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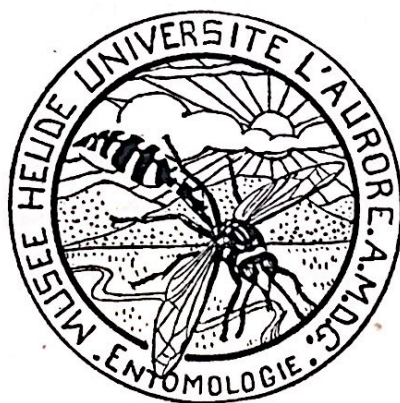
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NEW SPECIES AND RECORDS OF CHINESE *TETTIGONIIDAE* FROM THE HEUDE MUSEUM, SHANGHAI.

by

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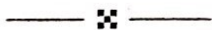


CHANG-HAI
UNIVERSITÉ L'AURORE
223 Avenue Dubail

NEW SPECIES AND RECORDS OF CHINESE
TETTIGONIIDAE FROM THE
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The new species and records of *Tettigoniidae* reported in this paper pertain to the Heude Museum of Aurora University, Shanghai, China. These specimens were loaned to the writer for study purposes by Father OCTAVE PIEL, Director of the Museum. A few additional specimens studied in the HEBARD Collection at Philadelphia and collected at Shanghai, in 1918, by Mr. E. SUENSON, have also been added, as well as a few additional records from other sources. An asterisk designates records new to China.

TETTIGONIIDAE

SCAPHURINAE (PHANEROPTERINAE)

Group **Elimaeae**

Elimaea punctifera WALKER

Chekiang: Chusan, 2 ♀, Aug. 11-28, 1931 (O. PIEL).
Lushan, 1 ♀, Sept. 22, 1934 (O. PIEL).

Kiangsi: Kuling, 3 ♂, 3 ♀, Sept. 3-15, 1934; 2 ♂,
1 ♀, Aug. 19, 1935 (O. PIEL).

Kwangtung: Canton, 1 ♀, Jan. 28, 1932 (O. PIEL).

Hainan: Samakong, 1 ♀, April 30, 1936 (G. ROS).

This common katydid, was not listed by Dr. K. S. FRANCIS CHANG in his "Index to Chinese *Tettigoniidae*". The male is quickly recognized by the deeply cleft subgenital plate and the form of the cercus. This species is widely distributed in eastern Asia.

Hemielimaea chinensis BRUNNER

Chekiang: Tien Mu Shan, 1 ♂, 2 ♀, July 21-Aug. 1, 1936 (O. PIEL).

These are the first definitely recorded specimens of this species, which was formerly known from "China". It is a mountain dwelling katydid and is recognized by its green coloration with a dark reddish brown band on the head and pronotum extending caudad by edging the posterior margin of the tegmina in both sexes. The subgenital plate is long and narrow, very narrowly cleft; the arms strongly recurved and diverging at their apices. The range of this species extends from central to south China.

Ducetia thymifolia (FABRICIUS)

Kiangsu: Shanghai, 1 ♂, 2 ♀, Sept. 1, 1930; 1 ♀, July 10, 1930; 1 ♀, Aug. 13, 1932; 1 ♂, 2 ♀, Aug. 29-Sept. 2, 1933 (O. PIEL).

Kiangsi: Kuling, 1 ♀, Sept. 14, 1934 (O. PIEL).

Kwei chow: Koei Yang, 1 ♀, Sept. 9, 1934 (O. PIEL).

Szechwan: Chengtu, Sept. 18, 1938 (Oregon Biological Supply House).

Tonkin: Hoa-Binh, 1 ♀.

This common small green katydid has a very wide range in eastern Asia. It is known from Formosa, Japan, Philippines, central and southern China, French Indo-China south to the islands of the Dutch East Indies.

* **Mirollia formosana** SHIRAKI

1930. *Mirollia formosana* SHIRAKI. Trans. Nat. Hist. Soc. Formosa. 20 (111): 332-333 (Male).

This pretty little katydid was described from a unique male from Kobayashi, Shinshiku Prefecture, Formosa.

Allotype: — ♀, Shanghai, Kiangsu Prov., east central China, Aug. 23, 1930 (O. PIEL). Measurements in millimeters: body length 15.0; length to tip of ovipositor 20.5; length to wing tips 30.5; pronotum 4.2; tegmina 24.2×6.0 ; hind femur 13.0; ovipositor 3.0×2.5 ; antennae 50.0 mms. Allotype deposited in the Heude Museum.

Description: Size closely similar to the Type male and form typical of the genus. Coloration uniformly foliage green; antennae pale with long and short annuli of black over its entire length. Leg spination as follows: fore legs with the fore femora bearing 4 to 5 small internal teeth on the inferior keel; fore tibiae with a large basal tympanum and with 3 small pairs of ventral teeth. Middle legs with 4 minute external teeth on the ventral keel of the meso femora; meso tibiae with 1 to 4 small external teeth on the inferior keel. Caudal femora with 4 minute widely spaced teeth on the external inferior keel; caudal tibiae with 25 external and 30 internal teeth (scattered long teeth interspersed with 2 to 3 minute teeth) on the dorsal keels and with 17 to 18 external and 5 long widely spaced internal teeth on

the ventral keels. Ovipositor short and very broad and typically recurved for the Group *Elimaeae*, with the apex broadly rounded; recurved margin of the dorsal valvulae minutely serrulate; ventral margin of ventral valvulae smooth, finely serrulate only near the apex. Subgenital plate almost quadrate, the posterior margin slightly sunken with a small median enlargement.

Paratype:—1 ♀, Lushan, Lien Hoa Tung, Sept. 22, 1934 (O. PIEL). Measurements in millimeters: body length 16.0; length to tip of ovipositor 20.5; length to tip of wings 30.5; tegmina 23.0×6.0 ; hind femur 12.5; ovipositor 5.0×2.5 mms. Paratype female in the TINKHAM Collection. Paratype closely similar to the Allotype. This is the first Chinese record of the genus *Mirollia*.

Phaneroptera falcata (PODA)

Kiangsi: Kuling, 1 ♂, 2 ♀, Sept. 22, 1934 (O. PIEL).

Kiangsu: Shanghai, 2 ♂, 2 ♀, Sept. 25, 1934 (E. SUENSON). Wusih, 1 ♀, Sept. 7, 1919 (E. SUENSON). Soochow, 1 ♂, Sept. 14, 1919 (E. SUENSON).

This small katydid has a very wide distribution ranging from east central China to central and eastern Europe. These appear to be the first records for east central China.

Group *Psyrae*

Isopsera denticulata EBNER

1939. *Isopsera denticulata* EBNER. Ling. Sci. Jour. 18 (3): 301, fig. 11.

Allotype:—♀, Tien Mu Shan, Chekiang, July 31, 1936 (O. PIEL). Measurements in millimeters: body length

25.0; length to tip of ovipositor 31.0; length to wing tip 43.0; pronotum 5.5; tegmina 32.0×8.51 hind femora 21.5; ovipositor 9.5×2.4 mms. Allotype deposited in the Heude Museum Collection.

Description: — closely similar to the Type Male but slightly larger and heavier; coloration deep foliage green. Leg spination as follows: fore legs with the fore femora bearing 4 to 5 internal teeth on the inferior keel; fore tibiae with 3 external and 4 internal small teeth on the inferior keels. Middle legs with the meso femora with 4 to 5 external teeth on the inferior keel; meso tibiae with 10 external and 5 to 6 internal teeth on the ventral keels. Caudal femora with 6 external and 7 internal widely spaced teeth on the ventral keels; caudal tibiae with 25 external and 27 internal large, uniform, moderately spaced, black tipped teeth on the dorsal keels and with 16 external and 9 to 10 internal teeth on the ventral keels. Ovipositor, scimitar-like, and characteristic of the group *Psyrae*, slightly broader in the apical than basal portions. Upper margin of dorsal valvulae with indistinct serrations; lower margin of ventral valvulae with coarser well defined serrations of minute teeth in the apical half. Subgenital plate, small, triangular with the extreme apex truncate.

Paratypes: — 4 ♀, Kuling, Kiangsi. (3 ♀, July 27-Aug. 19, 1935 and 1 ♀ Sept. 8, 1934) (O. PIEL). Range in measurement in millimeters: length to tip of ovipositor 25.5-26.0; pronotum 5.2-5.5; tegmina 30.0-31.0; hind femora 21.0-22.0; ovipositor 10.0 mms. Paratype in the HEUDE and TINKHAM Collections. Paratypes similar to the Allotype.

Males: 1 ♂, Tien Mu Shan, Chekiang, Aug. 5, 1936; 1 ♂, Kuling, Kiangsi, Aug. 25, 1935 (O. PIEL).

This species was described from a unique male from Chekiang in 1939, by Dr. R. EBNER.

Group *Holochlorae*

Holochlora japonica BRUNNER

Kiangsu: Shanghai, 1 ♂, 1 ♀, Aug. 5, 1930; 1 ♀, Aug. 25, 1933 (O. PIEL). Shanghai, 1 ♀, July 28, 1918 (SUENSON). Ihing, 2 ♂, Aug. 2-3, 1933 (O. PIEL).

Kwangtung: Hong Kong, 1 ♀, Oct. 29, 1932 (O. PIEL).

This common green katydid of medium size ranges from central China, Japan and Formosa south to French Indo-China.

A new genus, closely related to *Holochlora* STAL, with five new species from China is being described elsewhere. Paratypic material of two of the new species was contained in the HEUDE Collection.

Liotrachela convexipennis CAUDELL

Kiangsi, Kuling, 3 ♂, 2 ♀, July 27-Aug. 20, 1935 (O. PIEL).

This interesting green katydid with a few scattered incomplete squares of brown along the dorsal margin of the closed tegmina. This species was described in 1935 from the province of Szechwan and these are the first additional records.

Symphaestria truncato-lobata BRUNNER

Chekiang: Tien Mu Shan, 1 ♀, July 23, 1936 (O. PIEL).

This rather large katydid has not been reported definitely before from China. The HEBARD collection

contains a large series of this species from Mt. Omei, Szechwan province. This katydid inhabits the mountain systems of central and western China.

PSEUDOPHYLLINAE

Togona unicolor MATSUMURI and SHIRAKI

No specimens of this species is contained in the present collection. In 1936, the writer reported a female taken on Kuling mountain, Kiangsi, by Father O. PIEL. *T. unicolor* is known from Formosa and central and southern China.

Tegra karnya WILLEMSE

Chekiang: Tien Mu Shan, 1 ♀, July 30, 1936 (O. PIEL).

Kiangsu: Shanghai, 1 ♂, Aug. 18, 1918 (E. SUENSON; HEBARD CLN.).

Tonkin: Hoa-Binh, 1 ♀ (A. de COOMAN).

This handsome katydid was described from Szechwan by WILLEMSE, in 1933. These are the first additional records of this species.

MECAPODINAE

Mecapoda elongata (LINNAEUS)

Szechwan: Chengtu, 1 ♀, Oct. 1, 1938 (Oregon Biological Supply House).

This heavy-legged, large sized katydid was reported from Szechwan by C. WILLEMSE in 1933. It is known from Japan and in China south from Shantung to Kwangtung and west to Szechwan. It ranges south of China to the islands of the Dutch East Indies.

MECONEMINAE

Xiphidiopsis REDTENBACHER

1891. *Xiphidiopsis* REDTENBACHER. Verh. zool.-bot. Ges. Wien, 41: 531.

This interesting genus is peculiar in the remarkable speciation to be found in the specialized male genitalia; the females are with difficulty differentiated and are best distinguished by association with the conspicuous males. Regional speciation is quite marked and only one species at present *X. suzukii* MATSUMURA and SHIRAKI appears to enjoy a wide distribution in China. In the writer's possession are some thirty new Chinese species awaiting description of which number five are now described. Up until the present four species have been reported from China, namely: *X. clavatus* UVAROV, described in 1933 from S. Kansu; *X. hastaticercus* TINKHAM, 1936, from central Kwangtung and *X. suzukii* reported from Hupeh, in 1936, by the writer, and *X. bituberculata* EBNER, 1939, from a single female from Chekiang.

KEY TO THE CHINESE SPECIES OF *XIPHIDIOPSIS*

1. Species small, brachypterous; tegmina small oval pads..... 2
- Species larger, fully caudate, tegmina reaching to the apices of the caudal femora or beyond..... 3
2. Size very small, body length to tip of ovipositor 110 to 12.0 mms..... *minutus* TINKHAM n. sp.
- Size slightly larger; body length to tip of ovipositor 15.0 mms. Male cercus hastate in lateral outline with an internal basal tooth..... *hastaticercus* TINKHAM
3. Coloration blackish, tegmina not extending beyond the caudal femora; male subgenital plate, pale, and very large. Cerci very long and simple, with bidentate apex. Supra-

- anal plate with two long divergent, caudally produced processes..... **pieli** TINKHAM n. sp.
- Coloration pale green or brown (dead); tegmina extending beyond the caudal femora..... 4
4. Supra-anal plate without processes..... 5
- Supra-anal plate with processes..... 6
5. Cerci short, simple and straight..... **clavatus** UVAROV
- Cerci long, with subapical dorsal and ventral dentate ridges and with a small interno-basal tooth.....
..... **capricercus** TINKHAM n. sp.
6. Supra-anal plate with two short, separated, parallel caudally projecting prongs; cerci forcipate with the internal basal plate tridentate..... **kulingensis** TINKHAM n. sp.
- Supra-anal plate with enormous caudally produced processes..... 7
7. Supra-anal plate with decurved apex bifurcate; case of ovipositor with three pairs of downward projecting teeth.....
..... **suzukii** MATS. & SHIR.
- Supra-anal plate with the paired process decurved at right angles in the apical two-fifths; cercus large with apical portion strongly incurved with two large bifurcate prongs and with a large upward projecting process, incurved at apex, arising from the inner cercal face.....
..... **cervicercus** TINKHAM n. sp.

Xiphidiopsis suzukii MATSUMURA and SHIRAKI

1908. *Teratura suzukii* MATSUMURA and SHIRAKI. Jour. Coll. Agric. Tohoku Imp. Univ., Sapporo, Japan. 3 (1): 48, Pl. 1, fig. 4.

1935. *Teratura? suzukii* TINKHAM. Ling. Sci. Journ., 15 (2): 213 (Hupeh).

Kiangsu: Shanghai, 1 ♂, 1 ♀, Aug. 12, 1930 (O. PIEL).
Ihing, 3 ♀, Aug. 1-8, 1933 (O. PIEL).

In 1936, the writer reported this interesting species from Wu Tsu Tsz and 20 li from Hwang-mai, Hupeh province. This species is recognized by the long paired

decurved processes of the supra-anal plate which are terminated apically by two divergent bifurcated prongs in the male and by the three pairs of down-projecting prongs at the ventral base of the ovipositor. The tegmina also possess a row of small widely separated spots which serve to distinguish the species from the many species with unmarked tegmina. This species is known from Hupeh to Kiangsu and south to Kwangtung (unrecorded) and from the island of Formosa.

Xiphidiopsis minutus n. sp. (fig. 10)

This the smallest of the Chinese species of the genus, is quickly recognized by its minute size and pale green coloration. *X. minutus* n. sp. is smaller than *X. hastaticercus* TINKHAM from Loh Fau Shan, in central Kwangtung province.

Type:—♀, Kuling, Kiangsi prov., China, Sept. 9, 1931 (O. PIEL). Measurements in millimeters: body length 6.5; length to tip of ovipositor 11.3; pronotum 3.0; tegmina 1.0; hind femur 7.0; ovipositor 5.0 × 7.7 mms. The unique female Type is deposited in the HEUDE Museum, Shanghai, China.

Description:—Coloration tan although in life probably green, with four faint dorsal stripes of brown on the head and dorso-lateral stripes on the pronotum with the genicular areas of the caudal femora dark. Head with the occiput convexly rounded and strongly declivent with a small rounded fastigial cone at the upper level of the eyes. Eyes circular in lateral outline and strongly subglobular with a perceptible downward directed trend. Face strongly oblique. Pronotum typical of the genus. Tegmina minute coriaceous pads with parallel lateral margins and convexly rounded posterior margin; the

inner margins slightly overlapping. Ovipositor short, stout, moderately recurved; subgenital plate short with the posterior margin convexly rounded and with the median area broadly sulcate. Leg spination as follows: all femora unarmed; fore tibiae with 4 pairs of large ventral spines the proximal pair the largest. Meso tibiae with the central portions just beyond the base somewhat swollen and bearing 4 pairs of small spines. Caudal tibiae with 21 to 22 external and 19 to 20 internal small black teeth on the dorsal keels and with 3 to 4 minute pairs of spines hidden in the short hairs of the ventral surface.

Xiphidiopsis cervicercus n. sp. (figs. 1, 2, 12)

This interesting long-winged new species can be immediately recognized by its large size and peculiarly formed cercus and supra-anal plate. The supra-anal plate has two subparallel prongs directed caudad and sharply deflexed at right angles in the apical two-fifths; the cerci are many pronged processes resembling elk-horns, hence the derivation of the species name.

Type:— σ , Chusan, Chekiang prov., China, July 27, 1934 (O. PIEL). Measurements in millimeters: body length 13.0; pronotum approx. 4.0 (posterior margin broken off); tegmina 17.0; wing length 19.5; hind femora 11.0; genitalia 3.5 mms. Type deposited in the HEUDE Museum in Shanghai.

Description: Coloration uniformly pale yellowish brown, probably pale foliage green in life as is typical for the genus, with infuscated cells along the posterior margin of the tegmina. Form typical of the genus. Leg spination as follows: all femora unarmed; fore tibiae with 4 pairs of ventral spines; meso tibiae with 6 pairs

of ventral spines; caudal tibiae with 27 to 30 external and 27 to 28 internal teeth on the dorsal keels and with 8 external and 2 to 3 internal small spines on the ventral keels. Genitalia large, the supra-anal plate produced into two narrow parallel processes separated by their breadth at the base and somewhat convergent caudally and strongly deflexed at right angles in the apical two-fifths, the apices blunt and slightly outturned. Cerci peculiar cervoid processes, broad at the base and sharply incurved near the tip, the apical portion bearing two long bifurcate prongs. Inner cercal surface with an upward directed prong with incurved uncinatc apex which can be seen when the cercus is viewed in lateral profile. Subgenital plate small, semi-oval in outline, and with two small apical styli.

Allotype:—♀, Kuling, Kiangsi Prov., central China, July 19, 1935 (O. PIEL). Measurements in millimeters: body length 10.0; length to tip of ovipositor 22.0; length to wing tips 24.5; pronotum 4.5; tegmina 20.5×2.5 ; hind femora 11.5; ovipositor 13.0×0.6 mms. Allotype deposited in the HEUDE Museum.

Description: slightly larger than the Type but otherwise similar. Coloration uniformly buff, pale leaf green in life. Form typical for the genus. Tegmina long, surpassing the apices of the caudal femora by two-fifths its length. Leg spination as follows: all femora unarmed; fore tibiae with 4 pairs of very long ventral spines, the basal pair large and situated on the distal area of the chonchate tympanum, the second pair largest and with a minute apical fifth pair. Meso tibiae with 6 pairs of ventral spines, the proximal pair the largest. Caudal tibiae with 31 to 33 external and 32 to 36 internal black teeth on the dorsal keels and with 7 external small spines in the apical half and 3 apical internal spines on

the dorsal surface. Ovipositor long and slender gently recurved and with the tip almost extending to the apices of the tegmina. Subgenital plate somewhat triangular with convex lateral margins.

Paratypes:—4 ♀, same data as the Allotype but collected July 15-July 30, 1935 (O. PIEL). Range in measurements in millimeters: body length 12.0-14.0; pronotum 4.0-4.5; length to wing tips 24.5-26.0; tegmina 20.0-20.5; hind femora 11.5-12.0; ovipositor 13.0-14.0 mms. Paratypes deposited in the HEUDE and TINKHAM Collections. Paratypes similar to the Allotype in every respect. The Male Type is unique.

Distribution: This large interesting species is known from the mountains of Chekiang and Kiangsi province.

Xiphidiopsis capricercus n. sp. (fig. 3, 4, 11)

This medium sized species has the form of the cercus much like that in *X. elaphocercus* KARNY from Malaya, but can be easily separated by the concave supra-anal plate and the absence of a large median internal prong on the cercus. This new species is quite distinct from any of the known Chinese species.

Type:—♂, Tien Mu Shan, Chekiang Prov., July 28, 1936 (O. PIEL). Measurements in millimeters: body length 9.0; length to tip of cercus 12.0; length to wing tips 22.0; pronotum 4.2; tegmina 18.0; hind femora 9.0; cercus 2.8 mms. Type deposited in the HEUDE Museum Collection.

Description: size medium, form typical of the genus. Coloration pale greenish with a pair of short stripes on the dorsum of the head just interad of the inner eye margins and continued as a dorso-lateral brown stripe

on the pronotum. Leg spination as follows: all femora unarmed; fore tibiae with 4 pairs of long ventral spines, the proximal pair the longest and with one minute external subapical and a pair of very small apical spines. Meso tibiae with 6 external and 5 internal ventral spines, the proximal ones longest and the distal very minute. Caudal tibiae with 32 to 34 external and 28 to 30 internal teeth on the dorsal keels and 10 external and 3 internal apical ventral teeth. Supra-anal plate deeply concave; cerci long, gently incurved apically with dorsal and ventral subapical, ridged dentate areas and with a small interno-basal tooth. Subgenital plate narrow, rectangular, with small apical styli.

Allotype:—♀, same data as the Type but collected July 26, 1936 (O. PIEL). Measurements in millimeters: body length 12.0; length to tip of ovipositor 21.5; length to wing tips 24.5; pronotum 4.0; tegmina 19.5; hind femora 10.5; ovipositor 10.0 mms. Allotype deposited in the HEUDE Museum Collection.

Description: slightly larger than the Type but otherwise similar. Leg spination as follow: all femora unarmed; fore tibiae with 4 long pairs of ventral spines, the proximal the largest and with two small additional external spines, one of which is apical and a small internal apical spine. Meso tibiae with 6 external and 5 internal ventral spines, the proximal longest, the apical ones very short. Caudal tibiae with 28 to 30 external and internal teeth on the dorsal keels and with 10 to 11 external and 3 to 4 internal apical teeth; the internal ones crowded apically. Ovipositor moderately long, slightly recurved, the apex not quite reaching to the apices of the tegmina. Subgenital plate short, transverse, with posterior margin squarely truncate.

Paratypes:—6 ♂, same data as the Type but collected July 20-26, 1936 (O. PIEL). Range in measurements in millimeters: body length 8.5-10.0; length to wing tips 21.0-22.5; pronotum 3.8; tegmina 18.0-19.0; hind femora 10.0-10.5 mms. Male Paratypes similar to the Type in every respect.

Paratypes:—1 ♀, same data as the Allotype but collected July 20, 1936 (O. PIEL). Measurements in millimeters: body length 9.5; pronotum 3.6; tegmina 18.0; hind femora 10.0; ovipositor 9.3 mms. 1 ♀. Chusan, Chekiang, Aug. 18, 1931 (O. PIEL). Measurements in millimeters: body length 9.5; pronotum 3.5; tegmina 18.5; hind femora 10.5; ovipositor 10.5 mms. Female Paratypes similar to the Allotype. Paratypes deposited in the HEUDE and TINKHAM Collections.

***Xiphidiopsis kulingensis* n. sp. (figs. 5, 6)**

A small long-winged species not related to any of the known Chinese species from which it is quickly distinguished by the form of the male cercus.

Type:—♂, Kuling, Kiangsi Prov., central China, Sept. 17, 1934 (O. PIEL). Measurements in millimeters: body length 10.0; length to wing tips 14.5; pronotum 10.0; tegmina 11.7×8.5 ; hind femora 8.5 mms. Type deposited in the HEUDE Museum.

Description:—form typical for the genus; coloration pale greenish buff, pale foliage green in life. Dorsum of pronotum with faint trace of pale brown dorso-lateral stripe. Leg spination as follows: all femora unspined; fore tibiae with 4 pairs of spines, the proximal pair the largest; meso tibiae with 4 pairs of small ventral spines; caudal tibiae with 30 to 32 external and internal, alterna-

tely large and small teeth, on the dorsal keels and with 7 external and 2 internal apical teeth on the ventral surface. Supra-anal plate slightly concave with two small median, moderately separated caudally projecting prongs. Cerci forcipate, with a large internal basal and ventral plate of quadrate shape with the inner margin concave. From the ventral side a third inner dentate process is observed lying below the outer internal angle. Subgenital plate small, triangular, with truncate apex and with the lower subapical area concavely depressed.

Allotype:—♀, same data as the Type but collected Aug. 21, 1935 (O. PIEL). Measurements in millimeters: body length 7.0; length to wing tips 19.0; length to tip of ovipositor 17.0; pronotum 3.0; tegmina 15.0; ovipositor 9.8; antennae 38.0 mms. Allotype deposited in the HEUDE Museum Collection.

Description:—closely similar to the Type in form and size; coloration similar. Leg spination as follows: all femora unarmed; fore and meso tibiae with 5 pairs of ventral spines; caudal tibiae with 30 external and internal teeth on the dorsal keels and with 7 external and 2 internal ventral teeth. Ovipositor moderately long and only very gently recurved, the apex almost extending to the apices of the wings. Subgenital plate quadrate, the lateral margins with an enlargement near the outer angle; the posterior margin gently concave and with the ventral surface bearing a transverse subapical groove.

Paratypes:—6 ♂, same data as the Type but collected Aug. 15-24, 1935 (O. PIEL). Range in measurements in millimeters: body length 11.0-11.5; pronotum 3.2-3.2; tegmina 13.0-13.8; hind femora 9.0 mms. Male Paratypes similar to the Type in every respects.

Paratypes:—5 ♀, same data as the Allotype but collected Aug. 6-Sept. 3, 1935 (O. PIEL). Range in measurements in millimeters: body length 8.0-8.5; pronotum 3.4-3.5; tegmina 15.0-15.5; hind femora 10.0-10.5; ovipositor 10.0-10.5 mms. Female Paratypes similar to the Allotype in every respect. Paratypes deposited in the HEUDE Museum and TINKHAM Collections.

Xiphidiopsis pieli n. sp. (figs. 7, 8)

This prettily colored black and white species with shining black face, very long, simple, curving cercus and divergent caudal processes of the supra-anal plate in the male and short ovipositor in the female is conspicuous amongst the known Chinese species and is not related to any of the known forms.

Type:—♂, Tien Mu Shan, Chekiang Prov., east central China, July 22, 1935 (O. PIEL). Measurements in millimeters: body length 9.5; length to tip of cercus 13.0; length to wing tips 14.0; pronotum 3.3; tegmina 10.5; hind femora 9.0; cercus 3.0 mms. Type deposited in the HEUDE Museum Collection.

Description: form slightly shorter and stouter than typical for the genus with narrow dorso-ventrally compressed, ultimate, abdominal tergite and with very large subgenital plate. Tegmina and wings short, their apices approximating the apices of the caudal femora and little exceeding the tips of the cerci. Leg spination as follows: all femora unarmed; fore tibiae with 4 pairs of short widely spaced spines, the proximal ones on the distal portions of the chonchate tympanum, the distal pair apical. Meso tibiae with 4 external and 3 internal short ventral spines. Caudal tibiae with 21 to 23 external and 22 to 24 internal teeth on the dorsal keels and

with 3 external and 1 internal ventral apically placed teeth. Genitalia dorso-ventrally compressed with a large space between the cerci and the subgenital plate. Supra-anal plate with 2 divergent caudally produced processes. Cerci very long, simple, cylindrical, gently incurved with the extreme apex bidentate. Subgenital plate very large, shovel-formed with the posterior margin moderately concave between the very minute apical styli.

Coloration:—face shining black, dorsum of head black, labrum blackish, post-ocular and genal areas pale. Antennae pale with alternate segments black. Pronotum with disk of metazona and lateral lobes of the pronotum shining black, dorso-lateral line narrow and pale, edged inwardly with a little black on the pale disk of the prozona. Tegmina piceous with some veins and areas pale. Lateral areas of the abdomen piceous, paler dorsally and ventrally. Supra-anal plate and process shining black with pale areas above the bases of the cerci. Cerci with the basal half pale and apical half blackish. Fore and middle legs pale with blackish fasciations in the apical half of the femora and tibiae. Caudal femora with quadrifasciate markings of black dorsally at the base and apex and with two central areas separated by white and with pregenicular and prebasal pale areas. Outer pagina of the caudal femora pale with separated vertical black bars. Caudal tibiae pale, profusely mottled with indistinct patches of fuscous.

Allotype:—♀, same data as the Type. Measurements in millimeters: body length 12.0; length to tip of ovipositor 19.0; length to wing tips 15.5; pronotum 3.6; tegmina 12.5; hind femora 11.0; ovipositor 7.0 mms. Allotype deposited in the HEUDE Museum.

Description:—closely similar to the Type in form and coloration; size slightly larger. Leg spination as

follows: all femora unarmed; fore tibiae with 4 pairs of short spines; meso tibiae with 5 external and 4 internal ventral spines; caudal tibiae with 20 to 22 external and 20 internal black teeth on the dorsal keels and with 2 to 3 external ventral teeth. Ovipositor short and moderately recurved in apical half. Subgenital plate quadrate with lateral margins rounding into the slightly convex posterior margin with trace of median notch.

Paratypes:—1 ♂, same data as the Type but collected July 27, 1936 (O. PIEL). Measurements in millimeters: body length 8.0; pronotum 3.2; tegmina 10.5; hind femora 9.0; cercus 3.0 mms. Male Paratype identical to the Type.

Paratypes:—6 ♀, same data as the Allotype but collected July 20-28, 1936 (O. PIEL). Range in measurements in millimeters: body length 8.5-9.0; pronotum 3.3-3.6; tegmina 11.0-12.0; hind femora 10.0; ovipositor 6.5-7.0 mms. Female Paratypes similar to the Allotype.

Paratypes deposited in the HEUDE and TINKHAM Collections.

This beautiful little species is named in honor of Father OCTAVE PIEL, Director of the Heude Museum, who has labored for years to further the cause of Entomology in east central China.

HEXACENTRINAE

Hexacentrus unicolor SERVILLE

Kiangsu: Shanghai, 1 ♀, 1 ♂, Aug. 5-20, 1930 (O. PIEL).

Kiangsi: Kuling, 1 ♂, Aug. 3, 1935 (O. PIEL).

Chekiang: Chusan, 1 ♀, Aug. 28, 1931 (O. PIEL).

This common representative of the *Hexacentrinae* ranges from Japan, Formosa and central China south to the Malayan Archipelago and west to India.

COPIPHORINAE

Pseudorhynchus concisus (WALKER).

Chekiang: Tien Mu Shan, 1 ♀, July 30, 1935 (O. PIEL).

This is the first definite record of this species for China. The specimen measures: body length 25.0; length to tips of ovipositor 33.0; length to wing tips 36.0; fastigial cone 2.5; pronotum 7.0 × 4.0; tegmina 31.0 × 5.0; ovipositor 10.0 × 1.6 mms. *P. concisus* is distinguished by its very small size (for the genus), being less than half the size of such species as *P. nobilis*, and *P. gigas* which are very large sized. The cone of the head is long and sharply triangular, its length slightly greater than the interocular breadth; eyes very small, circular in outline and subglobular. Fastigial cone with the typical tooth at the base of the ventral fastigial keel. Inner keels of fore femora with 1 tooth; meso femora with 3 strong teeth; caudal femora with 6 to 7 external teeth on the inferior keels.

Coloration testaceous, face soft brown with the upper margin at base of eyes and antennal scrobes and fastigium edged with black; clypeal margin and mandible also black. All femora with 4 rows of large brown spots outside and inside.

* *Pseudorhynchus japonicus* SHIRAKI

1891. *Pseudorhynchus-antennalis* REDTENBACHER (nec STAL), (part). Monog. Conoceph., p. 55.

1908. *Pseudorhynchus antennalis* MATSUMURA and SHIRAKI. Locustiden Japans, p. 33.

1930. *Pseudorhynchus japonicus* SHIRAKI. Trans. Nat. Hist. Soc. Formosa, 20 (111): 341.

Kiangsu: Shanghai, 1 ♂, Aug. 27, 1925 (E. SUENSON; HEBARD Cln.).

This is the first record of this species for China. In 1935, I was able to study the Type of *P. japonicus* while in Formosa and can vouch for its authenticity. At that time I compared a Kwangtung specimen of *P. japonicus* with the Type but it has not be as yet reported in literature. *P. japonicus* is considerably smaller than *P. nobilis* and *P. gigas* but it is also very much larger than *P. concisus*.

* **Pyrgocorypha formosana** MATSUMURA and SHIRAKI

1908. *Pyrgocorypha formosana* MATSUMURA and SHIRAKI. Locustiden Japan, p. 35, Pl. I, fig. 1.

Although a common species in Kwangtung province, this Formosan species does not seem to have been reported in the literature up to date and CHANG did not list it in his "Index of Chinese Tettigoniidae" published in 1935. One male specimen of this handsome green katydid is in the present collection from Hong Kong, Kowloon, Dec. 12, 1932 and collected by Father O. PIEL. This species lives in the palm trees and feeds by chewing out portions of the margins of the palm fronds.

Homorocoryphus pallidus (REDTENBACHER)

1891. *Conocephalus pallidus* REDTENBACHER. Verh. zool.-bot. Ges. Wien, 41: 414.

Hainan: Nodoo, 1 ♀, March 22, 1936 (G. Ros).

Kwangtung: Canton, 1 ♀, Jan. 21, 1933 (O. PIEL).

Although a very common grass-dwelling species in South China this species has not been previously reported from China, and was omitted in CHANG'S Index.

CONOCEPHALINAE

KEY TO THE EAST ASIATIC SPECIES OF *CONOCEPHALUS*

1. Male supra-anal plate produced into a large conical prong.....*Conanalus* n. subg.
- Male supra-anal plate normal.....*Xiphidion* 2
2. Fastigial cone very narrow.....*chinensis*
- Fastigial cone of average width for genus..... 3
3. Tegmina and wings surpassing apex of the abdomen..... 4
- Tegmina and wings not reaching to the apex of the abdomen..... 7
4. Caudal femora not concolorous.....*melas*
- Caudal femora concolorous..... 5
5. Size very small, ovipositor less than 10 mms.....*maculatus*
- Size larger, ovipositor more than 10 mms..... 6
6. Ovipositor 10-17 mms, tegmina and wings very long.....
-*longipennis*
- Ovipositor very long, approx. 24 mms; tegmina and wings shorter.....*gladius*
7. Size large, apices of caudal femora black.....*gigantius*
- Size smaller, apices concolorous with caudal femora..... 8
8. Fastigial cone with lateral margins divergent apically, size medium, ovipositor 13 mms.....*divergentus*
- Lateral margins of fastigial cone almost parallel..... 9
9. Size medium, ovipositor 15 to 21 mms.....*japonicus*
- Size small, ovipositor 11 mms.....*formosanus*

Conanalus new subgenus

Description:— Form slightly heavier than *Xiphidion* with the face broader and shorter than that observed in

X. giantius and considerably broader and shorter than most of the Asiatic species of *Xiphidion*. Eyes circular and subglobose. Pronotum distinctly subsellate, anterior and posterior margins truncate and lateral lobes deepest at the posterior angle; seen from above the lateral lobes with a tumid semi-transparent area along the posterior margin above the opening of the prothoracic spiracle. Tegmina minute oval pads with their inner margins slightly overlapping in the male and slightly separated in the female. Prosternum bispinose. Leg spination as follows; all femora unarmed; fore and middle tibiae with six pairs of ventral spines; caudal tibiae armed with many teeth along the dorsal keels and with about 6 pairs of apical teeth on the ventral side. Supra-anal plate enormously modified into a large declivent base bearing a large caudally produced cone with acute apex, and bearing below a ventral downward projecting lobe. Cerci short with a large subapical internal tooth. Subgenital plate narrow and broadly transverse with the sides enlarged and infolded so that the hairy styli point directly inward and almost touch a small median hastate process. In death plate is forced downward completely hiding the cerci and subgenital plate. Ovipositor long and slender, of uniform breadth and moderately recurved in the basal region.

Subgenotype:—*Conocephalus (Conanalus) pieli* n. sp.

This new subgenus *Conanalus* is indigenous to the mountains of central and western China.

***Conocephalus (Conanalus) pieli* n. sp. (fig. 9)**

Type:— σ , Kuling, Kiangsi Prov., central China, Sept. 4, 1934 (O. PIEL). Type taken "in copula" with the Allotype. Measurements in millimeters: body length

12.5 (abdomen deflexed); pronotum 3.7; tegmina 1.7; hind femora 11.5; antennae 60.0; anal cone 2.0 mms. Type deposited in the HEUDE Museum Collection.

Description:—Form typical for the new subgenus. Face broad and deep; eyes circular and subglobular. Pronotum somewhat subsellate when viewed in profile; lateral lobes with a tumid area on the posterior margin immediately above the large oval opening of the prothoracic spiracle. Tegmina minute, subcircular pads with the inner margins slightly overlapping, and the two median veins in the black area cristately raised. Leg spination as follows: all femora unarmed; fore and meso tibiae with 6 pairs of ventral spines, the apical pair not plainly visible. Caudal tibiae with 24 to 26 external and 22 to 24 alternately large and small teeth with 6 external and 4 internal small teeth in the apical portions of the ventral side. Caudal femora with the lower angles of the genicular areas armed with a stout tooth internally and externally.

Coloration:—eyes castaneous, body coloration, probably green in life with all the legs pale pinkish red, the genicular areas of the caudal femora and the extreme base of the caudal tibiae black. Dorsum of fastigium and central portions of the vertex and occiput black. Dorso-lateral areas of the pronotum black with the intervening dorsal areas blackish. Dorso-lateral band on the abdomen weak with inward projecting spurs of black along the basal portion of each abdominal segment.

Allotype:—♀, same data as the Type but collected July 30, 1935 (O. PIEL). Taken "in copula" with the Type. Measurements in millimeters: body length 16.0; length to tip of ovipositor 36.5; pronotum 4.0; tegmina 2.0; hind femora 13.0; ovipositor 20.5×0.9 ; antennae

62.0 mms. Allotype deposited in the HEUDE Museum Collection.

Description: form typical and size slightly larger than the Type. Tegmina minute circular pads with the inner margins separated by a narrow space. Ovipositor very long, of uniform breadth and moderately recurved in the basal portions. Subgenital plate small, somewhat quadrate, lateral margins somewhat convergent apically, the posterior margin truncate and with a shallow median concavity. Prosternum bispinose. Leg spination as follows: all femora unarmed, the caudal femora with the lower angles of the geniculae bearing one stout spine each. Fore and middle tibiae with 6 pairs of ventral spines; caudal tibiae with 24 to 26 external and 23 to 27 internal black alternately large and small teeth on the dorsal keels, and a pair of small apical teeth on the ventral side.

Coloration: body color probably green in life, tan in the preserved specimen. Dorsum of fastigium and head with a broad dark band, the lateral margins of which do not touch the eyes. Dorsum of pronotum piceous, pale in the central portions and with conspicuous piceous dorso-lateral bands on the abdomen. Tegminal pads circular with a median stripe of piceous. Legs pale reddish pink with the knees of the caudal femora black.

Paratypes: — 3 ♂, same data as the Type but collected Aug. 20-Sept. 7, 1934 (O. PIEL). Range in measurements in millimeters: body length 11.5-12.5; pronotum 3.3-3.5; tegmina 1.0-1.5; hind femora 10.0-11.0; anal cone 2.0-2.2; length of body with cone outstretched 16.0 mms. Male Paratypes identical to the Type.

Paratypes:—3 ♀, same data as the Allotype but collected Sept. 4-9, 1934 (O. PIEL). Range in measurements in millimeters: body length 16.0-19.5; length to tip of ovipositor 37.0-41.5; pronotum 4.0-4.4; tegmina 2.0; hind femora 13.2-15.0; ovipositor 21.5-23.5 × 0.9; antennae 77.0 mms. Female Paratypes identical to the Allotype. 1 ♀ paratype from Kwanhsien, Szechwan, Aug. 5, 1930 (D. C. GRAHAM; HEBARD Cln.) measuring: body length 15.0; length to tip of ovipositor 32.0; pronotum 4.0; hind femora 15.0; ovipositor 18.5 mms. The Kwanhsien specimen has the ovipositor considerably shorter than the Kuling series.

Paratypes deposited in the HEUDE, HEBARD and TINKHAM Collections.

Conocephalus (Xiphidion) melas (DE HAAN)

Kiangsu: Wusih, 1 ♂, Sept. 7, 1919 (E. SUENSON; HEBARD Cln.).

Kwangtung: Maan Chi Shan, 1 ♀, Oct.-Dec. 1921 (C. W. HOWARD; HEBARD Cln.).

This prettily marked species is known from central China south to the islands of the Malayan Archipelago.

Conocephalus (Xiphidion) maculatus (LE GUILLOU)

Chekiang: Chusan, 1 ♀, July 14, 1934 (O. PIEL).

Kiangsi: Kuling, 1 ♂, 7 ♀, Sept. 22, 1934 (O. PIEL).
Kieou-Kiang, 3 ♂, 1 ♀, Sept. 22, 1934 (O. PIEL).

Kiangsu: Shanghai, 1 ♂, June 22, 1930 (O. PIEL);
1 ♂, Oct. 3, 1932 (O. PIEL). Ihing, 1 ♀, Aug. 4, 1933 (O. PIEL).

Kwangtung: Canton, 7 ♂, 4 ♀, 1 ♀ nymph, Nov. 10-23, 1932 (O. PIEL). Hong Kong, 2 ♂, 1 ♀, Dec. 2-3, 1932 (O. PIEL).

Hainan: Nodoo, 2 ♂, 1 ♀, March 22, 1936 (O. PIEL).

This species is abundant everywhere in the grass in central and south China. Its range includes a great part of Asia and Africa.

Conocephalus (Xiphidion) chinensis (REDTENBACHER)

Kiangsu: Shanghai, 2 ♀, Aug. 4-Sept. 5, 1933 (O. PIEL). Tchou-to-eu, 1 ♂, 1 ♀.

Kiangsu: Kuling, 2 ♂, Sept. 7-9, 1934 (O. PIEL).

This species is found in central China north to Manchuria, Siberia and Japan.

Conocephalus (Xiphidion) divergentus (MATSUMURA and SHIRAKI)

1908. *Xiphidium divergentum* MATSUMURA and SHIRAKI. Locustiden Japans, p. 61, Pl. 1 fig. 5 (Female only).

Kwangtung: Canton, 3 ♀, Nov. 22, 1932 (O. PIEL).

This is the first record of this species for S. China. The species was described from a unique female, the Type, from Shinsha, Formosa. Ebner reported this species from central China in 1939.

Conocephalus (Xiphidion) dimidiatus (MATSUMURA and SHIRAKI)

1908. *Xiphidium dimidiatum* MATSUMURA and SHIRAKI. Locustiden Japans, p. 56, Pl. 1, fig. 6 (male only).

Kiangsu: Shanghai, 1 ♂, Sept. 5, 1933 (O. PIEL).

The Type was described from Akasi. This is the first record of this small species from China.

DECTICINAE**Tettigonia chinensis** WILLEMSE

Chekiang: Chusan, 1 ♀, June 27, 1931 (O. PIEL); 1 ♂, July 13, 1934 (O. PIEL). Tien Mu Shan, 1 ♂, 1 ♀, July 10, 1935-Aug. 1, 1936 (O. PIEL).

Kiangsi: Kuling, 1 ♀, Aug. 1, 1935 (O. PIEL).

The writer reported a female from Kuling in 1936. WILLEMSE described this species from Chungking, Szechwan, in 1933. This large handsome species is now known from Szechwan east to Chekiang and it appears to be restricted to the higher mountains.

Gampsocleis sinensis (WALKER)

Chekiang: Tien Mu Shan, 1 ♂, July 15, 1936 (O. PIEL). Chusan, 1 ♂, July 7, 1934 (O. PIEL).

Anhwei: An-king, 1 ♀, July 1, 1935 (O. PIEL).

Kiangsu: Shanghai, 1 ♀, Aug. 29, 1935 (G. SUENSON; HEBARD Cln.).

Szechwan: Shin Kai Si, Mt. Omei, elev. 4400, 1 ♂, (D. C. GRAHAM; U. S. N. Mus.).

This interesting grass dwelling species was reported from Hupeh province, in 1936, by the writer, and was previously known from Amoy, Fukien, and Mokan Shan, Chekiang, the type locality of the synonymous *Drymadusa mokanshanensis* CAUDELL. *G. sinensis* ranges from Kwangtung and Kwangsi (unrecorded) north to Chekiang and Kiangsi and west to Szechwan and Hupeh.

Gampsocelis gratiosa BRUNNER

Kiangsu: Shanghai, Pootung, 1 ♂, Oct. 1922 (Nat. Geog. Soc. Exp., F. R. WUTSIU; U. S. N. Cln.).

This large green shield-back katydid has been previously reported from Shanghai. This species is known from Kiangsu to Shensi and southern Kansu provinces and north to Shantung.

Atlanticus SCUDDER

In a recently published fascicle of this journal I have described seven new Chinese species of the remarkable genus *Atlanticus* which was at first thought to be a strictly Nearctic genus until the discovery of *Atlanticus palpalis* REHN and HEBARD from Fukien Province, in 1920. The addition of seven new Chinese species to the genus brings the total Asiatic species to ten and the known Nearctic species are nine. The Type material of four species came from the HEUDE Museum Collection. The student is referred to this paper (see Bibliography) for a full account of the genus.

Atlanticus changi TINKHAM

The Type and Allotype were described from Kuling mountain in Kiangsi province.

Atlanticus pieli TINKHAM

The male and female Type came from Tien Mu Shan in Chekiang province.

Atlanticus kulingensis TINKHAM

This interesting new species was described from Kuling.

Atlanticus magnificus TINKHAM

The Type and Allotype of this handsome large winged species were described from Tien Mu Shan, Chekiang province.

Metrioptera bonneti (BOLIVAR)

Kiangsu: Nanking, 1 ♂, Spring 1924 (N. A. WOOD, Univ. of Michigan Cln.).

This Japanese species has been recorded from Kingan, Manchuria by BEY-IENKO in 1930, and from southern Kansu, by Uvarov, in 1933. This is the first record for east central China and represents the southernmost ditributional point for this species.

Summary

Thirty six species of Chinese *Tettigoniidae* have been reported in this paper. Despite this small number, the collection has proved very interesting for the many new species and new records that it contained. One new subgenus *Conanalus* of *Conocephalus* has been described with *Conanalus pieli* n. sp. as subgenotype. New species include five in the genus *Xiphidiopsis* namely; *minutus*, *cervicercus*, *capricercus*, *kulingensis* and *pieli*. The Allo-type of *Mirollia formosana* MATS. and SHIRAKI has been described and added to the Chinese list: Others reported for the first time from China are: *Pseudorhynchus japonicus* SHIRAKI, *Pyrgocorypha formosana* MATSUMURA and SHIRAKI, *Homorocoryphus pallidus* (REDTENBACHER), *Conocephalus (Xiphidion) dimidiatus* MATS. and SHIRAKI and *Elimaea punctifera* WALKER. Recently described in a fascicle of this journal were seven new species of the genus *Atlanticus* SCUDDER. Another new genus, related to *Holochlora* STAL, with five new species is being published elsewhere. Finally the author recorded *Xiphidiopsis suzukii* MATS. and SHIRAKI and described *X. hastaticercus*, in 1936. CHANG listed 41 genera and 85 species and races in his 1935 "Index of Chinese Tettigoniidae."

Recent papers by the author. have revised this list upwards to 44 genera and 112 species and races. The completed list for China will stand above 150 species as the writer possesses many new species waiting description.

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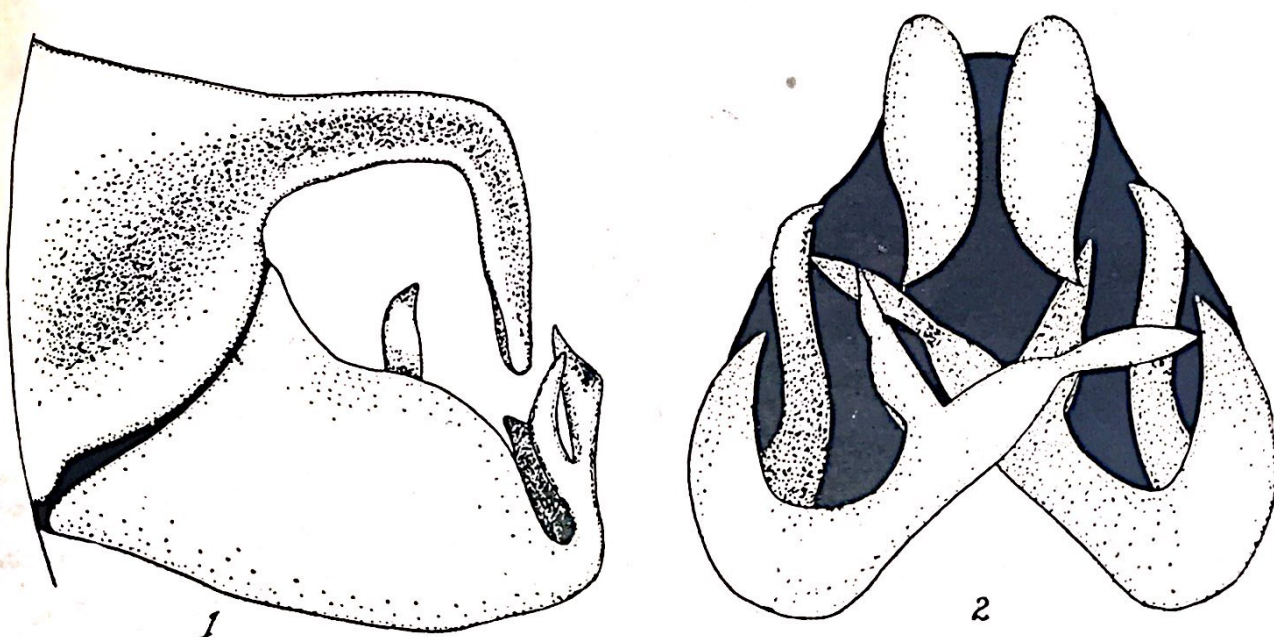


Figure. 1. Lateral view of genitalia of Type Male of *X. cervicercus* n. sp.
 Figure. 2. Rear view of genitalia of Type Male of *X. cervicercus* n. sp.

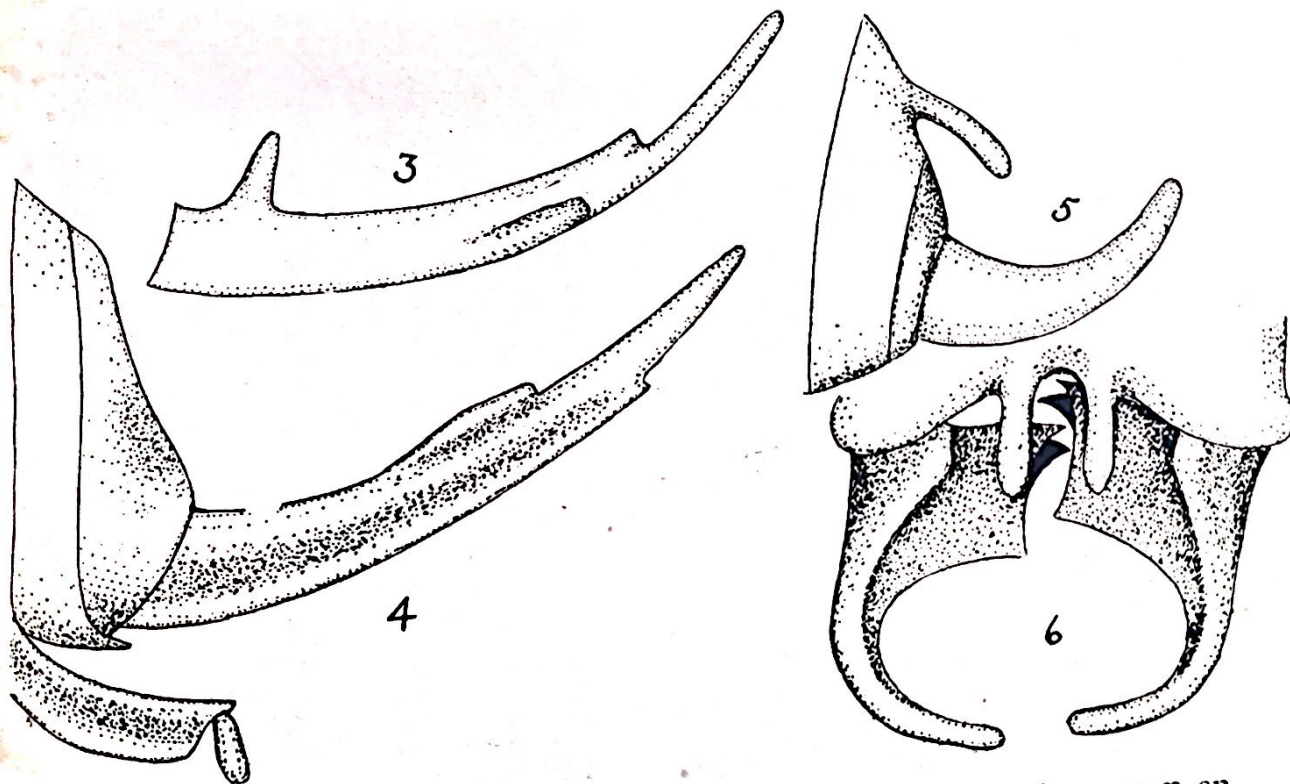


Figure. 3. Dorsal view of cercus of Type Male of *X. capricercus* n. sp.
 Figure. 4. Lateral view of genitalia of Type Male of *X. capricercus* n. sp.
 Figure. 5. Lateral view of genitalia of Type Male of *X. kulingensis* n. sp.
 Figure. 6. Dorsal view of genitalia of Type Male of *X. kulingensis* n. sp.

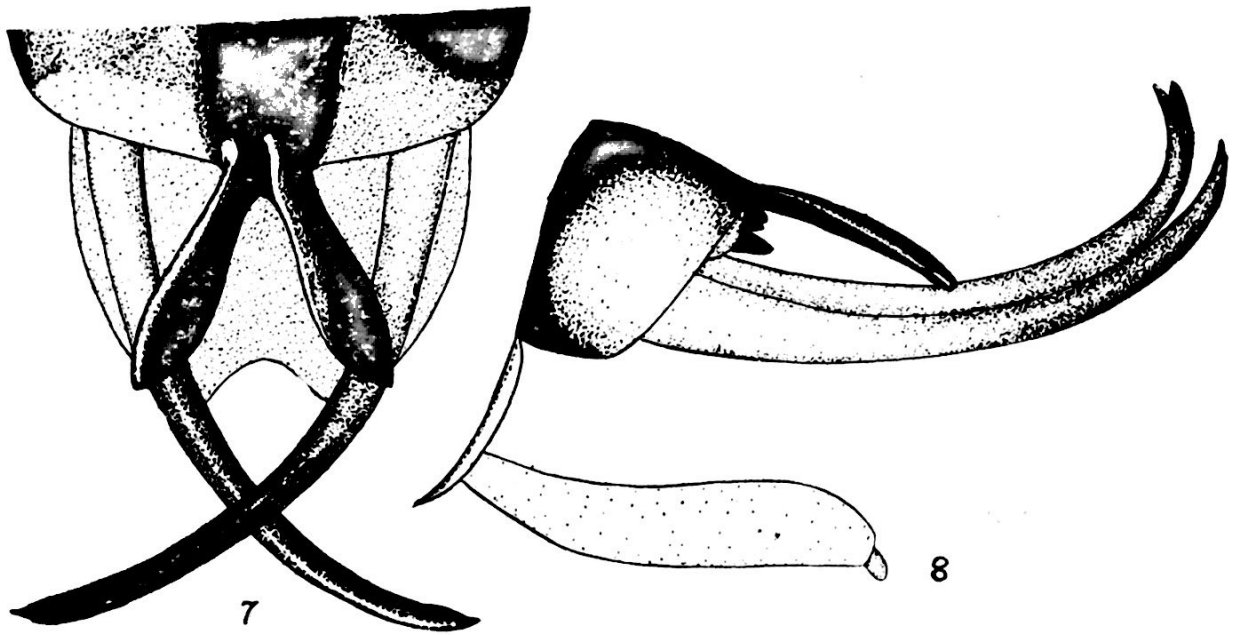


Figure. 7. Dorsal view of genitalia of Type Male of *X. pieli* n. sp.

Figure. 8. Lateral view of genitalia of Type Male of *X. pieli* n. sp.

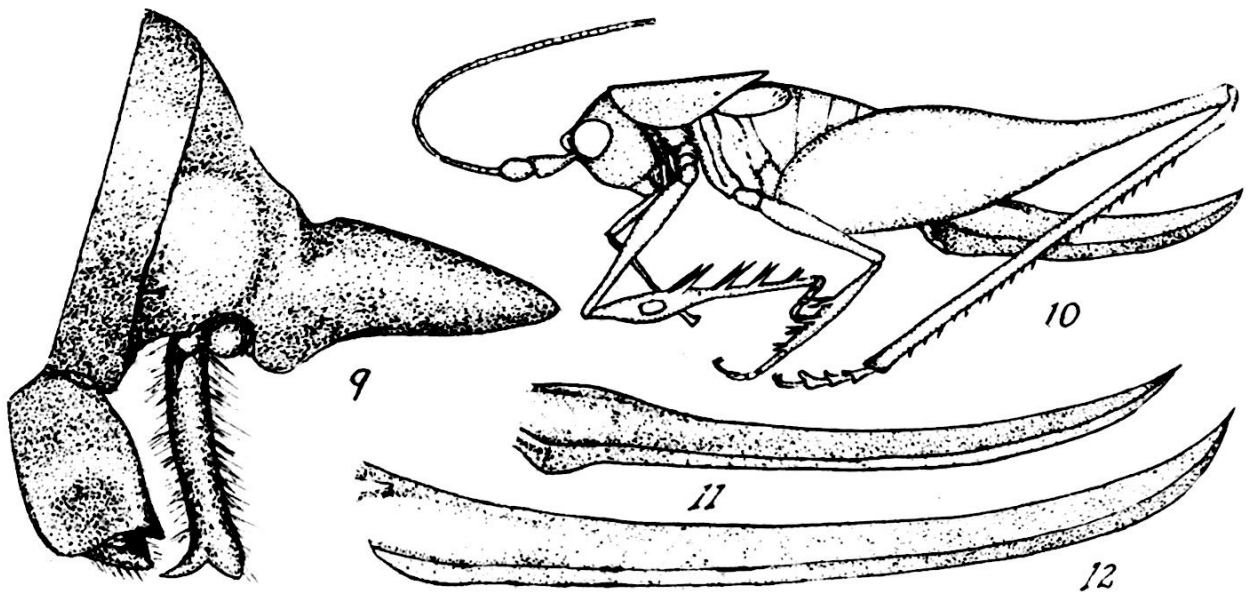


Figure. 9. Lateral view of genitalia of Male Type of *Conocephalus (Conanalus) pieli* n. subgenus et n. sp.

Figure. 10. Lateral view of Allotype Female of *X. minutus* n. sp. (x 8 nat.)

Figure. 11. Lateral view of ovipositor of Allotype Female of *X. capricercus* n. sp. (x 8 nat.).

Figure. 12. Lateral view of ovipositor of Allotype Female of *X. cervicercus* n. sp. (x 8 nat.).