiträge zur Entomologie 29(1): 106.

Paratettix asbenensis Roy, R. 1990. Bull. IFAN (A) 43 [1986-1987]: 369.

Material Examined. Pakistan- **Sindh prov.**• 13♀; Saiqa; 10 Oct. 2020; Mirpurkhas N 25.5065°, E 69.0136°, 02♀; Saiqa; 29 Sep. 2020; Jamshoro N 25.4304°, E 68.2809°, 05♀; Saiqa; 30 Sep. 2020; Hyderabad N 25.3960°, E 68.3578°, 03♀; Saiqa; 15 Oct. 2020; Mithi N 24.7436°, E 69.8061°, 01♀; Saiqa; 16 Oct. 2020; Umerkot N 25.3549°, E 69.7376°, 06♀; Saiqa; 22 Oct. 2020; Kotri N 25.3494°, E 68.2743°, 04♀; Saiqa; 25 Oct. 2021; Khairpur N 27.5256°, E 68.7551°.

Description. Body long and stout, with black spots (Fig. 3 E). Antennae filiform, 13 segments. Head small but may rise above level of pronotum (Fig. 4, 5 N). Pronotum has two dark black bands along median carina in region of thorax (Fig. 6, 7 O). Tegmina elongated and rounded at apex. Hind femur thicker with black spots (Fig. 8 O). Hind tibia pale with eight or nine spines. Cerci are small. Subgenital plate small and slightly curved. Valves of ovipositor leaf-like with serrated margins (Fig. 9 I).

Female. (mm) LH 0.67 ± 0.05, WH 1.54 ± 0.05, LP 12.6 ± 1.52, WP 2.53 ± 0.08, LF 5.42 ± 0.62, WF 1.48 ± 0.08, LT 3.59 ± 0.56, WT 0.29 ± 0.05, TBL 17 ± 01.

Ecology. The specimens were collected from moist grasses, but some were found on stones covered with thick mosses.

Global Distribution. Madagascar, Somalia, Pakistan, Niger (Cigliano et al. 2021).

Remarks. Gunther (1979) reported this species from Africa. During this study we collected only females in September and October.

446 **Key to the genera of Tetrigidae**

1 Body small (16-17 mm), pale golden with black-brown bands on the different parts of the body. Head smaller than other species' and slightly depressed towards the pronotum. Eyes small, oval in shape and inwardly compressed…….**2**

- Body longer (17-19 mm), variable in color black to brown. Head is small but slightly raised above the level of pronotum. Eyes oval in shape, protruding slightly outwards…….....**3**

2 Pronotum contains compressed and undulating median carina. Dorsal median carina is incomplete in the region of thorax. Straight white line runs longitudinally along the length of the dorsal surface…….……..……...***Hedotettix* Bolivar**

- Pronotum contains a yellowish line along the complete dorsal surface. Median carina is raised anteriorly but depressed and obscure at the posterior part of the pronotum……..……..…..***Euparatettix* Hancock**

3 Wings fully developed not extend beyond the level of pronotum. Hind femur is short and thick with serrated margins. Cerci short and with pointed apices. Valves of the ovipositor are leaf-like and have serrated margins. Subgenital plate is curved and rounded at the apex……....…….. ***Lamellitettigodes* Gunther**

- Wings fully developed extend beyond the level of pronotum. Hind femur is small and slender with dark marks and with serrated carina. Hind tibia is pale with two dark spaces. Tibia contains 10 or 11 spines. Third tarsal segment is longer than the remainder with acute pulvilli. Cerci are small. Subgenital plate is compressed and curved with rounded apex. Valves of the ovipositor are leaf-like but slightly curved toward the apex, with serrated margins …… ***Paratettix* Bolivar**

447

448 **Key to the species of Tetrigidae**

1 Body pale golden with black-brown bands on different parts of the body (Fig. 1 A). Head smaller than other species (0.78 mm) and slightly depressed towards the pronotum. Eyes small, oval and compressed. Fastigium of vertex small, prominently narrower at anterior edge (Fig. 4, 5 A)…….……..…..**2**

- Body dusty brownish grey in color (Fig. 1 B). Head small, eyes oval, dark brown and bulging outwards. Fastigium of vertex small, narrower and compressed at anterior edge..... **3**

2 Pronotum contains two black bands anteriorly. Rough texture of the pronotum has brown dots on the complete surface. Median carina raised and more elevated anteriorly (Fig. 6, 7 A)……...***Hedotettix angustatus,*** **Hancock**

- Pronotum is rigid and wrinkled without color banding but with small spots behind the shoulder. Median carina is compressed (Fig.6, 7 C)…….…..**4**

3 Femur dusty brownish, contains rough irregular patches and dots on the complete surface (Fig. 8 B). Tibia contains 7 or 8 pairs of spines. Ovipositor valve leaf-like, pointed anteriorly, both margins serrated (Fig. 9 B)…. ***Hedotettix punctatus*** **Hancock**

- Femur pale and contains brownish patches in the middle and outer surface is convex in shape (Fig. 8 D, E). Tibia is thin 8-10 spines present, first segment of tarsi is longer than the remaining segments. Ovipositor valves are long and serrated but with the curved margins (Fig. 9 D)……..…**5**

4 Tegmina are oval and rounded at the apex. Wings are developed and hyaline. Hind femur is brown with serrated carina. 8-11 spines are present on the hind tibiae. (Fig. 6, 7 C). Sub genital plate is conical at the apex and margins are curved inward before the apex…….. ***Hedotettix gracilis*** **Haan**

- Tegmina are elongated and it is rounded at the apex. Wings are fully developed and are hyaline. Hind femur is pale brown with yellowish patches, median carina is serrated. 8-9 spines are present on the hind tibiae (Fig. 8 F). Subgenital plate is long and curved……..**6**

5 Head is small (0.58 mm) and raised with level of pronotum, fastigium of vertex is narrow and carrying prominent median carina, frontal ridge is deeply sulcate above the lateral ocelli. (Fig. 4, 5 C, D). Cerci are narrow and pointed at the apex, while its apical portion is white and dark at the base. Subgenital plate is long and curved. Ovipositor's valves are long and serrated with smooth curved margins (Fig. 7 D)……...…….……...…..***Hedotettix lineifera*** **Walker**

- Head is small (1.03 mm) but slightly raised above the level of pronotum, fastigium of vertex narrow and compressed (Fig. 4, 5 F). Cerci short and with pointed apices; no

basal pigmentation. Subgenital plate is curved and rounded at the apex (Fig. 9 E). Valves of the ovipositor are leaf-like have serrated margins; apices curved ……**7**

6 Median carina of pronotum is not very compressed (Fig. 6, 7 F). Tegmina are elongated and rounded at the apices. Wings are fully developed and are hyaline……..…...***Hedotettix attenuatus*** **Hancock**

- Median carina is raised anteriorly but depressed and obscure at the posterior part of the pronotum (Fig. 6, 7 H). Tegmina are elongated with rounded apex. Wings are fully developed and hylline……**8**

7 Antennae are filiform with 11-13 segments. Head is small but slightly raised above the level of pronotum (Fig. 4, 5 F). Pronotum has two dark black bands on the dorsal surface in the region of thorax…….……...***Lamellitettigodes sagittatus*** **Bolívar**

- Antennae are filiform with 12 or 13 segments, inserted between the lower margins of the eyes. Head is small but raised above the level of pronotum (Fig. 4, 5 H, I). Pronotum is broad anteriorly but gradually narrows down towards the posterior end of the pronotum. A black band is present along anterior margin of the pronotum, while a yellow band is found along the sides (Fig. 6, 7 I, J)……..……..……...**9**

8 Tegmina are elongated with rounded apex. Pronotum contains a yellowish line along the dorsal surface. Median carina is raised anteriorly but depressed and obscure at the posterior part of the pronotum (Fig. 6, 7 H)……..… ***Euparatettix indicus*** **Bolivar**

- Tegmen oval in shape. Pronotum median carina raised and prominent dorsally, anterior end has a black circular patch in the middle, two semi-curved black patches on each dorsal side of the pronotum. Median carina contains a structure making an x- like impression in the center of these three black patches. 4 or 5 more patches along the remaining length of the pronotum (Fig. 6, 7 K)…….……..…**10**

9 Body is small, slender (13 mm), brownish and slightly ridged and wrinkled (Fig. 2 C, D). Female is similar to male but slightly larger. Head is small but raised above the level of pronotum. Eyes prominently raised and fastigium of vertex is narrow, having a depressed median carina (Fig. 4, 5 H, I)…… ***Paratettix variabilis*** **Bolivar**

- Body is stout (17 mm), and dusty grey in color. Female is similar to male but stouter and longer in size (Fig. 3 B, C). Head is small with flattened fastigium of vertex. Eyes slightly raised above the level of pronotum (Fig. 4, 5 K. L)…….……..…...**11**

10 Head small. Eyes oval, greyish, protruding outwards. Fastigium of vertex narrower at anterior proximity, sulcus little prominent (Fig. 4, 5 J). Antennae with 13 or-14 segments……..…***Paratettix meridonialis*** **Rambur**

\- Head is small, oblique in profile and raised above the level of pronotum. Eyes oval in shape. Fastigium of vertex of head is narrow with depressed median carina (Fig. 2-3, 13) Antennae 12 or 13 segments... ……..... ***Paratettix nigrescens*** **Sjostedt**

11 Pronotum is stout anteriorly but narrows towards the posterior end. Along the median carina two dark spots are present within the dorsal surface in the region of thorax (Fig. 4, 5 K, L). Tegmina are elongated and obtusely rounded at the apex. Hind femur is thick and serrated, contains few black dots (Fig. 8 L, M)…..…***Paratettix cingalensis*** **Walker**

\- Pronotum has two dark black bands along the median carina in the region of thorax (Fig. 6, 7 O). Tegmina elongated and rounded at the apex. Hind femur is thick with black spots (Fig. 8 O)……..... ***Paratettix asbanensis*** **Chopard**

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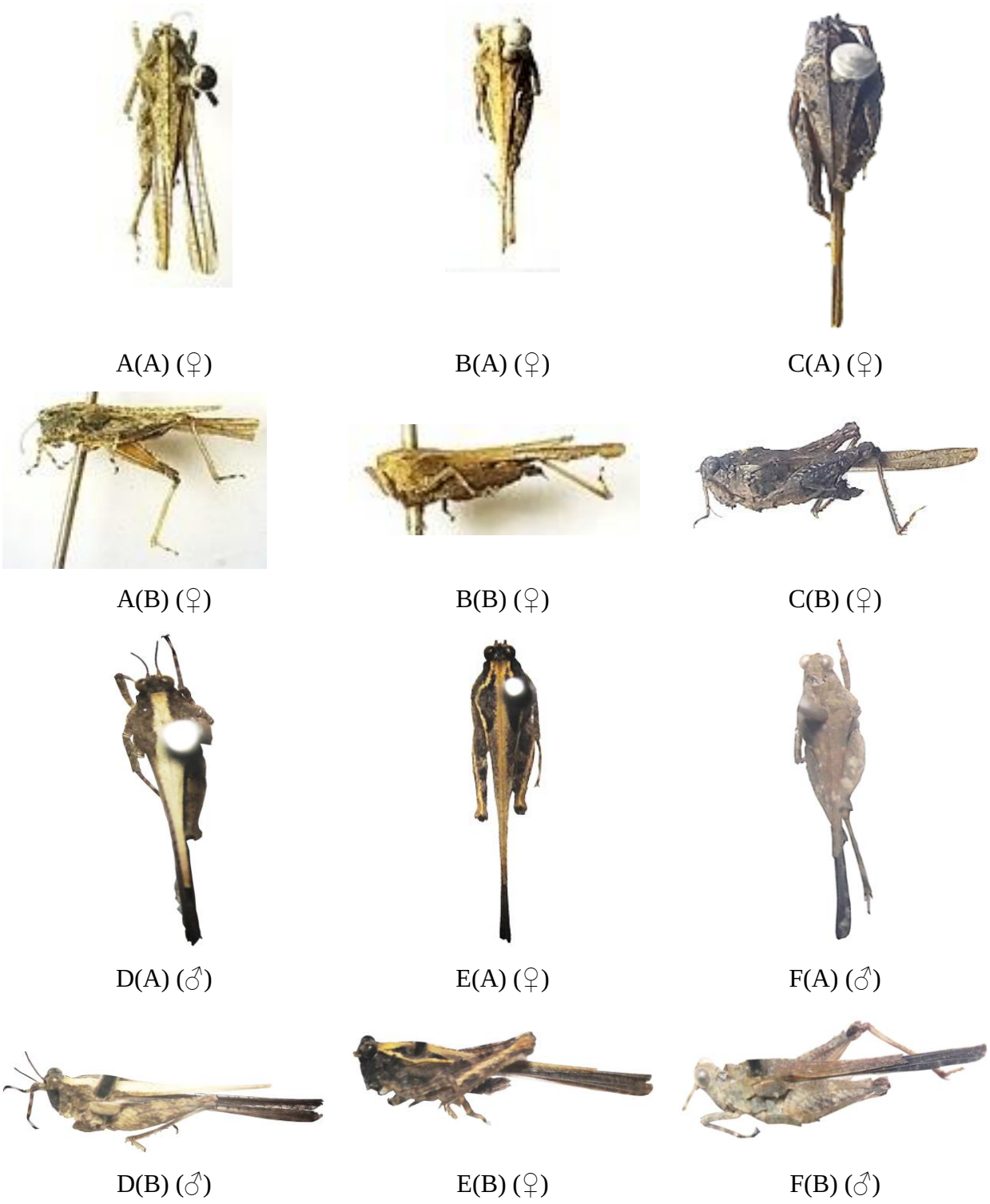

503 **Figure 1.** Male and female dorsal and lateral view of Tetrigidae species. Subfamily Tetriginae: A,
504 *Hedotettix angustatus* (♀), B, *H. punctatus* (♀), C, *H. gracilis* (♀), D, E, *H. lineifera* (♂, ♀), F, *H.*
505 *attenuatus* (♂).

A(A) (♀)

B(A) (♂)

A(B) (♀)

B(B) (♂)

C(A) (♂)

D(A) (♀)

C(B) (♂)

D(B) (♀)

Figure 2. Male and female dorsal and lateral view of Tetrigidae species. Subfamily Tetriginae: A, *Lamellitettigodes sagittatus* (♀), B, *Euparatettix indicus* (♂), C, D, *Paratettix variabilis* (♂, ♀).

A(A) (♀)

B(A) (♂)

A(B) (♀)

B(B) (♂)

C(A) (♀)

D(A) (♂)

E(A) (♀)

C(B) (♀)

D(B) (♂)

E(B) (♀)

Figure 3. Male and female dorsal and lateral view of Tetrigidae species. Subfamily Tetriginae: A, *Paratettix meridionalis* (♀), B, C, *P. cingalensis* (♂, ♀), D, *P. nigrescene* (♂), E, *P. asbensis* (♀).

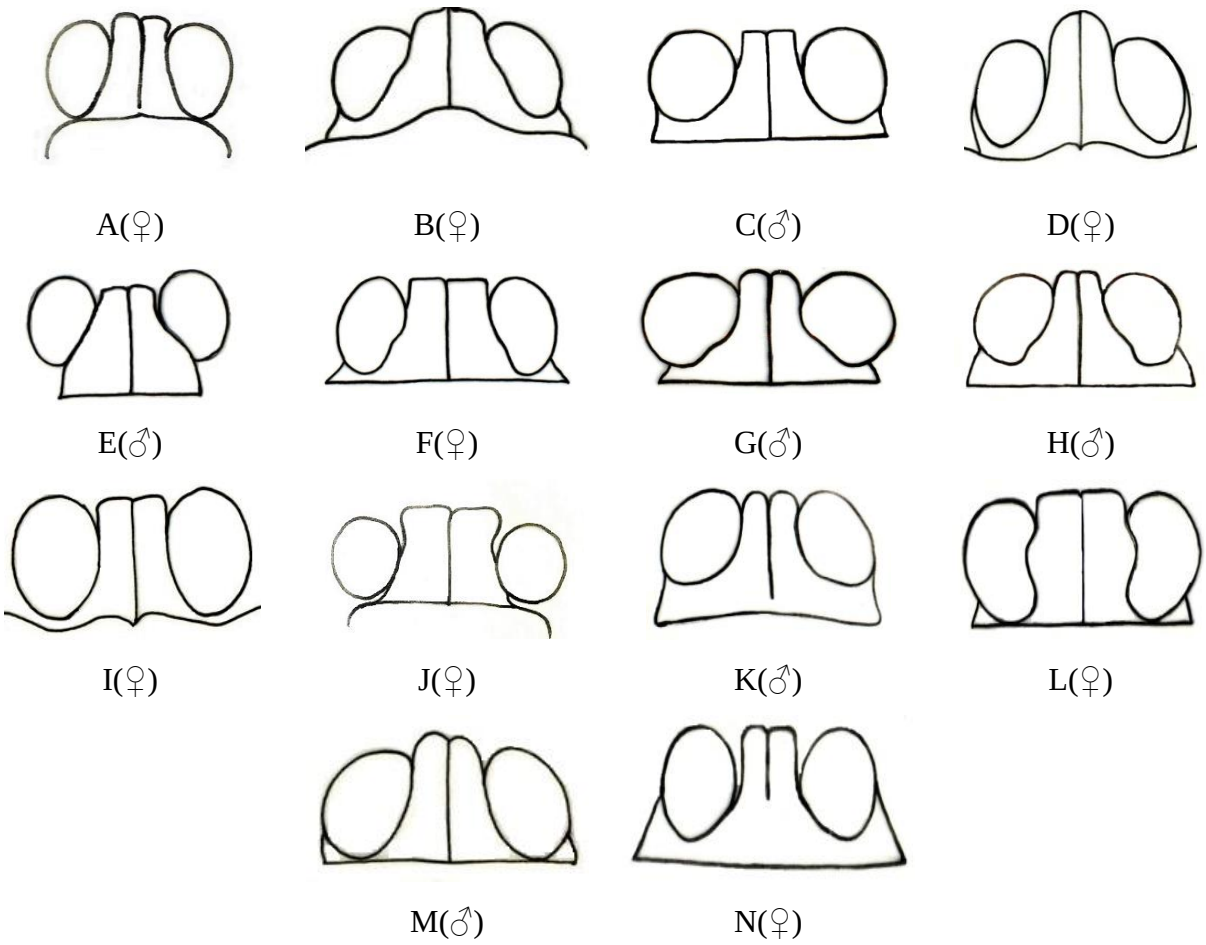

Figure 4. Male and female dorsal view of head of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. gracilis* (♀), C, D, *H. lineifera* (♂, ♀), E, *H. attenuatus* (♂), F*Lamellitettigodes sagittatus* (♀), G, *Euparatettix indicus* (♂), H, I, *Paratettix variabilis* (♂, ♀), J, *P. meridionalis* (♀), K, L, *P. cingalensis* (♂, ♀), M, *P. nigrescene* (♂), N, *P. asbensis* (♀). Scale bar: 2mm

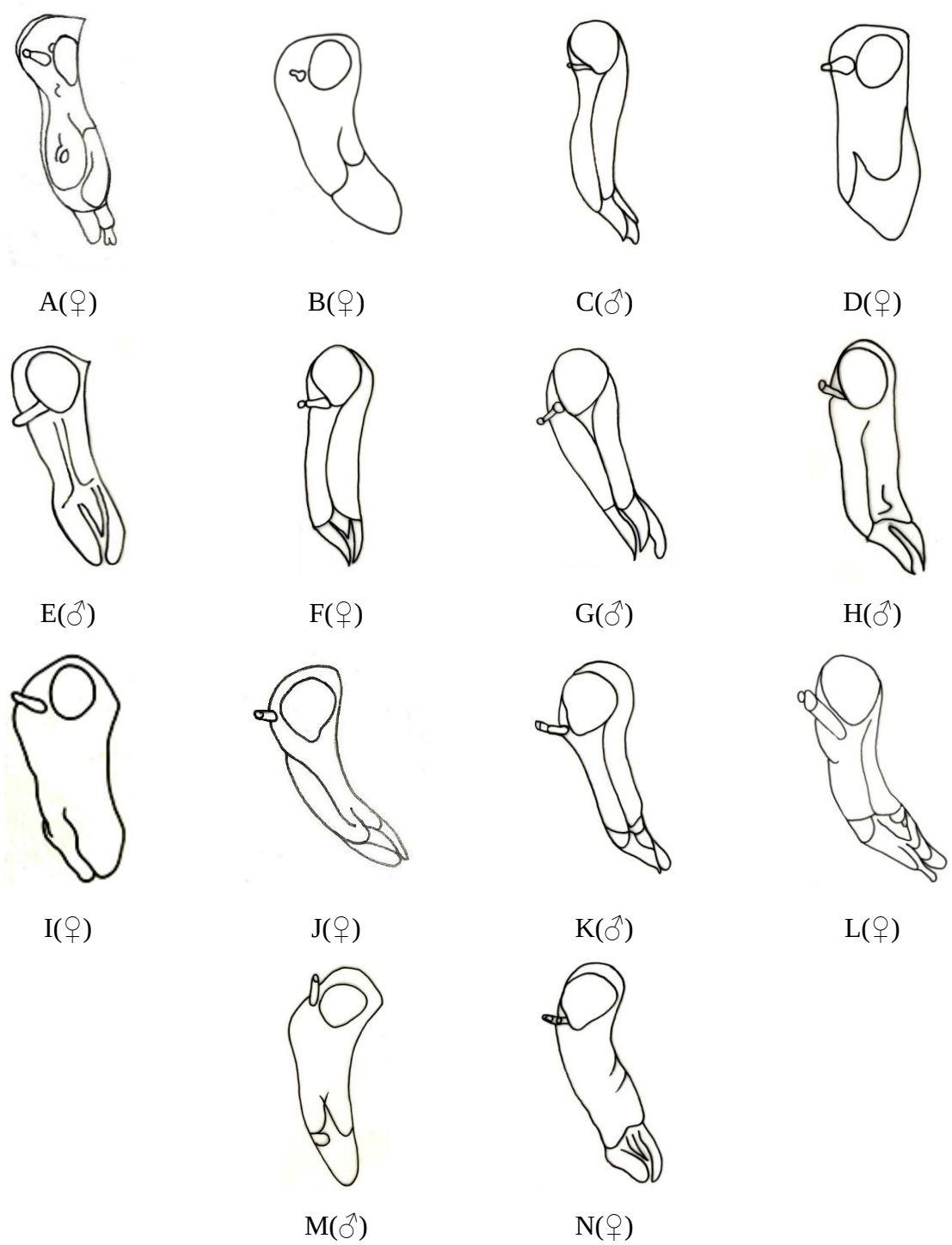

Figure 5. Male and female lateral view of head of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. gracilis* (♀), C, D, *H. lineifera* (♂, ♀), E, *H. attenuatus* (♂), F, *Lamellitettigodes sagittatus* (♀), G, *Euparatettix indicus* (♂), H, I, *Paratettix variabilis* (♂, ♀), J, *P. meridionalis* (♀), K, L, *P. cingalensis* (♂, ♀), M, *P. nigrescene* (♂), N, *P. asbenensis* (♀). Scale bar: 2mm.

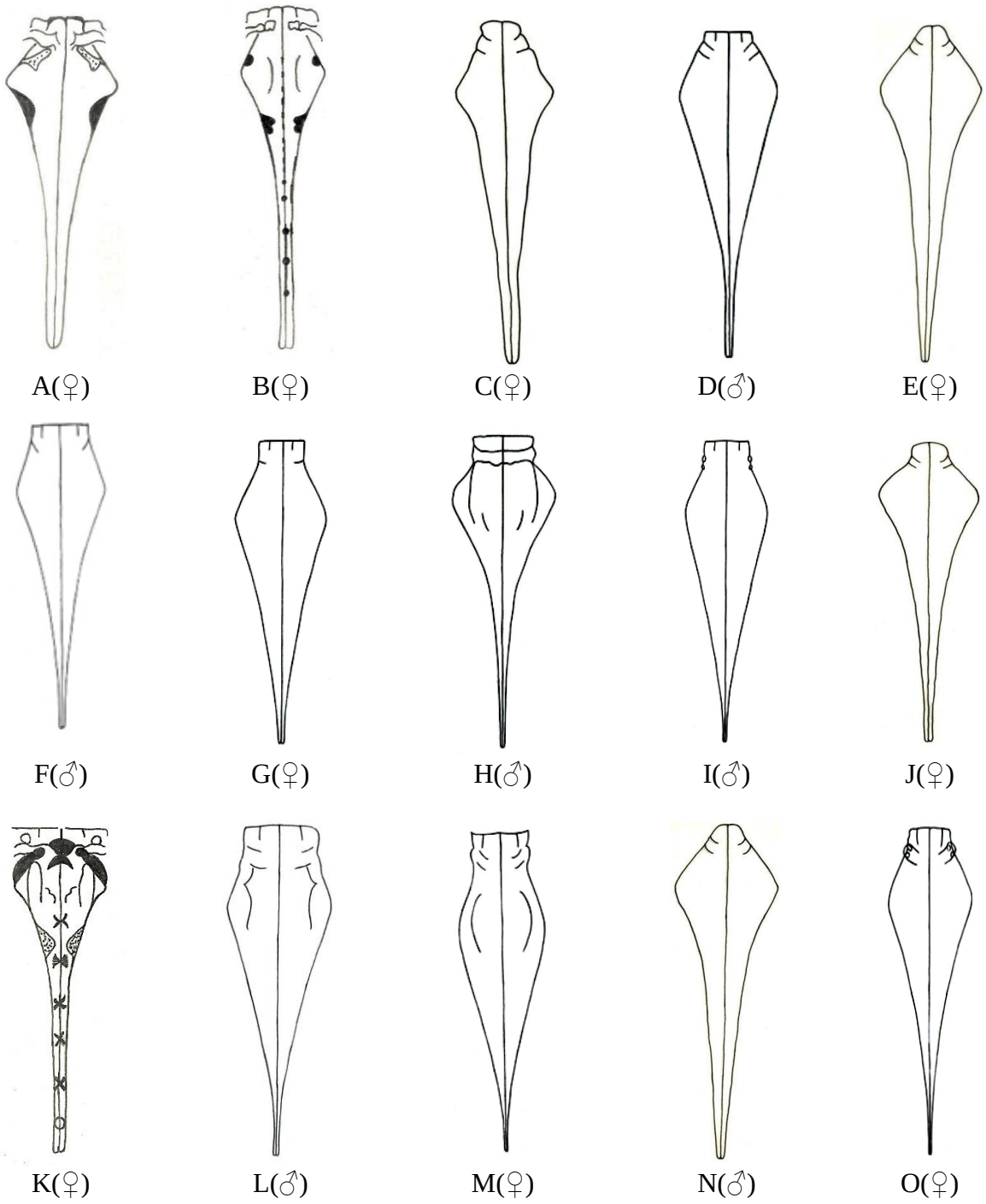

Figure 6. Male and female dorsal view of pronotum of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. punctatus* (♀), C, *H. gracilis* (♀), D, E, *H. lineifera* (♂, ♀), F, *H. attenuatus* (♂), G, *Lamellitettigodes sagittatus* (♀), H *Euparatettix indicus* (♂), I, J, *Paratettix variabilis* (♂, ♀), K, *P. meridionalis* (♀), L, M, *P. cingalensis* (♂, ♀), N, *P. nigrescene* (♂), O, *P. asbensis* (♀). Scale bar: 1mm.

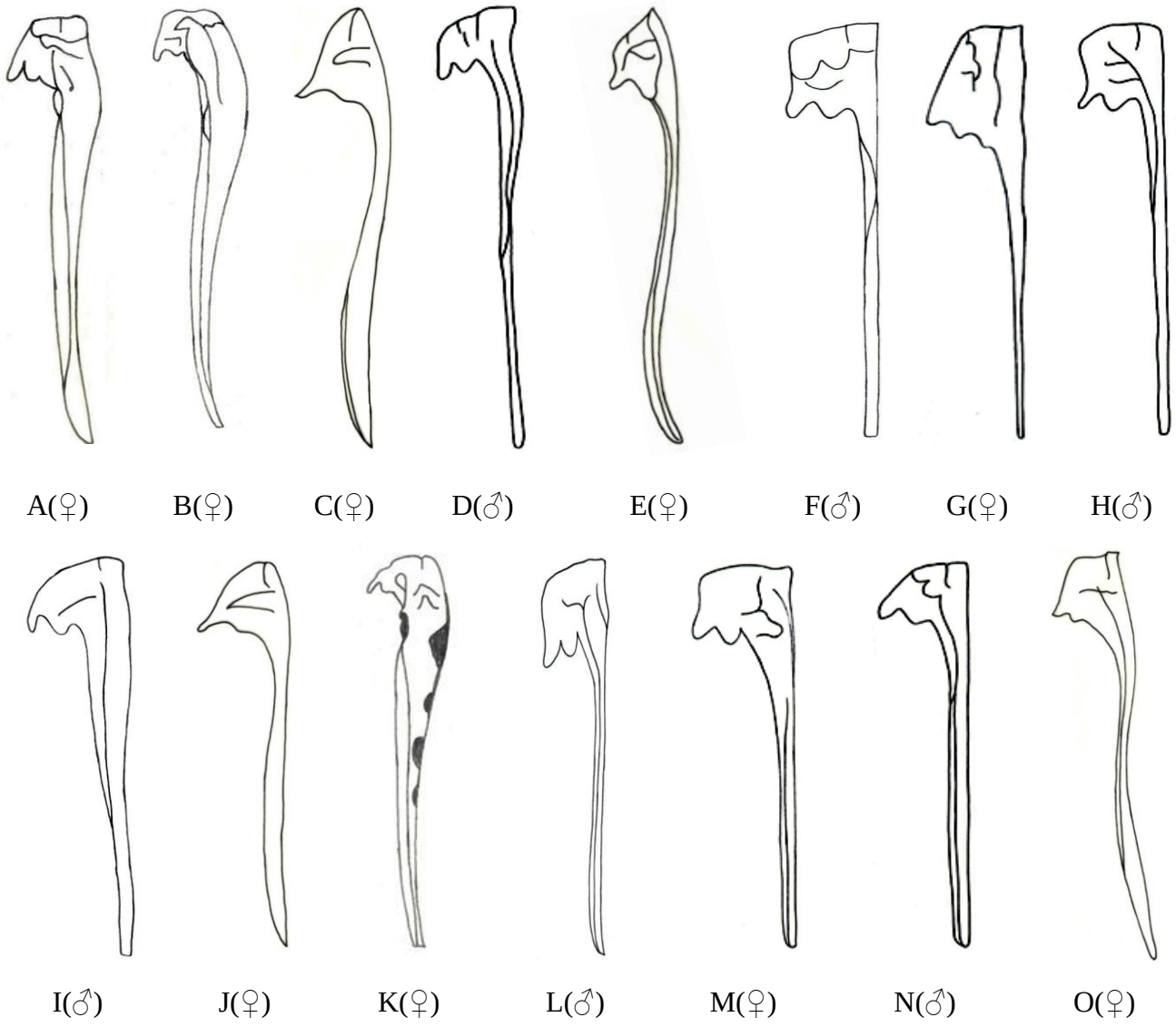

Figure 7. Male and female lateral view of pronotum of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. punctatus* (♀), C, *H. gracilis* (♀), D, E, *H. lineifera* (♂, ♀), F, *H.attenuatus* (♂), G, *Lamellitettigodes sagittatus* (♀), H, *Euparatettix indicus* (♂), I, J, *Paratettix variabilis* (♂, ♀), K, *P. meridionalis* (♀), L, M, *P. cingalensis* (♂, ♀), N, *P. nigrescene* (♂), O, *P. asbensis* (♀). Scale bar: 1mm.

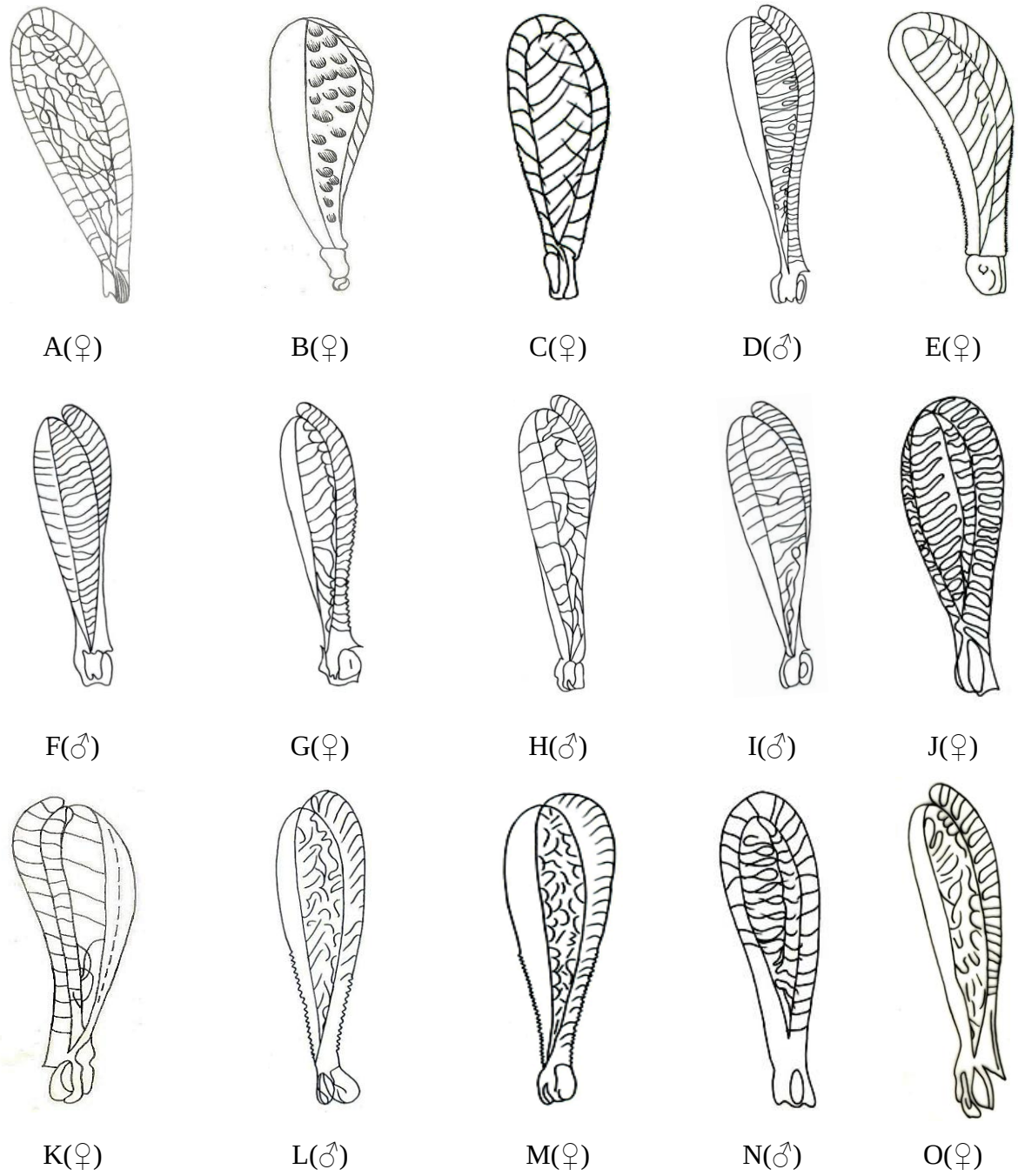

Figure 8. Male and female femur of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. punctatus* (♀), C, *H. gracilis*(♀), D, E, *H. lineifera* (♂, ♀), F, *H. attenuatus* (♂), G, *Lamellitettigodes sagittatus* (♀), H, *Euparatettix indicus* (♂), I, J, *Paratettix variabilis* (♂, ♀), K, *P. meridionalis* (♀), L, M, *P. cingalensis* (♂, ♀), N, *P. nigrescene* (♂), O, *P. asbensis* (♀). Scale bar: 2mm.

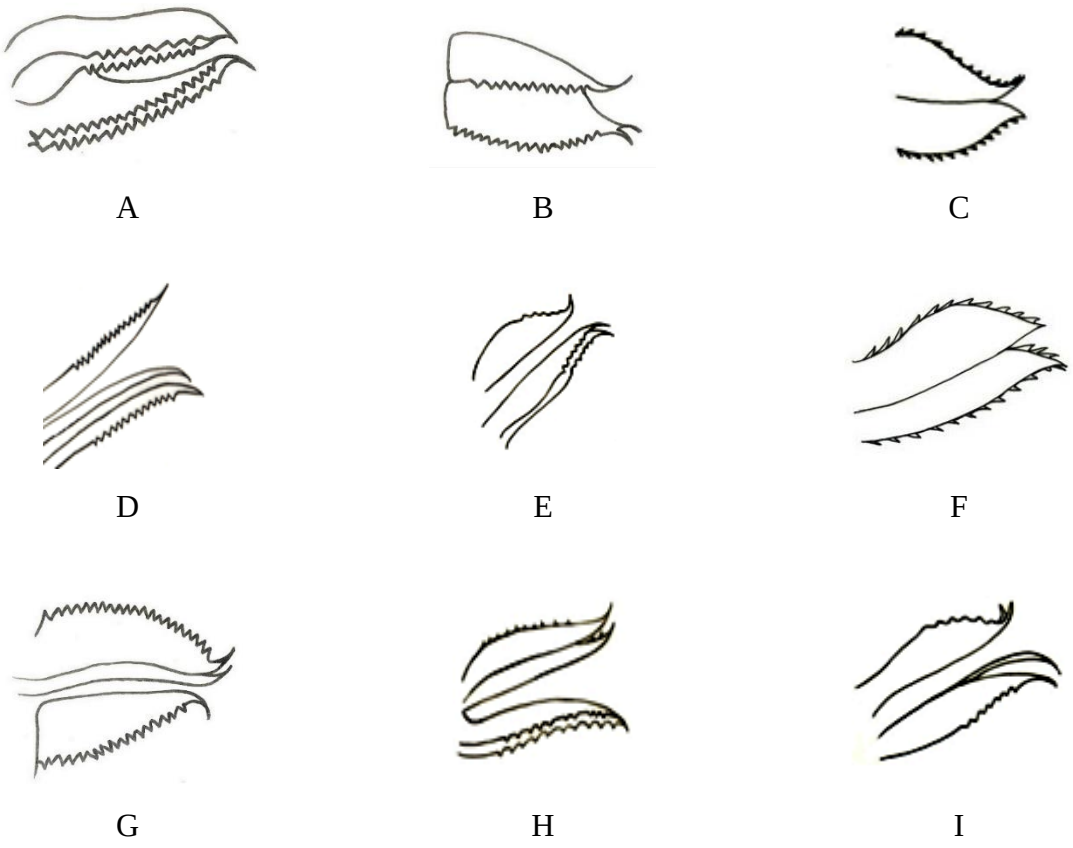

Figure 9. Female ovipositor of Tetrigidae species. Subfamily Tetriginae: A, *Hedotettix angustatus* (♀), B, *H. punctatus* (♀), C, *H. gracilis* (♀), D, *H. lineifera* (♀), E, *Lamellitettigodes sagittatus* (♀), F, *Paratettix variabilis* (♀), G, *P. meridionalis* (♀), H, *P. cingalensis* (♀), I, *P. asbensis* (♀). Scale bar: 4 mm.

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Table 1. Shows distribution of Tetrigidae species from various sites of Sindh during the year 2019-2021.

Genus/ species	Surveyed Localities																Total 260	%
	Mirpurkhas		Jamshoro		Hyderabad		Mithi		Umerkot		Sukkur		Kotri		Khairpur			
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Genus *Hedotettix* Bolivar,1887																		
H. angustatus Hancock, 1909	--	02	--	04	--	01	--	02	--	01	--	--	--	05	--	02	**17**	**6.54**
H. punctatus Hancock, 1909	--	01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**01**	**0.38**
H. gracilis (Haan, 1843)	--	10	--	07	--	07	--	08	--	03	--	04	--	08	--	06	**53**	**20.38**
H. lineifera (Walker, 1871)	02	03	--	01	01	02	--	02	--	01	01	02	02	01	--	--	**18**	**6.92**
H. attenuates Hancock,1904	04	--	--	--	--	--		--	--	--	--	--	01	--	--	--	**05**	**1.92**
Genus *Lamellitettigodes* (Bolívar, 1887)																		
L. segittatus (Bolivar,1887)	--	07	--	04	--	02	--	04	--	05	--	01	--	07	--	05	**35**	**13.46**
Genus *Euparatettix* Hancock,1904																		
E. indicus (Bolivar,1887)	02	--	--	--	--	--	--	--	--	--	--	--	--	01	--	--	**03**	**1.15**
Genus *Paratettix* Bolivar, 1887																		
P. variabilis (Bolivar, 1887)	06	08	02	07	01	03	--	03	--	01	--	03	02	04	--	05	**46**	**17.69**
P. meridonialis (Rambur, 1838)	--	01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**01**	**0.384**
P. cingalensis (Walker, 1871)	03	06	--	03	01	02	--	01	--	--		01		06		01	**24**	**9.23**
P. nigrescens Sjostedt, 1921	07	--	02	--	01	--	04	--	01	--	02	--	05	--	01	--	**23**	**8.85**
P. asbenensis Chopard, 1950	--	13	--	02	--	05	--	03	--	01	--	--	--	06	--	04	**34**	**13.07**

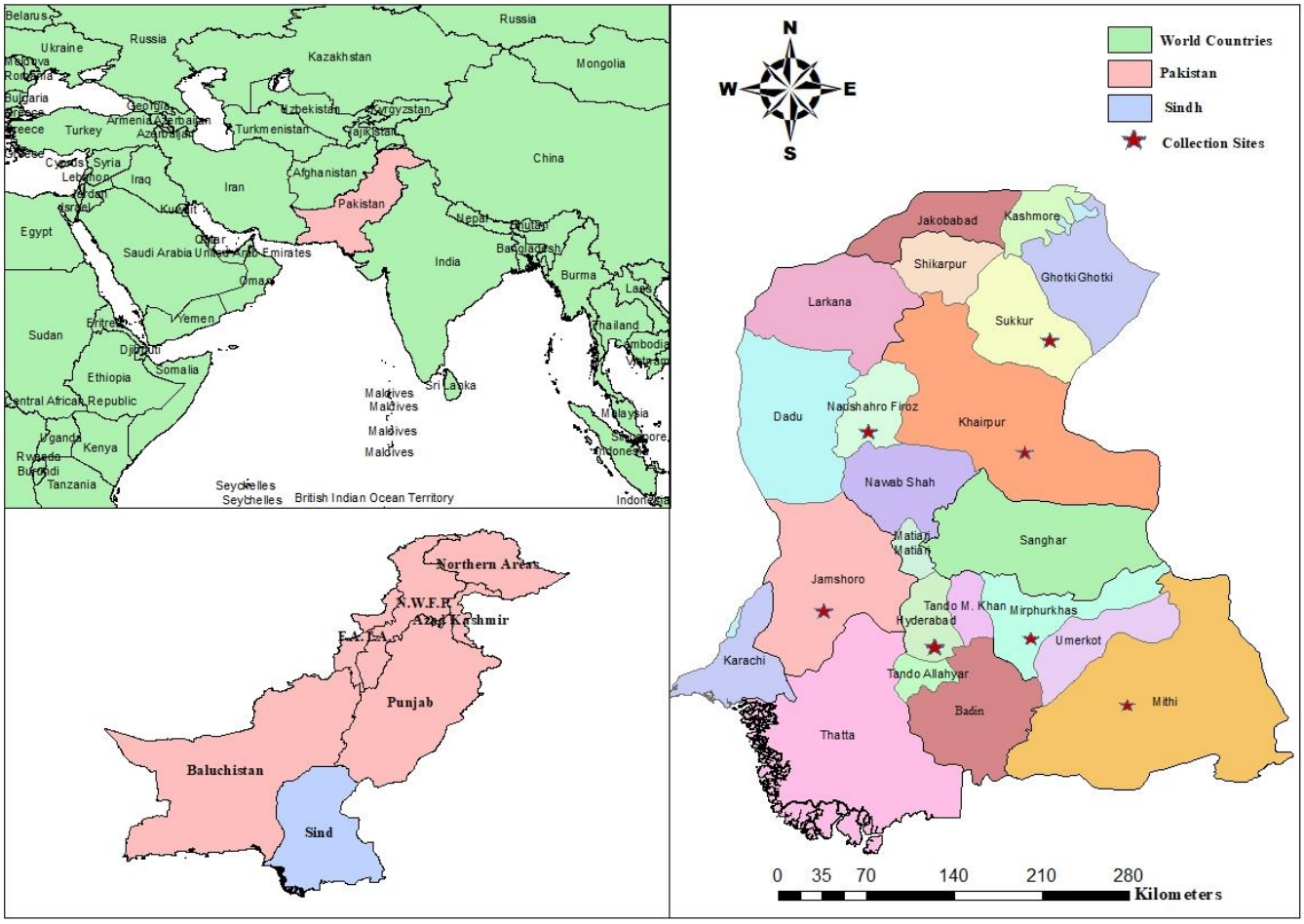

Figure 10. Map shows the distribution of Tetrigidae species from different sites of the Sindh Province Pakistan.

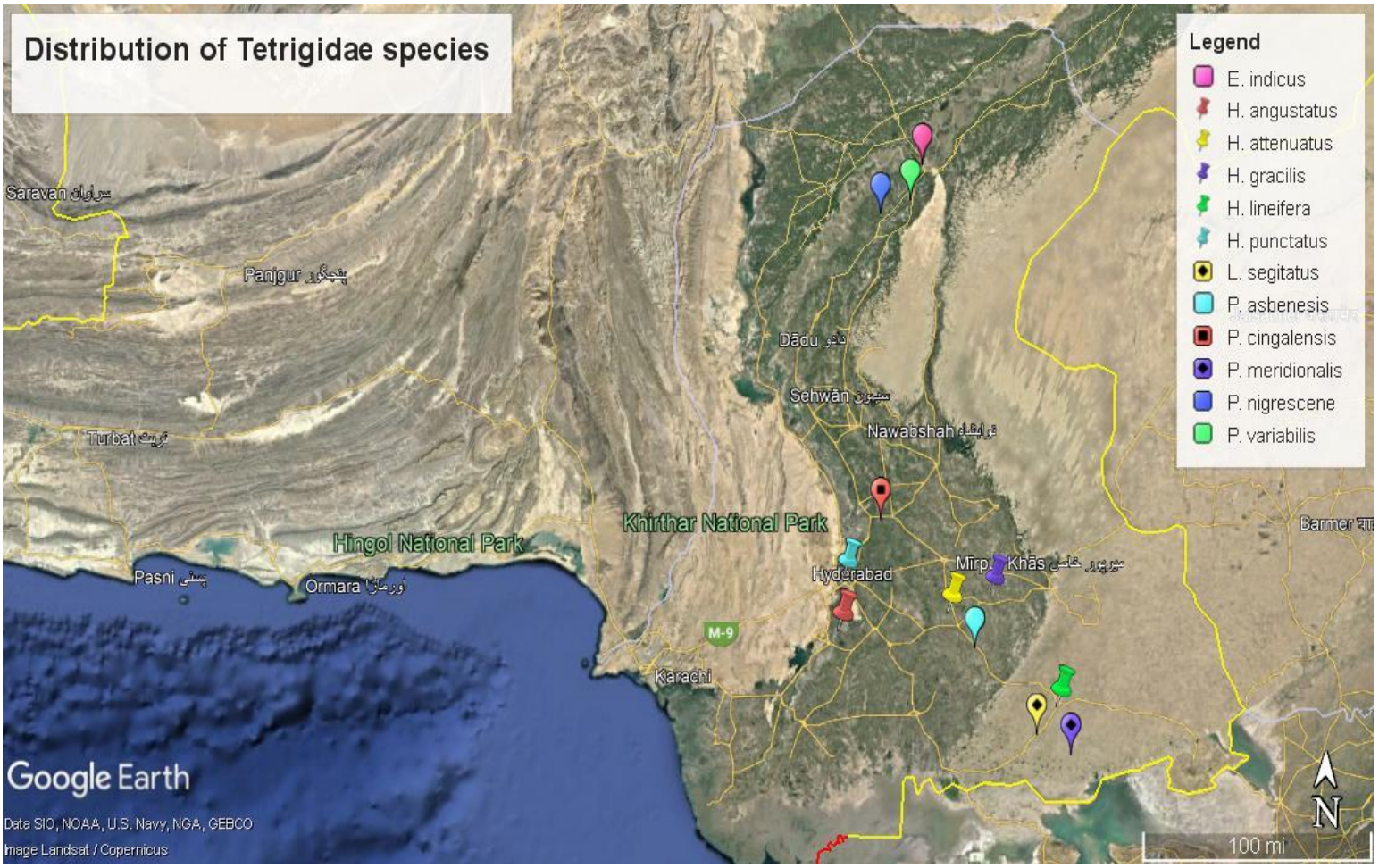

Figure 11. Georeferencing of Tetrigidae species from different sites of the Sindh Province Pakistan.