

ZOOGEOGRAPHICAL NOTES ON THE
GENUS *ATLANTICUS* WITH KEYS AND
DESCRIPTIONS OF SEVEN NEW
CHINESE SPECIES

BY

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Few general present a more interesting zoogeographical record than the genus *Atlanticus*. Described, in 1894, by SCUDDER (the name in the Greek meaning "a mythical island") *Atlanticus* has within recent years justified its strange name. By 1916 no less than nine distinct Nearctic species had been described from the United States in the area east of the Mississippi and ranging from the latitude of New York south to northern Florida.

In 1920 REHN and HEBARD described an interesting Dectacid, collected in 1917, from the South China province of Fukien as *Atlanticus palpalis*. With this discovery *Atlanticus* assumed a new role. It was the first non-Holarctic orthopteran genus possessing Neogeic and Geron-togeic affinities to be known to science. An although *Atlanticus* is a scientific entity and a living creature, yet its palaeohistory is still mysterious, going back into the palaeontological record millions of years.

Since *A. palpalis* was described several new species from China and eastern Siberia have been made known to science. To-day *Atlanticus* is represented by two island-faunas, one in the eastern United States, the other in eastern Asia. We can only conjecture that in the past these two island-faunas of present day discontinuous distribution

were connected in some remote geological era, perhaps in the Pliocene or Pleistocene. The advent of the Ice Age was probably the great factor that destroyed a great portion of the palaeohistorical distribution of *Atlanticus* creating the two island-faunas to be found in the Old and New World to-day.

This remarkable case of discontinuous distribution in the insect world has further corroboration from the zoological realm. One interesting example is afforded by the genus *Alligator*. Two species are known, *mississippiensis* of the eastern United States and *A. sinensis* of the Yangtze River of central China. The paleontological record reveals that Alligators were common during the Pliocene in the territory now occupied by the State of Wyoming. In the Turtles we find the family *Emydidae* (genera *Emdys* and *Clemmys*) endemic to both regions under discussion. The poisonous snakes of the genus *Agkistrodon* are similarly distributed as is also *Elaphe*, *Natrix* and *Liopeltis*. The short nosed frogs of the family *Brevicipitidae* also show this same distribution. *Kaloula pulchra* of south China is the Old World representative of the New World *Hypopachus cuneus* and similarly the species of *Microhyla* of South China are very close to the Nearctic species of *Gastrophyne*.

There are a number of grasshoppers, such as *Chorthippus*, *Aeropedellus* (*Gomphocerus* in part), *Mecostethus* and *Zuboyskya* (*Podisma* in part), mainly of the subfamilies *Acridinae* and *Cyrtacanthacrinae* of the *Acrididae*, that are Holarctic in distribution. In the *Decticinae*, of which *Atlanticus* is a member, one species of *Metrioptera*, namely *M. sphagnorum* has penetrated into North America. The Eurasian continent possesses no less than sixty species of *Metrioptera* with new ones constantly appearing. The fact that a single species, *sphagnorum*, which is very closely allied to the Siberian *M. ussuriana* UVAROV 1926, is found in North America, would indicate that *Metrioptera* penetrated into North America from Asia since Glacial times. Or it might

be equally true that the Holarctic genera persisted in both Asia and North America because of their adaptations to a more rigorous climate, moving north into the territory they now occupy since Glacial times. *Atlanticus* because of its lack of inherent characteristics to survive a colder climate never was able to regain or repopulate the area from which it was displaced during the Pleistocene glaciation — and consequently the two relic faunas persist, one in eastern Asia, the other in eastern North America.

Allocation of Material

The greater portion of the type material was loaned to the describer through the courtesy of Rev. OCTAVE PIEL, Director of the Heude Museum, Aurora University, Shanghai, China. Two specimens of *grahami* n. sp. came from the United States National Museum in Washington; two from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China; six specimens of topotypic material of *palpalis* from the HEBARD Collection in the Academy of Natural Sciences of Philadelphia and 12 specimens, ten of which are nymphs in the TINKHAM Collection. Type material will be returned to the various institutions from whence they came and some Paratypic material retained in the TINKHAM Collection.

In all 35 specimens of Asiatic *Atlanticus* have been studied, in addition to the Type material of *A. palpalis* REHN and HEBARD; one pair of paratypes of *A. sinensis* UVAROV and a male of *A. brunneri* (PYLNOV). The only species not examined from actual specimens in this study is *A. ussuriensis* UVAROV from Siberia.

Measurements

The following measurements have been taken: body length in the male; body length in female from head to base of ovipositor and also the total length from the head to the tip of the ovipositor and the ovipositor length from

the posterior margin of the subgenital plate to the apex of the ovipositor. Pronotal measurements include the length and the breadth in the narrowest and broadest parts. The tegminal length is that of the costal margin, also dorsal width and lateral depth were recorded. The hind femora were measured for length and greatest breadth of the swollen basal third of the caudal femora. In addition careful attention was given to the teeth and spines of all the legs as these are of specific value. The word "tooth" or "teeth" is used to designate those acute processes solidly fused to the femoral and tibial portions of the legs whereas spines are usually larger and always moveable in the socket in which they rest. In *Atlanticus* all the femoral teeth are shining black; the fore and mesotibial spines are large, acute, and pale colored, whereas the spines and teeth of the caudal tibiae are concolorous with the caudal tibiae.

Foreword

In the following treatise the writer will characterize the Asiatic genus *Atlanticus*, discuss the various groups, present keys to the males and females of the Asiatic species and describe seven new Chinese species. In addition an already prepared key to the American species of *Atlanticus* will be given with a summarization of the known distribution of the various Nearctic species.

The discovery of seven new Chinese species of *Atlanticus* augments the total of known Asiatic species to eleven and that of eastern North America to nine. It is interesting that Asia with its larger land mass should at last surpass North America and it is possible that other species will yet be found when the fauna of China and eastern Asia has been more thoroughly explored.

Atlanticus SCUDDER

1859. *Orchesticus* SAUSSURE. *Revue et Mag., Zool.*, 2 ser., 9: 201 (preocc.).

1893. *Engoniaspis* BRUNNER. Ann. Mus. Genova. 33 : 185 (invalid).
1893. *Amuria* BRUNNER. l. c. p. 185 (invalida & preocc.),
1894. *Atlanticus* SCUDDER. Can. Ent. 24: 177, 179.
1914. *Amuria* PYLNOV. Rev. Russe d'Ent 14: 109.
1916. *Atlanticus* REHN and HEBARD. Trans. Amer. Ent. Soc. 42: 33-100.
1920. *Atlanticus* BLATCHLEY. Orth. Northeastern America, pp. 587-9.
1923. *Atlanticus* UVAROV. Trans. Ent. Soc. London, parts iii, iv, p. 510.
1935. *Atlanticus* CHANG. Notes d'Ent. Chinoise. 2 (3): 63.

The history of the genus has been a restless and interesting one. BURMEISTER described two Nearctic species *pachymerus* and *dorsalis* from South Carolina under the name of *Decticus*. Later SAUSSURE (1859) described *americanus* as an *Orchesticus* and SCUDDER (1862) placed the North American forms under the gerontogic genus *Thyreonotus* (SERVILLE). SCUDDER characterized the new genus *Atlanticus* in 1894 and by 1916, SCUDDER, DAVIS, and REHN and HEBARD brought the total of described North American species to nine.

The first Asiatic species to be described was *brunneri* in 1914, and placed by Pylnov, the describer, in the genus *Amuria*. *Amuria* however was preoccupied by STAUDINGER's *Amuria* in the *Lepidoptera* 1887. REHN and HEBARD described the first Chinese species *palpalis* from a female in 1920, and for the first time recognized the existence of *Atlanticus* in Asia. UVAROV described the male of *palpalis* in 1922, *sinensis* in 1923, and *ussuriensis* in 1926. UVAROV placed *Paradrymadusa siberica* CAUDELL from Kongaus, Siberia, as a synonym of his *ussuriensis* and *brunneri* was recognized as an *Atlanticus*. In 1930 Tarbinsky put *ussuriensis* in the genus *Paradrymadusa* and UVAROV again, in 1939, removed it to *Atlanticus* showing that in reality it was quite closely related to *palpalis* in the form of the male cercus.

Thus by 1940, nine American species and four Asiatic, two from China and two from Siberia have been made known and considerable debate and generic and specific synonymy has been involved.

Characterization of the Asiatic *Atlanticus*.

Male : — Head broad and deep, eyes small, subcircular and subglobose; labrum circular; mandibles powerful and maxillary palpi very long. Pronotum rather narrow and moderately long to long with rounded posterior margin and very slightly concave anterior margin. Lateral keels moderately to well defined slightly to strongly constricted in the anterior third with the keels slightly, moderately to strongly divergent caudally to round into the gently or moderately rounded posterior margin of the pronotum. Lateral lobes deepest about the middle; the anterior margin slightly aslant to the rear; the posterior margin strongly aslant forward with a slight median concavity; the inferior margin sloping from in front down to the broadly rounded lateral lobes. Tegmina variable in the male ranging from half to almost twice the pronotal length and from shallow rounded lobes to greatly inflated ones as broad or broader than the greatest breadth of the pronotum and considerably greater than the depth of the lateral lobes of the pronotum. Prosternum with two small widely spaced needle-like spines; mesosternum with two large rather triangularly lobate processes and the metasternum with two smaller lobes. **The leg spination** is characteristic and specific and as follows : fore femora with one to six small to large black appressed teeth on the inferior internal keel; foretibiae with always 6 pairs of long, stout pale acute spines on the ventral surface (the upper surface in the folded legs) and 3-4 large external spines on the dorsal side, the basal one always placed on the distal portions of the conchate tympanum at the base of the fore tibiae, the last one always apical, and one or two intermediate ones depending on the species. Fore coxae with a long strongly decurved spine-like tooth.

Mesofemora with one to several small shining black appressed teeth on the external inferior keel (this would be the internal keel if the legs were forward as the fore legs) and without internal teeth. Mesotibiae with 6 pairs of ventral spines and 2 outer and four inner dorsal spines, the two outer paired with the two intermediate internal ones, the other two, apical and subbasal, on the internal margin. Caudal femora with the external inferior keel only rarely toothed (if toothed with 1-4 usually large shining black teeth) and always with 1-5 or 6, rarely more, small to large shining black internal teeth on the inferior keel. Caudal femora strongly swollen in the basal half to retain the powerful saltatorial muscles. Caudal tibiae with from 21-28 external and 18-24 internal, teeth, usually a large and smaller one more or less paired, on the dorsal surface (i.e. when leg outstretched in the walking position); and with 9-12 (usually 12), external and 8-10 internal small weak spines on the ventral surface. Cerci variable, usually forcipate, the apex usually acute with the internal unciniate tooth usually subapical or median, rarely basal in position. Supra-anal plate with a shallow or deep, rarely arcuate, emargination or excision of a "U" or "V" shape; and with a smaller variable emargination between the apical styli of the subgenital plate.

Coloration : variable, but usually dark greyish or reddish brown in the preserved specimens with always shining dark verona brown on the upper portions of the lateral lobes of the pronotum just ventrad of the lateral keels. Lower portions of the lateral lobes usually lightcolored or buffish, rarely mahogany brown, with a central invasion of light color extending upwards to almost reach the lateral carinae. Caudal femora with always a median line on the outer pagina of the swollen basal half of the femora, below which is dark shining verona brown extending occasionally to almost the inferior keel, though usually occupying half of the lowermost half of the caudal femora.

Female : similar to the males. Lateral carinae of the pronotum usually gently divergent caudally, even in the species possessing males with strongly divergent keels on the posterior two-thirds of the pronotum. Tegmina usually very small and usually not visible when viewed from above : if exposed, only for several mms. Leg spination quite similar to the males. Ovipositor short to long, approximating the apices of the caudal femora or surpassing them to variable specific extent. Ovipositor usually gently to moderately recurved, rarely very long and straight or very gently curved downwards as in the North American species; the dorsal valvulae obliquely truncate at the tip. Supra-anal and subgenital plates with only slight degrees of emargination.

Asiatic Groups of the *Atlanticus*.

Of the various groups of Asiatic *Atlanticus*, the *Palpalis* group is the most pronounced and composite. In this group the exposed portions of the male tegmina are equal to or greater than the length of the pronotum. The pronotum is long and linear, the lateral carinae gently divergent caudally. The cerci are closely similar and distinguish the group, being moderately large and stout with the apical arm abruptly incurved and bearing an internal uncinat subapical tooth. The ovipositor is long and very gently recurved in *palpalis* R. and H. and *kwangtungensis* n. sp. and shorter and more strongly recurved in *hoffmanni* n. sp. and very long and gently decurved in *ussuriensis* UVAROV.

The new species *A. magnificus* because of its size and ampliate tegmina would appear to be in a group by itself and yet most closely allied to the *Palpalis* group, especially *palpalis*. The cerci is longer but of the same general type with a more attenuate apical arm beyond the median internal tooth. The metazona in the male is very broad with strongly divergent keels and a slight tendency

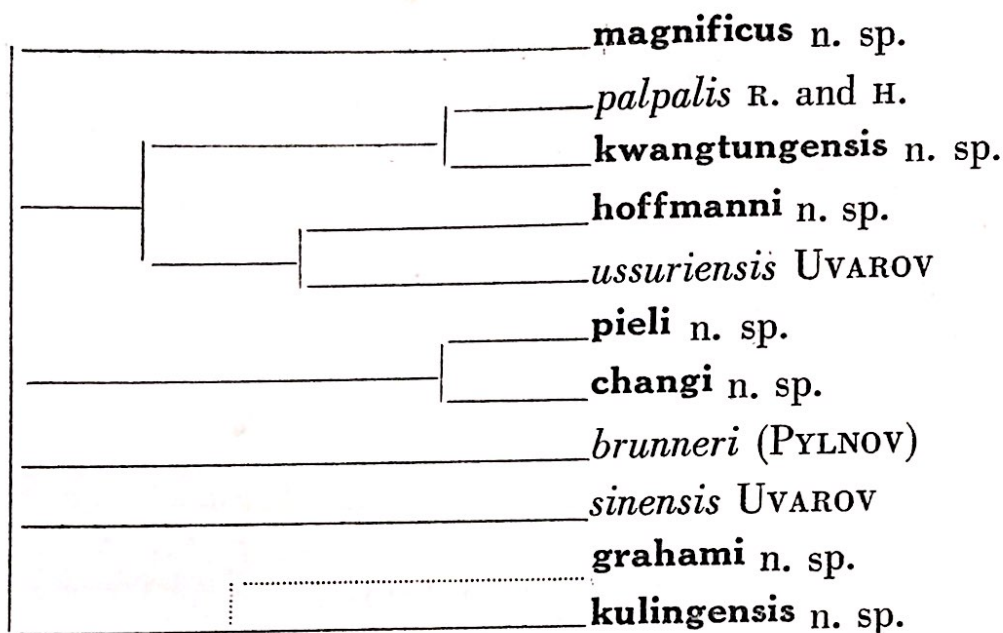
to this extreme appears in the male *palpalis*, which has the keels slightly more divergent than its nearest relative *kwangtungensis*. The female ovipositor is practically straight and very long; in all other Chinese species, except *ussuriensis*, distinctly recurved, least so in *palpalis* and *kwangtungensis* which again illustrates the affinity of the two groups. Hence *magnificus* n. sp. appears to be in a group by itself and apparently most closely allied to *palpalis*.

The new species *pieli* and *changi* form a closely knit unit differing chiefly in the size of the body and of the tegmina and cercal features. This group is characterized by the straight acuminate cerci bearing a small median internal uncinuate tooth. The tegmina are longer than the pronotum and both species are of moderately large size. The ovipositor is of moderate length and distinctly recurved.

The next two species *sinensis* and *brunneri* appear to be in groups by themselves as their cercal features are vastly different. *Brunneri* is distinguished from all other Chinese species by the long slender forcipate cerci with an internal basal uncinuate tooth. *Sinensis* has a short stout cercus slightly incurved at the apex and with a large median internal tooth.

Kulingensis and *grahami*, two new species, are placed together in the last group, *grahami* temporarily because the male is unknown. The male of *kulingensis* is distinguished by its large size and very small tegmina, about half the length of the short pronotum. The cerci are large and forcipate with a large internal tooth just basad of center. The females of the two species are quite similar in size, *grahami* being distinguished by its very heavy, long recurved ovipositor and very dark coloration; the lower portions of the lateral lobes of the pronotum being dark mahogany brown.

The groups and species of Asiatic *Atlanticus* would appear to align themselves in the following manner.



Key to the Males of the Asiatic species of *Atlanticus*

1. Exposed portion of the tegmina less than the length of the pronotum 8
- Exposed portions of the tegmina equal to or greater than the length of the pronotum 2
2. Internal cercal tooth subapical, closely approximated to the incurved apical tooth 3
- Internal cercal tooth not subapical but situated medianly or basally on the internal margin of the cercus 6
3. Size large for *Atlanticus* 4
- Size medium to small for *Atlanticus* 5
4. Apical cercal tooth acute, inferior internal margin of the cercus with a minute tooth basad of the more distad one on the internal superior margin. Tegmina testaceous. Hind femora with 1-3 external and 8-11 large internal teeth on the inferior keels. Fukien *palpalis* R. and H.
- Apical cercal tooth blunt, no denticulate area on the lower internal margin of the cercus. Tegmina reddish brown. Hind femora without external and with only 3-5 fairly large internal teeth on the inferior keel. ***kwangtungensis*** n. sp.
5. Size medium. Hind femora with 4-5 internal and no external teeth on the inferior keels. Tegmina slightly greater than the length of the pronotum. Fukien. ***hoffmanni*** n. sp.

- Size small. Hind femora with several teeth on both the external and internal inferior keels. Tegmina equal to or slightly greater than the length of the pronotum. Siberia.
..... *ussuriensis* UVAR.
6. Pronotum with the lateral keels strongly divergent caudad, so that their breadth is almost equal to their length. Tegmina very large and almost twice the length of the pronotum and very broad and deep. Hind femora with 3-6 small internal teeth on the inferior keel. Cerci with the internal tooth just proximad of center with the apical arm roundly incurved to an acute apex. Chekiang. **magnificus**
n. sp.
- Pronotum without strongly divergent lateral keels caudad. Tegmina as large as but not twice the size of the pronotum. Cerci straight acuminate with a small median internal tooth 7
7. Tegmina about equal to the length of the pronotum with dark veins. Cerci straight and fairly stout with small uncinatate internal tooth. Hind femora with 4-7 internal teeth on the inferior keels..... Chekiang. **pieli** n. sp.
- Tegmina longer than the pronotum with pale veins. Cerci slenderer, slightly incurved near the apex with a small median uncinatate tooth. Hind femora with 1-4 internal teeth on the inferior keel..... Kiangsi. **changii** n. sp.
8. Cerci long and slender, inner tooth basal, the long arm extending for about twice the length from the base to the tooth with the apical portions gently incurved. Size medium.
..... Siberia. *brunneri* (PYLNOV)
- Cerci not long and slender; inner tooth about median.... 9
9. Size large, cerci long and forcipate with a strong uncinatate internal tooth just basad of center. Hind femora with 5-6 small internal teeth on the inferior keel. Tegmina less than half the length of the pronotum. Kiangsi
..... **kulingensis** n. sp.
- Size small; cerci short and stout slightly incurved in the apical portions with a large median denticulate prominence on the internal margin; not as above
..... Shensi. *sinensis* UVAR.

Key to the Females of the Asiatic Species of *Atlanticus*

1. Ovipositor longer than the body 2
— Ovipositor shorter than the body 3

2. Ovipositor curving gently downwards; size small.
 *ussuriensis* UVAR.
- Ovipositor almost straight with only a feeble trace of upward curvature; size large **magnificus** n. sp.
3. Ovipositor long and very gently recurved 4
 — Ovipositor short to long and distinctly recurved 5
4. Caudal femora with 1-3 external and 4-5 large internal teeth on the lower keels; supra-anal plate with a « U » shaped notch; size large *palpalis* R. and H.
 — Caudal femora without external teeth and with 5-6 large internal teeth on the lower keel; supra-anal plate with a very deep and large “ V ” shaped notch; size large **kwangtungensis** n. sp.
5. Caudal femora without external teeth on the lower keel; ovipositor approximating the apices of the caudal femora but barely surpassing; length 20 mms. or less; forefemora with 4 external spines 6
 — Caudal femora possessing external teeth on the lower keel; ovipositor surpassing the apices of the caudal femora by 5 mms. or more; length of ovipositor 23 mms. or more; forefemora with 3 external spines (number uncertain in *sinensis*) 8
6. Ovipositor less than 20 mms 7
 — Ovipositor 20-22-mms. long **changi** n. sp.
7. Pronotal maximal width more than 5 mms; caudal tibiae with more than 25 external and internal dorsal teeth; lateral keels of the pronotum well defined **hoffmanni** n. sp.
 — Pronotal maximum width less than 5 mms; caudal tibiae with less than 23 external and internal dorsal teeth; lateral keels of the pronotum rounded **pieli** n. sp.
8. Size small *sinensis* UVAROV
 Size large 9
9. External teeth on the inferior margin of the caudal femora large and 4 in number, with 5-6 large internal ones. Ovipositor heavy 2 mms. wide in the middle and 24 mms. long. Body coloration very dark; lower portions of lateral lobes mahogany brown **grahami** n. sp.
 — External teeth on the inferior margin of the caudal femora small and 1-3 in number, with 2 small internal ones. Ovipositor slenderer 1.6 mms wide in the middle and 25 mms long. Body coloration lighter with the lower portions of the lateral lobes of the pronotum buffish brown **kulingensis** n. sp.

Magnificus Group.

The only member of this group, *Atlanticus magnificus* n. sp., is in some respects the most aberrant and interesting of the Chinese species. The pronotum is broadly expanded on the metazona so that its length is almost as broad as long; the tegmina are very large, broad and deep; the cerci are forcipate with a long acute gently incurved apical arm and an almost medianally placed internal uncinuate tooth; the ovipositor is very long and practically straight. On one side affinities are noticeable with *A. palpalis* in the form of the pronotum and the shape of the cerci and ovipositor and on the other with *A. kulingensis* n. sp. in the form of the pronotum and the cercus, but not in the shape of the ovipositor.

The writer is placing *magnificus* first in the series in a group by itself but the form of the pronotum, cercus and ovipositor would appear to indicate that its nearest relative is *A. palpalis* in the *Palpalis* Group. *Magnificus* may throw some light on the origin of *Atlanticus* or on the other hand due to its somewhat aberrant form reveal little of the true origin of the genus.

Atlanticus magnificus n. sp.

(Pl. I, fig. 3; II, fig. 4; III, figs. 1,2,3,4,5).

Differs from all the other species of Asiatic *Atlanticus* in the males by the large ampliate metazona of the pronotum, the deeply cleft supra-anal plate, the very broad and deep tegmina larger than in any other species and having the median vein reinforced and forming a convex lateral margin to the tegmina with the dorsal and lateral planes at right angles to each other. Females differ from all other species of the genus by possessing a very long and almost straight ovipositor. This is one of the most striking of the Chinese species of *Atlanticus*.

Type : — ♂, Tien Mu Shan, Chekiang prov., July 26, 1935 (O. PIEL).

Measurements in millimeters : body length 28.0; pronotum 10.6×8.4 max. $\times 4.2$ min; tegmina 19.0×8.9 wide $\times 10.5$ deep; hind femora 28.2×4.9 max. mms. Type in the Heude Museum.

Description : — Head much deeper than broad, the depth of the face from the fastigium to the base of the jaws slightly less than the facial breadth. Eye small, circular and subglobular. Mandibles powerful; labrum circular in outline. Antennae about twice the length of the body. Pronotum flat, ampliate behind, the lateral margins strongly divergent caudad of the narrowed anterior third with the posterior half of the metazona with a slight median tectate ridge. Lateral lobes of the pronotum deepest at their middle; fore margin very slightly concave, posterior margin strongly oblique with a slight central concavity, the ventral margin aslant caudad to the posterior angle which is the deepest portions of the lateral lobes. Tegmina, the largest in the Asiatic species, and considerably broader than in *A. palpalis*. The median vein forming the lateral margin of the tegmina is slightly convex and heavily reinforced; the dorsal and lateral planes flat and at right angles to each other; the lateral plane deepest in the apical fourth where it exceeds the breadth of the dorsal plane.

“**Leg spination**” as follows : — forefemora with 2-3 small black appressed teeth on the internal inferior keel; foretibiae with 6 pairs of large acute spines on the ventral surface and three external dorsal ones, one basal on the distal areas of the conchate tympanum, one apical and one intermediate. Mesofemora with two small black teeth on the external inferior margin; mesotibiae with 6 pairs of ventral spines and 2 external and 4 internal dorsal spines, the two external ones paired with the two intermediate internal ones. Hind femora with 3-6 small black internal teeth on the inferior keel. Hind tibiae with 19-20 external and 18 internal teeth on the dorsal surface (leg in extended position) and with 10-11 external and 9-10 internal widely

spaced small spines on the ventral surface (the upper side in the folded position).

Supra-anal plate with a large and deep "V" shaped cleft and a shallow emargination between the apical styli of the subgenital plate. Cerci long and forcipate with the apical arm arcuately incurved to a long acuminate acute tip; internal tooth uncinatate and about medianly placed, the cerci appearing as two pairs of pinchers one within the other.

Coloration : general body tone in the pinned specimen dark testaceous tinged with reddish on the dorsum of the head and the pronotum. Pronotum shining dark blackish brown just below the lateral carinae on the lateral lobes of the pronotum; the inferior margins broadly pale colored. Tegmina reddish brown; abdomen rust brown. Fore and middle legs blackish. Hind femora testaceous with a well defined median line on the outer pagina in the basal swollen half, below which is dark blackish brown paling ventrad towards the inferior keel. Dorsal surface of the hind femora also dark greyish.

Allotype : — ♀, same data as the Type but collected July 27, 1935 (O. PIEL).

Measurements in millimeters : body length 27.0; length to tip of ovipositor 58.0; pronotum 11.5×7.0 ; tegmina 3.5 along costal margin but barely visible from above; hind femora 32.0×5.5 ; ovipositor 32.0×1.8 mms. Allotype deposited in the Heude Museum in Shanghai.

Description : Size slightly larger than the Type; head and body build similar to the male. Pronotum not ampliate behind, the lateral carinae only very slightly divergent caudad. Posterior half of the metazona with a slightly more tectate median ridge than in the Type. Tegmina visible from the side but barely discernible from above.

Leg spination as follows : forefemora with two large teeth on the internal inferior margin; foretibiae as in the

Type. Mesofemora with 2-3 external teeth on the inferior keel; mesotibiae as in the Type. Caudal femora with 2-4 teeth on the internal inferior margin. Caudal tibiae with 18 external and 18-19 internal teeth on the dorsal surface and 10 external and 7 internal small spines on the ventral side.

Ovipositor, very long and almost straight, only perceptibly recurved with the apex obliquely truncate. Subgenital plate emarginate in the center forming two bilobed convexities.

Coloration : — head testaceous, darker on the facial and genal areas. Pronotum dull reddish brown with upper portions of the lateral lobes just below the lateral carinae shining blackish brown. Abdomen reddish brown; ovipositor clear reddish brown darker apically. Fore and middle legs greyish mottled with black. Caudal femora greyish with a sharply defined, median, shining dark line on the outer pagina with vertical rib-like projections extending ventrad to disappear on the pale lower margins of the femora.

Paratypes : — 1 ♂, same data as the Type.

Measurements in millimeters : body length 32.0; pronotum 11.7×8.9 max; tegmina $20.0 \times 9.5 \times 9.5$; hind femora 30.0×5.0 mms. Paratype in the TINKHAM Collection. Paratype similar to the Type in coloration and characteristics and only slightly larger than the Type.

There is also one female mature nymph which is much darker colored than the Allotype and having same data as the Allotype.

Palpalis Group

The members of this group are distinguished by the peculiar cercus which is short and stout converging rapidly from the base to the apex. The apex is abruptly incurved and usually acutely pointed with a subapical internal tooth. The size is medium to large in the Chinese species with

ussuriensis from Siberia a small species which on the form of the cercus appears to belong to this group although I have examined no specimens. *Ussuriensis* is the only Asiatic species with the ovipositor gently curved downwards and in this respect approaches more nearly the American species than any other of the Palaearctic species. Of the nine American species only one, *monticola*, has the distinctly recurved ovipositor, whereas seven of eleven Asiatic have this feature. Of the remainder, three belong to the *Palpalis* group and one to the *Magnificus* group. Two species *palpalis* and *kwangtungensis* have a long, very gently recurved ovipositor, and the fourth *hoffmanni* n. sp. has a short and strong, recurved ovipositor. With the exception of *ussuriensis* the other three species of the group are restricted to Fukien and Kwangtung Province of South China.

***Atlanticus palpalis* REHN and HEBARD.**

(Pl. I, fig. 1; II, 2; III, 6, 7, 8, 9, 10).

1920. *Atlanticus palpalis* REHN and HEBARD. Trans. Amer. Ent. Soc. 46: 219-223, 4 figs (♀ described).
 1922. *Atlanticus palpalis* UVAROV. Trans. Ent. Soc. London, p. 513 (♂ described, Kualun, Fukien).
 1935. *Atlanticus palpalis* CHANG. Note d'ent. Chinoise 2 (3): 63 (catalog).

This large interesting species was described from a unique female by REHN and HEBARD, in 1920, from a specimen found in the American Museum of Natural History. This specimen was collected on July 12, 1917 from the mountains around Yenping in Fukien Province of South China.

The discovery of *Atlanticus*, a genus considered endemic to the eastern United States, in South China, came as a considerable surprise. UVAROV, in 1922, described the male Type from Kualun in the northwestern part of Fukien.

I have examined topotypic material from the mountains near Yenping which were in the HEBARD Collection

at the Academy of Natural Sciences of Philadelphia. These were collected July 4-August 2, 1922 by Mr W. R. CALDWELL. **Measurements** for a topotypic male in the writer's collection are as follows : body length 31.0 mms; pronotum 12.0×8.0 in greatest breadth $\times 4.4$ min.; tegmen 16.0; hind femora 31.0×5.0 in max. breadth. Topotypic female measured : body length 32.0; to tip of ovipositor 57.0; pronotum 12.5×7.0 ; hind femora 34.0×4.7 ; ovipositor 26.0×2.0 mms in central width. **Description** of topotypic male material : — head typical. Pronotum slightly convex laterally on the anterior half, the posterior portion of the metazona distinctly reflexed with the lateral carinae caudad, distinctly divergent and rounding into the arcuate posterior margin of the pronotum. Tegmina larger than the pronotum and quite broad and deep.

Leg spination as follows : fore femora with 4-6 large black teeth on the internal inferior margin; fore tibiae with 6 pairs of large pale spines on the ventral side and 3 smaller external dorsal ones, the basal on the distal portions of the conchate tympanum, the other two intermediate and apical. Mesofemora with 2 strong black external teeth on the inferior keel; mesotibiae with 6 pairs of ventral spines and 3 external and 4 internal dorsal spines. Caudal femora with 1-2 outer and 5-10 large internal black teeth on the inferior keels. Caudal tibiae with 28 external and 21-22 internal dorsal teeth and 12-13 external and 9-10 small appressed ventral spines. Supra-anal plate with a small "V" shaped emargination; subgenital plate with a smaller one between the apical styli. Cerci moderately large and stout with an incurved apical arm, a subapical uncinat internal tooth and a median denticulate area on the internal inferior margin of the cercus.

Description of topotypic female material : head typical; pronotum flatter and narrower than in the male with very gently divergent lateral keels caudally. Tegmina very small.

Leg spination as follows : — fore femora with 2-3 teeth on the inferior internal keel; fore tibiae as in the male. Mesofemora with 2-3 external inferior teeth; mesotibiae with 6 pairs of ventral spines and 2 outer and 4 inner dorsal spines. Caudal femora with 1-2 outer and 3-6 inner teeth on the inferior margins. Caudal tibiae with 26-27 external and 19-21 internal dorsal teeth and 9-10 external and 7-8 internal small appressed spines on the ventral surface. Ovipositor almost stright, only slightly recurved, surpassing the apices of the caudal femora by more than 5 mms. Supra-anal plate with a broad shallow "V" shaped excision and a "V" emargination on the subgenital plate.

At present *Atlanticus palpalis* is known only from the mountains of Fukien Province, South China.

***Atlanticus kwangtungensis* n. sp.**

(Pl I, fig. 1; Pl. III, figs. 11, 12, 13, 14, 15).

Largest member of the group *Palpalis*, exceeding even *palpalis* in size and largest of the Asiatic species of *Atlanticus*. Differs from *palpalis*, to which it is most closely related, in many respects : slightly greater size; more elongated pronotum with the lateral keels of the pronotum less divergent posteriorly and with the dorsal plane of the pronotum flatter and not distinctly uptilted in the posterior part as in *palpalis*. Tegmina dark mahogany brown and not pale yellowish brown as in *palpalis*. Caudal femora lacking the external teeth on the inferior keels possessed by *palpalis* and with fewer internal ones. Cerci with the apical tooth bluntly pointed and not acute as in *palpalis*.

Palpalis also possesses a slight denticulate area on the lower internal surface of the cercus. As only mature female nymphs are available it is not possible to give any female comparisons but the spination characteristics on the caudal femora holds in both sexes. In addition there are other minor features contrasting the two species.

Type — ♂, Kwangtung, S. China, Lo Ba vicinity, First Division of Che Hing District, June 30, 1936 (Tsz HAI, Collector).

Measurements in millimeters: body length 32.0; pronotum $12.7 \times 6.8 \times 4.8$ min.; tegmina 12.5×6.0 wide and 6.5 deep; hind femora 32.0×5.2 . Type deposited in the TINKHAM Collection.

Description : — Head typical; antennae almost twice the body length. Pronotum almost flat above with a “v” shaped suture centrally placed and with a slightly tectate median area on the posterior half of the metazona. Lateral keels slightly constricted in front of the “v” shaped suture; the keels of the metazona gently divergent caudally but not as much as observed in *palpalis*. Lateral lobes of the pronotum typical. Tegmina large and covering two-thirds of the abdomen.

Leg spination as follows: Forelegs with the femora bearing 2 small teeth on the lower internal keel; fore tibiae with 6 pairs of strong spines on the lower keels and three external spines, one apical, one on the distal portions of the conchate tympana, and one intermediate. Mesofemora with 2-3 teeth on the lower external keel; 6 pairs of strong spines ventrally and 2 external and 4 internal spines on the dorsal surface of the mesotibiae. Caudal femora typical with the basal third strongly swollen to contain the saltatorial muscles; lower external keel without teeth, lower internal keel with 4-5 teeth. Caudal tibiae with 22-24 external and 19-22 internal spines on the dorsal surface and 12 external and 8-9 internal widely spaced smaller spines on the ventral surface of the caudal tibiae.

Ultimate abdominal segment with a triangularly shaped supraanal plate possessing a median circular emargination. Subgenital plate with a small deep “U” shaped incision between the apical styli. Cerci short and stout, strongly constricted with the apical fourth abruptly incur-

ved and with a bluntly pointed tooth. Subapical tooth less prominent than in *palpalis* and without a trace of a blunt tooth on the internal inferior edge of the cerci as observed in the latter species.

Coloration : — darker than *palpalis*. Genae, lower half of the lateral lobes, fore and middles legs and upper half of the caudal femora, testaceous colored. Dorsum of head, pronotum and abdomen and all tibiae darker and more reddish brown. Upper portions of the lateral lobes below the lateral keels of the pronotum dark shining verona brown in front and shining black below the metazonal keels; the dark areas occupying more than half the lateral lobes with a pale central area extending almost to the upper margin. Tegmina mahogany brown. Lower outer portions of the basal half of the caudal femora shining dark blackish brown, especially ventrad of the straight median line on the outer pagina and slightly paling towards the inferior keel. Antennae dark reddish brown.

Paratype : — 1 ♂, Kwangtung, S. China Tai Tit Shan (Big Iron Mt.), First division of Che Hing District, June 13, 1936 (Tsz HAI). Measurements in millimeters : body length 31.5; pronotum 13.0×7.0; tegmina 18.0×6.0 wide ×7.0 deep; hind femora 32.0×4.5 mms. Paratype in the TINKHAM Collection. Paratype similar to the Type in every respect.

In addition the writer possesses the following immature material from the same area as the types : 1 small ♀, Siu Tit Chai Mt. June 3, 1936; 1 large ♀ Siu Tit Chai Mt., June 4, 1936; 1 large ♀, Yau Loh Woh Mt., June 6, 1936; 1 large ♂ Che Tsai Tung Mt., June 8, 1936; 2 mature ♂ nymphs, Chi To Woh Mt., June 7, 1936; 2 mature ♂ nymphs, Chau Chuk Shan, June 17, 1936.

At present this large new species *Atlanticus kwangtungensis* is known only from the mountainous districts of northern Kwangtung province of south China.

Atlanticus ussuriensis UVAROV

1926. *Atlanticus ussuriensis* UVAROV. Ann. Mag. Nat. Hist. 9, 18: 276 (Ussuri prov.).
1927. *Paradrymadusa siberica* CAUDELL. Proc. U.S. Nat. Mus. 71, art. 7, pp. 1-7, 2 figs (Kongaus, Siberia).
1930. *Paradrymadusa ussuriensis* TARBINSKY. Zool. Anz. 91: 325.
1931. *Atlanticus ussuriensis* BEY-BIENKO. Bol. Soc. Esp. Hist. Nat. 31: 673.
1939. *Atlanticus ussuriensis* UVAROV. Ann. Mag. Nat. Hist. 11, 4: 136.

This small species was described by UVAROV, in 1926, and as *Paradrymadusa siberica* by CAUDELL, in 1927. Later in 1930 TARBINSKY removed it to the genus *Paradrymadusa*. However, in 1931, BEY-BIENKO placed it again in the genus *Atlanticus* stating that "*Paradrymadusa* is Mediterranean in its origin and therefore its occurrence in the Far East is improbable." Again, in 1939, UVAROV, questioned TARBINSKY's placement saying that "*ussuriensis* agrees in every respect with the characters of *Atlanticus* as given by REHN and HEBARD... and differs strikingly from *Paradrymadusa* in the strongly developed pronotal carinae of the shape highly typical for *Atlanticus*. The male cercus of *A. ussuriensis*, which is considered by TARBINSKY as typical for *Paradrymadusa* is actually very close to that in *A. palpalis* REHN and HEBARD, from China."

I have not seen any specimens of this species but from the character of the cercus would appear to be a member of the *Palpalis* group, where I am placing it.

Atlanticus ussuriensis UVAROV is known from the Spassky District in South Ussury region (UVAROV); Kongaus, Siberia (CAUDELL) and Mt. Peikto in northern Korea (BEY-BIENKO).

Atlanticus hoffmanni n. sp.

(Pl. I, fig. 5; II, 7; III, 15, 16, 17, 18, 19)

A medium sized species of the *Palpalis* group distinguished by its cercus, tegmina about the length of the pronotum, short and stout recurved ovipositor and other features as well. From *palpalis* and *kwangtungensis* n. sp. it is distinguished by its smaller size, almost bi-pronged cercus, short tegmina and short and recurved ovipositor. From *ussuriensis* UVAROV it differs by its larger size, short and recurved ovipositor which in *ussuriensis* is long and very gently decurved and from the other Asiatic species it is easily recognized by its peculiar cercus.

Type — ♂, Fu-chau (Foochow), Fukien prov., S. China, altitude 2500 feet, Sept. 2, 1921 (C. R. KELLOGG).

Measurements in millimeters: body length 26.0; pronotum $9.5 \times 5.0 \times 3.2$ min; tegmina 10.5×4.0 wide $\times 5.0$ deep; hind femora 29.5×4.8 mms. Type of this unique male is in the HEBARD Collection at the Academy of Natural Sciences at Philadelphia.

Description : — Head typical. Pronotum with the dorsal plane flat with a trace of a broad "V" shaped suture with sigmoid sides just cephalad of center. Lateral keels sharply defined converging gently forward from the evenly rounded posterior margin, then suddenly expanded at about 1.5 mms. caudad of the anterior margin, to meet the anterior margin which is very slightly concave in the center. Lateral lobes deep, typical, the lateral keels of the pronotum, viewed laterally, dipping downwards to meet the fore margin where the expansion occurs; the lobes when viewed from above practically straight sided and aslant outwards to a slight degree. Tegmina about the length of the pronotum, slightly deeper than broad, the right dorsal margin of the uppermost tegmen straight and slightly undulate running transversely to the apex; tegmen prominently veined.

Spination of legs : fore legs with fore femora bearing two small black appressed teeth on the internal inferior keel; fore tibiae with 6 pairs of long acute ventral spines and 4 external dorsal spines, the basal one on the distal portions of the conchate tympanum. Middle legs with the meso-femora with the external inferior keel only with 1-2 small black teeth; meso-tibiae with 6 pairs of ventral spines and two external and 4 internal evenly spaced spines, the two external paired with the two internal intermediate ones. Caudal femora with 3-5 small black teeth on the internal inferior keel. Caudal tibiae with 27-28 external and 22-24 internal teeth on the dorsal surface (the underside if the leg is folded) and 12 small external and 9-10 internal spines on the ventral surface.

Genitalia with the supra-anal plate with an arcuate emargination in the center and with slightly concave sides; subgenital plate with a "v" shaped excision between the styli. Cercus short and stout with the apical tooth stout, acute, and abruptly incurved, the internal tooth immediately below the apical one.

Coloration : — general one dark greyish brown with the face darker and with a small circular spot of buff just below the fastigium. Pronotum dark greyish, the areas just below the lateral carinae on the lateral lobes of the pronotum shining dark brownish black and covering two-thirds of the lobes; the remainder dark purplish grey with a central invasion extending upwards to almost touch the lateral carinae. Tegmina dark brownish, the radial veins at the base dark, dull, brownish black, with the costal margin, especially basad, yellowish white. Hind margin, dorsally, with a buffish patch of finely reticulate cells. Legs dark greyish, the femoral teeth shining black and appressed or strongly aslant; the tibial spines pale colored. Outer pagina of the caudal femora with the typical median line on the swollen basal half of the femora, below which is a narrow

margin of dark verona brown paling ventrad. Four or 5 irregularly shaped small spots of dark brown lie above this line at about the basal two-fifths.

Allotype : — ♀, Lingnan University, Canton, Kwangtung prov., S. China, May, 1933 (Miss. KOA PEI LAN).

Measurements in millimeters : body length 27.0; length to tip of ovipositor 42.0; pronotum 10.5×5.7 ; tegmina 5.0 along costal margin projecting dorsally 2 mms beyond the pronotum; hind femora 28.0×5.5 ; ovipositor 18.0×1.5 mms. Allotype in the Collection of the Lingnan Natural History Survey and Museum.

Description : — Head typical. Pronotum of identical conformation to the Type but slightly larger, the suture broadly "V" shaped with straight sides and the tectate median carinal area of the posterior part of the metazona slightly more prominent than in the Type. Lateral lobes similar to ther Type but slightly larger. Tegmina surpassing the posterior margin of the pronotum by 2 mms.

Leg spination as follows : fore femora with 1-2 small black teeth on the internal inferior keel; fore tibiae with 6 pairs of strong ventral spines and 4 external dorsal spines, the basal one on the distad area of the tympanum. Mesofemora with 1-2 external teeth on the inferior keel; mesotibiae with 6 pairs of ventral spines and 2 external and 4 internal spines on the dorsal surface. Caudal femora with 4-5 small teeth on the internal inferior keel. Caudal tibiae with 25-27 external and 25 internal teeth on the dorsal surface and 11-12 external and 10-12 internal small widely spaced spines on the ventral surface.

Ovipositor short and stout, recurved, the obliquely truncate apex of the dorsal valvulae equal to but not surpassing the apices of the caudal femora. Supra-anal plate with a concave emargination; subgenital plate with almost a right-angle excision.

Coloration : — face, sides of the pronotum and thorax pale buffish orange. Abdomen more purplish brown with isolated flecks of brown along the posterior margins of each abdominal segment. Lateral margins of the fastigium and the basal segments of the antennae edged with piceous; remainder of the antennae reddish brown.

Dorsum of the pronotum pale reddish brown in the anterior two-thirds; the posterior third dark reddish brown. Lateral lobes margined with shining dark verona brown below the lateral keels, with the central median areas brownish and merging into the broad pale buffish orange band bordering the anterior, inferior and posterior margins of the lateral lobes. Tegmina reddish brown with the radial area darker and the costal margin buffish. Below the anterior margin of the small tegmina there is a patch of dark verona brown on the meso and metathoracic segments. Fore and middle legs pale, darkened dorsally on the fore femora and apically on the meso femora; fore tibiae dark; meso tibiae darkened apically. Caudal femora pale with the typical median longitudinal line on the outer pagina which is brown, but little brown extending ventrad as in the other species and with flecks of brown dorsally at the base of the femora. Caudal tibiae dark. Ovipositor medium colored.

The Types are unique. It is a great pleasure to name this interesting new species in honor of Professor WM. E. HOFFMANN, Director of the Lingnan Natural History Survey and Museum of Lingnan University, Canton, China, who unquestionably has done more for the advancement of Entomology in south China than any other man.

Atlanticus hoffmanni n. sp. is at present known from the hills around Foochow, Fukien, and from Lingnan University, Canton, China. It appears to be a rare species of the grasslands inhabiting the northeastern limits of the Indo-chinese subregion in south China.

Pieli Group

At present the *Pieli* group is known from two new species taken on Tien Mu Shan in Chekiang and Kuling mountain in Kiangsi. The group is characterized by their moderately large size, rather large tegmina larger than the pronotum, almost straight acuminate cerci with a median uncinata internal tooth, short recurved ovipositor and other minor features as well.

Atlanticus pieli n. sp.

(Pl. I, fig. 6; II, fig. 5; III, figs. 20, 21, 22, 23, 24)

1936. *Gampsocleis* sp. TINKHAM. Ling. Sci. Jour. 15 (2) : 214 (Hupeh).

Distinguished from other Asiatic species by the straight acuminate cerci bearing a small internal median uncinata tooth, the darkly veined tegmina, the deep "U" shaped emarginated supra-anal plate and other minor features.

Type : — ♂, Tien Mu Shan, Chekiang Prov., August 5, 1936 (O. PIEL).

Measurements in millimeters : body length 27.0; pronotum $9.3 \times 5.5 \times 3.2$ min; tegmina $14.0 \times 5.7 \times 4.4$ deep; hind femora 26.0×4.5 mms. Type in the Heude Museum, Aurora University, Shanghai, China.

Description : — head typical. Pronotum flat with a median "V" shaped suture with sigmoid shaped sides and a faint trace of a tectate ridge on the posterior portions of the metazona. Lateral carinae well rounded and not sharply angled as in *hoffmanni* which is closely similar in shape and size of the pronotum. Lateral carinae typically constricted in front of the suture and diverging gently caudad and rounding into the moderately arcuate posterior margin of the pronotum. On the front of the prozona the keels curve gently outwards as is typical for *Atlanticus*. Lateral lobes of the pronotum typical. Tegmina slightly

greater than the length of the pronotum and quite typically formed.

Leg spination as follows: femora with 2 small black teeth on the internal inferior keel; fore tibiae with 6 pairs of long acute ventral spines and 4 external dorsal spines, the basal one on the distal portions of the conchate tympanum, the third quite small and subapical. Mesofemora with only one external inferior tooth; mesotibiae with 6 pairs of ventral spines and 2 outer and 4-5 inner spines on the dorsal surface. Caudal femora with 4-5 small black teeth on the lower internal keel. Caudal tibiae with 22-24 external and 22 internal dorsal teeth and 12 external and 8 widely spaced small internal spines on the ventral surface (leg in the extended position).

Supra-anal plate triangular with a deep "U" shaped emargination in the center; subgenital plate with a broad and deep "V" shaped excision between the apical styli. Cerci straight, acuminate to the acute apex, with a median internal uncinata tooth on the upper margin.

Coloration : — dark; face dark greyish, antennae dark reddish brown. Pronotum dark reddish brown above; lateral lobes shining dark verona brown just below the lateral carinae; the inferior margins broadly pale buffish brown with a central invasion extending into the dark brown. Tegmina blackish red, laterally with the costal margin narrowly pale; dorsal surface medium brown with the veins dark reddish brown. Abdomen medium reddish brown. Forelegs quite dark, middle legs paler with the basal areas surrounding the pale colored spines piceous. Caudal femora pale buffish brown with a broad band of verona brown below the median line on the basal half of the outer pagina which has an equally broad band of pale buffish brown. Dorsal surface of the hind femora somewhat darkened with the dorsal basal area dark brownish and with 2-3 small brown spots just dorsad of the median line at about the basal third of the femora. Caudal tibiae

pale with spots of piceous at the base of the sparsely spaced teeth on the ventral side, the tibiae in the extended position. All femoral teeth shining black; all tibial spines pale, those on the fore and mesotibiae the longest.

Allotype : — ♀, same data as the type, collected Aug. 1, 1936 (O. PIEL).

Measurements in millimeters : body length 25.0; length to tip of ovipositor 41.0; pronotum 9.2×4.5 ; tegmina with costal margin 4.0 and projecting 1.5 mms behind the pronotum; caudal femora 27.0×4.6 ; ovipositor 18.5×1.4 mms. Allotype in the Heude Museum.

Closely similar to the female of *hoffmanni* n. sp. but slightly smaller in size, pronotum smaller with less defined lateral keels and median carinal area on the metazona, and the caudal femora less strongly tumid in the basal third than in *hoffmanni*. Differs from *changi* n. sp. by ist slightly smaller size, shorter pronotum and shorter ovipositor.

Description : — head typical. Pronotum as in the Type and only a shade narrower in the maximum metazonal breadth. Tegmina small and surpassing the posterior margin of the pronotum by 1.5 mms.

Leg spination as follows : fore legs identical to the Type; mesofemora with 0-2 outer teeth on the inferior keel; mesotibiae as in the type. Caudal femora with 5 small black teeth on the lower internal keel. Caudal tibiae with 21-23 external and 21-23 internal teeth on the dorsal surface with 11-12 external and 9 fine internal spines on the ventral surface.

Ovipositor moderately short and stout, recurved with the dorsal valvulae obliquely truncate at the tip which approximates the apices of the caudal femora. Supra-anal plate with a slight triangular excision; subgenital plate with a slight emargination giving the appearance of a bilobed structure.

Coloration paler on the dorsum of the head and pronotum but otherwise essentially as in the Type.

Paratypes : Males — 2 ♂ same data as the Type and collected Aug. 4, and June 24, 1936 (O. PIEL). 1 ♂, Shanghai, Kiangsu prov., June 23, 1930 (O. PIEL). 1 ♂, Hupeh prov., Tai Ho Po, 13 miles NW. of Hwangmei, Hwang-mei Dist., Aug. 1933 (Y. W. DJOU) (Lingnan Natural History Survey and Museum; head and front part of the pronotum devoured by a large mantis *Paratenodera aridifolia sinensis* preying upon it). Range in measurements in millimeters in male Paratypes: body length 23.0 — 25.0; pronotum 8.8×5.2 — 9.2×5.3 ; tegmina $13.0 \times 4.5 \times 4.8$ deep — $14.0 \times 5.5 \times 4.8$; hind femora 26.0×4.5 — 27.0×4.8 mms. Paratypes in the HEUDE, TINKHAM and Lingnan Natural History Survey and Museum Collections.

Females: 1 ♀, same data as the Allotype. Measurements in millimeters: body length 27.0; length to tip of ovipositor 43.0; pronotum 9.8×5.5 ; tegmina with costal margin 4.0 and projecting 3.0 mms behind the posterior margin of the pronotum; hind femora 29.0×4.8 ; ovipositor 20.5 mms. Paratypes similar to the Types in every respect.

It is a privilege to name this interesting new species of central China in honor of Rev. Pere O. PIEL, Director of the Heude Museum of Aurora University in Shanghai, who has labored through the years to further the cause of Entomology in central China.

Atlanticus pieli n. sp. is at present known from Tien Mu Shan in Chekiang province, Shanghai in Kiangsu province and from Tai Ho Po in the vicinity of Hwangmei in northeastern Hupeh. The species inhabits the grasslands apparently at low elevations.

Atlanticus changi n. sp.

(Pl. I, fig. 4; II, fig. 8; III, figs. 25, 26, 27, 28, 29)

Most closely allied to *A.ieli* n. sp. from which it differs in the following respects: slightly greater size, considerably larger tegmina, larger and broader pronotum, slenderer cerci, lighter coloration especially of the tegmina, spination of legs, the longer ovipositor and in other minor details. From *magnificus* n. sp. by the much narrower pronotum and tegmina and the form of the cerci; from *hoffmanni* by the greater size, larger tegmina and the shape of the cerci.

Type : — ♂, Kuling Mt., Kiangsi, Sept. 13, 1934 (O. PIEL).

Measurements in millimeters: body length 26.0 (abdomen deflexed) about 30.0 in normal position; pronotum $10.5 \times 6.3 \times 3.8$ mm; tegmina $17.0 \times 7.0 \times 7.0$; hind femora 29.0×5.0 mm. Type in the Heude Museum.

Description : — head typical for *Atlanticus*. Pronotum flat above with a broad "U" shaped suture almost in the middle. Lateral keels rounded, laterad of the suture almost parallel and expanding immediately behind the fore margin to reach that margin and abruptly amplify posteriorly, laterad of the bottom of the "U" shaped suture, to continue caudad moderately diverging to round into the arcuate posterior margin of the pronotum. Lateral lobes typical. Tegmina large, greater than the length of the pronotum and moderately broad and deep.

Leg spination as follows : — fore femora with only one small internal tooth on the inferior keel; fore tibiae with 6 pairs of ventral spines and 4 external dorsal spines, the basal one on the distal areas of the tympanum, the other three beyond the middle and evenly spaced. Mesofemora with 1-2 small external teeth on the inferior keel; mesotibiae with 6 pairs of ventral and 2 external and 4 internal spines

on the dorsal surface. Caudal femora with only 2 small internal teeth on the inferior keel. Caudal tibiae with 21-23 external and 18-19 internal dorsal teeth and 9 small widely spaced external and 10 internal spines on the ventral surface. Supra-anal plate with a deep "U" shaped excision and a smaller one between the apical styli of the subgenital plate. Cerci straight, of even width to the small internal median uncinata tooth, then abruptly acuminate to the acute apex.

Coloration : — Head, thorax and abdomen reddish brown with the upper portions of the lateral lobes below the lateral carinae of the pronotum dark shining verona brown with the lower marginal areas typically pale. Central portions of the meso- and metathoracic segments just ventrad of the costal margin of the tegmina with a patch of dark brown. Tegmina pale yellowish brown similar to that in *palpalis* with the veins dull yellowish. Basal radial area between the radial and subcostal veins dark reddish brown or almost piceous. Legs dark purplish grey, the fore tibiae almost piceous, the mesotibiae with piceous areas at the base of the spines. Caudal femora with the typical median line on the outer swollen basal half of the femora, below which is dark verona brown paling to yellowish brown on the ventral margins; above pale yellowish with darker impunctations on the dorsal surface and with 2-3 small brownish spots just above the median line at about the basal third.

Allotype : — ♀, same data as the Type but collected July 7, 1935 (O PIEL).

Measurements in millimeters : body length 29.0; length to tip of ovipositor 47.0; pronotum 10.0×5.0; tegmina, costal margin 3.0, barely visible from above; caudal femora 29.0×5.0; ovipositor 21.5×1.7 mms. Allotype is unique and deposited in the Heude Museum.

Description : — head typical. Pronotum narrower than the Type, the lateral carinae showing the same cons-

triction immediately caudad of the fore margin of the pronotum, thence slightly divergent to the metazona where the lateral keels are almost parallel, rounding posteriorly into the evenly rounded hind margin of the pronotum. Lateral lobes typical. Tegmina very small and barely visibly from above.

Leg spination as follows: — fore femora with 2-3 internal teeth on inferior margin; fore tibiae as in the Type. Mesofemora with 1-2 external teeth on the inferior keel; mesotibiae as in the Type. Caudal femora with 5-6 internal teeth on the interior keel. Caudal tibiae with 24-26 external and 22 internal dorsal teeth and 12 external and 9-10 widely spaced weak small spines on the ventral side. Ovipositor moderately long, recurved, with the dorsal valvulae obliquely truncate at the apex which surpasses the apices of the hind femora by approximately 5 mms. Supra-anal plate weakly triangular with a shallow arcuate excision; subgenital plate with a shallow median emargination.

Paratype : — 1 ♂, Lushan, Kiangsi, July 27, 1932 (O. PIEL). Measurements in millimeters: body length 30.0; pronotum 10.5×6.5 ; tegmina $16.5 \times 7.0 \times 5.5$; caudal femora 28.0×5.0 mms.

Paratype slightly larger with the tegmina more reddish brown; otherwise closely similar to the Type.

The writer names this fine species in honor of Dr. KWANG-SO FRANCIS CHANG, of the Department of Biology of St. John's University in Shanghai, who has already considerably advanced our knowledge of the Orthoptera of Central and western China.

Brunneri Group

This group is characterized by its medium size, small tegmina and long forcipate cercus; the internal uncinat tooth basal in portion and the long attenuate apical arms

gently incurved distally. Caudal femora with no external teeth on the inferior margin. At present, only *A. brunneri*, is known in this group with distribution in eastern Siberia.

Atlanticus brunneri (PYLNOV)

(Pl. III, fig. 37)

1914. *Amuria brunneri* PYLNOV. Rev. Russe Ent. 14: 110
 1926. *Atlanticus brunneri*. UVAROV. Ann. Mag. Nat. Hist. (9) 17: 274-291, 8 figs. (redescribed).

I have examined a male of this interesting species in the Collection of the Academy of Natural Sciences of Philadelphia. At present this interesting species has been found only in eastern Siberia.

Sinensis Group

The members of this group as known at present are small species, with small tegmina and the ovipositor in the female is long and slender and distinctly recurved. The cerci in the male sex are short and stout with a strong median internal tooth; the apices of the cerci slightly incurved. The caudal femora bears teeth on both the internal and external inferior margins. At present *A. sinensis* is the sole member of this group although when the male of the new species *grahami* is discovered it is possible that that species may be placed here.

Atlanticus sinensis UVAROV

(Pl. III, fig. 36)

1923. *Atlanticus sinensis* UVAROV. Trans. Ent. Soc. London, p. 512, figs. (Shense).
 1933. *Atlanticus sinensis* UVAROV. Ark. Zool. 26: 4 (S. Kansu, Szechwan).
 1933. *Atlanticus sinensis* WILLEMSE. Ov. uit het Nat. Maandblad, 22 : 18 (Szechwan).
 1935. *Atlanticus sinensis* CHANG. Notes d'Ent. Chinoise, 2 (3) : 64 (Index).

In my studies I have been able to examine a Paratype male and female in the Collection of the Academy of Natural Sciences in Philadelphia. The supra-anal plate in the male paratype has a deep narrow "U" shaped emargination in the center. The female ovipositor is long and slender and distinctly recurved; its narrowest breadth about the middle of the ovipositor. No measurements were taken of the Paratypes at the time of examination in 1937. The female supra-anal plate bears a broad "V" shaped notch and the subgenital plate has a small "V" shaped excision or cleft. *A. sinensis* is a small species with small wings and at present is known from Shense, southern Kansu and northeastern Szechwan provinces. The type locality is Taipaishan in Shense province. There is a possibility that the specimens recorded from Chungking, Szechwan, by C. WILLEMSE, in 1933 represents *A. grahami* n. sp. but until his specimens have been examined their identity can only be guessed at.

Kulingensis Group

The members of this group are large species with very short tegmina, in length about half that of the pronotum. The pronotum is strongly constricted in the anterior third and the lateral carinae quite strongly divergent in the posterior two-thirds, especially in the male sex. The cerci are long and forcipate, with the apical arm strong, attenuate and gradually incurved with the internal tooth large and placed proximad of center. *A. grahami* n. sp. because it appears to be nearest the female of *kulingensis* n. sp., it placed temporarily in this group but not until the male has been discovered can its true placement be attempted.

Atlanticus kulingensis n. sp.

(Pl. I, fig. 7; II, fig. 6, III, 30, 31, 32, 33, 34)

A moderately large species quickly recognized by the short tegmina in the male, the strongly constricted lateral carinae of the pronotum in the anterior third; the rather

short pronotum; the peculiar cerci; the short caudal femora and the long recurved rather slender ovipositor in the female.

Type : — ♂, Kuling Mt., Kiangsi prov., Aug. 12, 1935 (O. PIEL).

Measurements in millimeters : body length 27.0; pronotum 9.0×5.8 max. $\times 2.8$ min; tegmina $6.0 \times 4.0 \times 3.0$; hind femora 25.5×4.8 mms. Type in the Heude Museum.

Description : — head typical. Pronotum shorter than the average with a central "V" shaped suture on the dorsum which is not well defined and with a transverse groove in the anterior sixth, transecting the lateral but not the median carinae. Pronotum strongly constricted in the anterior third; the lateral carinae well rounded and converging strongly from the anterior margin to the wings of the "V" shaped suture then diverging strongly to the metazona where the carinae are gently divergent to round evenly into the weakly convex posterior margin of the pronotum. Lateral lobes of the pronotum typical. Tegmina very short approximately half the length of the pronotum, the posterior portion convex with a reticulation of many poorly defined veins.

Leg spination as follows : fore femora with 2-3 teeth on the internal inferior keel; foretibiae with 6 pairs of ventral spines and only three external dorsal spines, the basal one on the distal areas of the conchate tympanum, the others apical and intermediate. Mesofemora with 0-1 external tooth on the inferior keels; mesotibiae with 6 pairs of ventral spines and 2 external and 4 internal dorsal spines. Caudal femora with 1-3 external and 4-5 internal teeth on the lower margins. Caudal tibiae with 24-26 external and 21-23 internal dorsal teeth and 12 external and 10 internal small weak spines closely appressed.

Supra-anal plate rounded with a narrow deep "U" shaped emargination; subgenital plate with a broad "U"

shaped excision between the apical styli. Cerci forcipate and moderately long, heavy in the basal third to the strong unciniate tooth, then rapidly narrowed and gently incurved in the apical third.

Coloration : body coloration dark, perhaps due to discoloration in the preserved specimen. Pronotum with the lateral lobes typically marked with shining dark brown below the lateral carinae and a pale buffish area along the inferior margins. Tegmina dark reddish brown along the lateral and stridulating areas with dark reddish veins; the dorsal posterior areas caudad of the strong transverse veins, finely reticulate with cells and dull yellowish in color with yellowish veins. Fore and middle legs dark. Caudal femora with a broad band of dark verona brown below the median line on the outer pagina of the basal half of the femora; the lower margins pale yellowish brown; the portions above the median line pale yellowish brown darkening on the dorsal surface with 3-4 spots of brown just above the median line in the basal two-fifths. There are also brown spots on the dorsal surface at the extreme base of the caudal femora.

Allotype : — ♀, same data as the Type.

Measurements in millimeters : body length 32.0; length to tip of ovipositor 52.0; pronotum 9.5×5.2 max.; tegmina with costal margin 1.5 mms, not visible from above; hind femora 20.0×5.0 ; ovipositor 25.0×1.6 in median width. Allotype in the Heude Museum.

Female distinguished from other females of the recurved ovipositor type by its greater length and only 3 external dorsal spines on the foretibiae; from the closely related *grahami* n. sp. by its lighter coloration, distinctly slenderer ovipositor, narrower pronotum and fewer and smaller external teeth on the lower margin of the caudal femora.

Description : — head typical; pronotum quite similar to the Type but slightly less constricted in the anterior third. Tegmina minute and not visible from above.

Leg spination as follows : forefemora with 2-3 small internal inferior teeth; fore tibiae with 6 pairs of ventral spines and 3 external dorsal ones, arranged as in the Type. Mesofemora and mesotibiae as in the Type. Caudal femora with 1-3 external and 2 internal small teeth on the lower margins. Caudal tibiae with 23-26 external and 22-23 internal dorsal teeth and 12-13 external and 9-10 internal small appressed spines on the ventral side. Ovipositor long, moderately slender, and recurved, surpassing the apices of the caudal femora by about 10 mms.; apex of dorsal valvulae very obliquely truncate. Supra-anal plate with a slight emargination; subgenital plate with a moderate "V" shaped excision.

Coloration : — face, lower portions of the lateral lobes and thorax buffish brown. Dorsum of pronotum and abdomen reddish brown. Upper two-thirds of the lateral lobes of the pronotum shining medium verona brown. Fore and middle legs dark mottled purplish grey. Caudal femora with a narrow median stripe of shining dark verona brown on the basal half of the outer pagina; buffish below to the lower margin and buffish above darkening to greyish on the dorsal surface. Apical half of the caudal femora, caudal tibiae and ovipositor mottled dark purplish grey.

Paratypes : — 1 ♂, Haichow, Kiangsu prov., July 6, 1926 (O. PIEL). Measurements in millimeters: body length 31.5; pronotum 10.6×6.5 ; tegmina $6.0 \times 4.5 \times 3.0$ deep; hind femora 29.5×5.0 . Paratype male in the TINKHAM Collection. Paratype larger than the Type and paler colored. Pronotum with the keels and sutures less defined and with slight variations in the leg spination. Upper portions of lateral lobes lacking the shining brown areas but this may be due to bleaching and discoloration. Otherwise paratype quite similar to the Type.

Paratype : — 1 ♀, same data as the Allotype : Measurements in millimeters : body length 27.0; to tip of ovipositor 48.0; pronotum 10.0×5.5 ; hind femora 29.0×4.7 ; ovipositor 23.0×1.6 mms. Paratype lighter colored, abdomen somewhat shrunken, decreasing several of the body measurements, but otherwise closely similar to the Allotype.

Atlanticus grahami n. sp.

(Pl. II, fig. 3; III, fig. 35).

A large species, known from the female only, most closely allied to *A. kulingensis* n. sp. from which it is distinguished by the very heavily constructed recurved ovipositor; the 4 large teeth on the external inferior keel of the caudal femora; broader pronotum; rougher dorsum of the pronotum and more punctate dorsal surface of the caudal femora serve to separate this species from its near relative *kulingensis*. From *magnificus*, *kwangtungensis* and *palpalis* it differs by the heavy long recurved ovipositor; from *hoffmanni*, *pieli* and *changi* and *sinensis*, by larger size, longer and heavier ovipositor and from all (but *sinensis*) by possessing 3 and not four external dorsal spines on the foretibiae.

Type : — ♀, Kwanhsien, Szechwan prov., western China, Aug. 8, 1930 (D. C. GRAHAM).

Measurements in millimeters : body length 32.0; length to tip of ovipositor 54.0; pronotum 10.5×6.2 max. $\times 3.5$ min.; tegmina with costal margin 2.5, not visible from above; hind femora 30.0×5.0 ; ovipositor 24.0×2.0 in median width mms. Type in the United States National Museum.

Description : head typical. Pronotum with lateral keels strongly constricted in the anterior third where the plane of the pronotum, seen in profile is slightly swollen. Lateral keels on the metazona only slightly subparallel. La-

teral keels, from the side, slightly arched upwards in the anterior, then descending at a considerable angle to the anterior margin. Lateral lobes typical. Tegmina minute, not visible from above.

Leg spination as follows : forefemora with 3 small black internal teeth on the inferior margin; foretibiae with 6 pairs of long pale acute spines ventrally and with 3 external dorsal ones. Mesofemora with 0-1 external inferior teeth; mesotibiae with 6 pairs of ventral spines and 2 external and 4 internal dorsal spines, the two external paired with the two intermediate internal spines. Caudal femora with four large black external and 5-6 large internal teeth on the inferior margins. Caudal tibiae with 21-24 external and 20 internal dorsal teeth and 11-12 external and 9-10 internal small, widely spaced, appressed spines.

Ovipositor strong, heavy and long, recurved, surpassing the apices of the caudal femora by more than 5 mms. Supra-anal plate with a small, deep, narrow "U" shaped notch; subgenital plate with a moderately large "V" shaped excision.

Coloration : — darker than the other species of *Asiatic Atlanticus*. Face dark mottled, with a small circular spot of white just below the fastigium. Pronotum with the dorsum dull and dark; lateral lobes shining dark blackish brown below the metazonal keels with a small patch of buffish in the central portions of the posterior margin at the slight concavity; remainder of the lobes mahogany brown. Fore and middle legs dark. Caudal femora dark purplish grey, darker above on the dorsal surface and with areas ventrad of the median line dark shining verona brown which extends almost to the lower margin. Caudal tibiae and ovipositor dark reddish grey.

Paratype : — 1 ♀, same data as the Type but collected July 11, 1928. Measurements in millimeters : body length 28.0; to tip of ovipositor approx. 50; pronotum 11.0×6.0; hind femora 31.0×6.0; ovipositor 24.0×2.0

mms. Paratype in very poor condition but apparently similar to the Allotype.

The Nearctic species of the genus *Atlanticus*.

The genus *Atlanticus* was described by SAMUEL SCUDDER in 1894 although three species had been earlier placed in the genera *Decticus* and *Orchesticus* by BURMEISTER and SAUSSURE. REHN and HEBARD revised the genus in 1916 and BLATCHLEY gives a good summarized account of the various North American species in his book on the Orthoptera of North-Eastern America. Of the nine Nearctic species of *Atlanticus*, *testaceus* and *americanus*, which is divided into two geographical races, are the most widely dispersed species; the others are much more restricted in their distribution. The following key is taken from BLATCHLEY after REHN and HEBARD, but rearranged in the style of the Chinese keys.

Key to the American species of *Atlanticus*

1. Disk of pronotum distinctly narrower near apical third or fourth, its margins or lateral carinae thence distinctly diverging backward, its length never twice the greatest width 2
- Disk of the pronotum not or very feebly narrowed at any point, its lateral carinae subparallel or nearly so, its length always more than twice its greatest width..... 8
2. Lateral carinae of disk of pronotum sharp, the angles very distinct; tegmina of male never completely covered by the pronotum 3
- Lateral carinae of disk of pronotum obtusely rounded, distinct only on the posterior lobe; tegmina of male almost or wholly covered by the pronotum 7
3. Subgenital plate of male angularly emarginate but never deeply and narrowly cleft; notch of subgenital plate of female V—or U—shaped, the projections each side never long and sublanceolate; cercus of male in front of tooth stout 4
- Subgenital plate of male narrowly and deeply cleft; notch of subgenital plate of female very deep, the projections each side elongate and narrowly rounded; cercus of male

- rather long, slender, subcylindrical; ovipositor with apex tapering only on upper side, the tip ventral *americanus*
4. Length of exposed portion of male tegmina more than half that of pronotum; hind femora less than twice as long as pronotum; notch of subgenital plate of female narrowly V-shaped, its side projections short, broadly rounded; ovipositor with apex tapering only on upper side, its tip therefore ventral *testaceus*
- Length of projecting male tegmina not more than one-third that of the pronotum; hind femora at least twice as long as disk of pronotum; lateral projection each side of notch of subgenital plate of female not broadly rounded 5
5. Ovipositor with apex tapering only on upper side, its tip therefore ventral; hind femora of male 19 or more mms. in length; tegmina of male with tips slightly produced *pachymerus*
- Ovipositor with apex tapering both above and below, the tip therefore median; hind femora of male less than 19 mms; tegmina of male with tips broadly rounded 6
6. Ovipositor straight; notch of subgenital plate of female very narrowly V-shaped *davisi*
- Ovipositor feebly but distinctly curved; notch of subgenital plate of female U-shaped *monticola*
7. Size large, length of body, male 26-33 mms; cercus of male elongate, tapering with a long slender curved sub-basal tooth; basal half of hind femora strongly swollen; disk of pronotum more narrow at apical fourth than at front margin *gibbosus*
- Smaller, length of body, male, less than 26 mms; cercus of male short, robust, its tooth short; basal half of hind femora much more slender; disk of pronotum not more narrow at apical fourth than at front margin *dorsalis*
8. Middle apical spur on inner margin of hind tibiae but little if any more than twice as long as the lower inner one; prosternal spines present, elongate, slender ... *glaber*
- Middle inner apical spur of hind tibiae two and a half times of more as long as lower inner one; prosternal spines absent or very short..... *calcaratus*

Atlanticus testaceus (SCUDDER) 1900

The distribution of this species is roughly outlined by the following peripheral records : Southeastern Minnesota;

Huron and Porcupine Mountains of Michigan; Arner in southern Ontario; Marion and Brookline, Massachusetts; south through Pennsylvania, Illinois, Crawford County in southern Indiana, to Tyrone and Bee Springs in Kentucky and Lane, South Carolina. Like all other species in the genus this sylvan species is restricted to the woodland plots. The destruction of large forested areas within recent times has accounted for its local yet widespread distribution. Its range roughly coincides with that of the Oak, Maple Basswood forests of the east.

2 a. *Atlanticus americanus americanus* (SAUSSURE)
1859 (Pl. I, fig. 8)

Derogatus Sc. is a synonym of this species. Racial status was established for this species by HEBARD in 1934. It is an inhabitant of the Pine and deciduous forest ranging from the vicinity of Greensboro, N. Carolina, north through Plummers Island; Delaware county, Pennsylvania; to Dedham, Massachusetts and southern New Hampshire.

2 b. *Atlanticus americanus hesperus* HEBARD 1934.

HEBARD described *hesperus*, the western race of *americanus*, in 1934. Its distribution lies principally west of the Appalachian Mountains extending from Mississippi; Bainbridge, Barnesville and Armuche, Georgia; Camp Torreya and River June in northern Florida north through Alabama (Leesburgh, Sprott, Talladega), Tennessee (Lookout Mt., Nashville, Allardt) to southern Ohio, Indiana, and Alto Pass and Thebes in Illinois.

3. *Atlanticus davisii* REHN and HEBARD 1916.

This interesting species was named in honor of Wm. T. DAVIS, noted for his studies on North American *Orthoptera* and *Cicadidae*. The range of this species is from Lake George, New York to Koekuk, Iowa; mountains of Pennsylvania, southern half of Indiana to southern Virginia. Its habitat appears to be high, rocky, thinly wooded slopes.

4. *Atlanticus monticola* DAVIS 1915.

The known range of this mountain loving species is defined by the following records : Lake Toxaway and Jones Knob, North Carolina; Clayton, Georgina and Durban, West Virginia. Its altitudinal distribution extends from 2000-to 6000 feet and REHN and HEBARD state that it is an inhabitant of the deciduous forest lying immediately below the spruce belt. This is the only American species having a distinctly recurved ovipositor in the female; whereas seven of eleven Asiatic species possess this character. *A davisii* is also the only American species dwelling in a zone of higher elevations and in this respect resembles the Chinese species, although little is known about their biology at present.

5. *Atlanticus pachymerus* (BURMEISTER) 1938.

The distribution of this rather problematical species is given by REHN and HEBARD as extending from Greensboro and Raleigh, North Carolina, to the Ozark Mountains of Arkansas. It is a sylvan species of the deciduous forest occupying the Chestnut-Oak-Poplar region of the Southern Hardwood Forests.

6. *Atlanticus gibbosus* SCUDDER 1894.

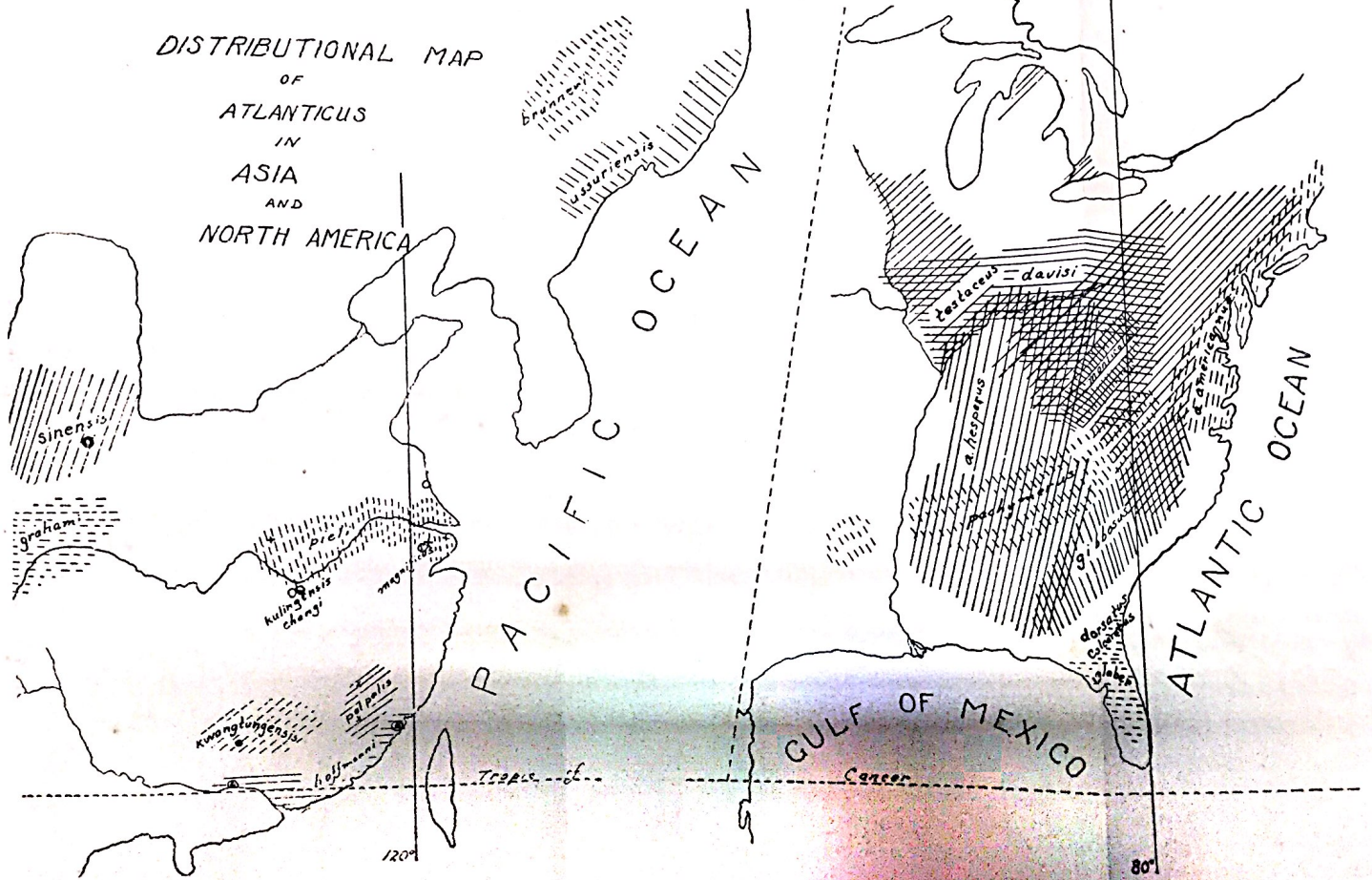
This, the largest species of the North American *Atlanticus*, possesses very powerful jaws. Its range extends from the oak and pine woods of northern Florida to North Carolina and inland to Warm Springs, Georgia, at altitudes from sealevel to 2000 feet. It appears to be indigenous to the Southeastern Pine Forest composed of Long Leaf Loblolly Pines.

7. *Atlanticus dorsatus* (BURMEISTER) 1838.

The specific status of this species is rather questionable.

It is known only from an unique male from Billy's Island and a female from Thomasville, Georgia and from Jacksonville, Florida.

DISTRIBUTIONAL MAP
OF
ATLANTICUS
IN
ASIA
AND
NORTH AMERICA



PACIFIC OCEAN

ATLANTIC OCEAN

GULF OF MEXICO

120°

80°

Tropic of Cancer

Cancer

8. *Atlanticus glaber* REHN and HEBARD 1912.

A. glaber appears to replace *A. gibbosus* in central and southern Florida, occurring as adults in the early spring in the undergrowth of the pine woods. North of Florida it has been taken only on Billy's Island, Georgia.

9. *Atlanticus calcaratus* REHN and HEBARD 1916.

This species, closely related to *A. glaber*, was described from Billy's Island, Georgia. In addition to the type locality it has been taken only at Hastings, Florida.

Summary

In this treatise, the unusual zoogeographical distribution of the remarkable genus *Atlanticus* has been revealed. This was followed by a complete treatment of the Asiatic species with the description of seven new Chinese species. Keys to the males and females of the Asiatic species have been carefully prepared and the distribution of the Neogeic species summarized with an already prepared key to the species furnished at the close.

At this moment it is possible to briefly review the chief features presented in the distribution of the Old and New World species of *Atlanticus* by referring to the double page map especially prepared for the occasion. It will be readily observed that the latitudinal land distribution of the Palearctic species is considerably more extensive than that of the Nearctic species. This is probably accounted for by the smaller land surface of the North American continent, restricted by the subtropical influence of the Gulf of Mexico on the south and the northern coniferous forests of eastern Canada on the north, strongly influenced by the boreal conditions of the ice-bound Hudson Bay. On the other hand eastern Asia is a large continental land mass unbroken by any large bodies of water and mitigated by the temperate Japan Current flowing north off the Asiatic coast. On the contrary the polar Labrador Current cools the north-

eastern shores of North America and prevents the occupation of territories by *Atlanticus* at latitudes inhabited in eastern Siberia. It will be noted that the distribution of *Atlanticus*, as known at present, is north of the Tropic of Cancer, although the mountains of southern Kwangtung and Kwangsi may eventually be found to possess species indigenous to them.

The distribution of the genus *Atlanticus* in the United States and Canada lies east of the Mississippi River, except for the presence of *A. pachymerus* in the Ozark Mountains of Arkansas, and from south of the Great Lakes to the Gulf of Mexico and southern Florida. One species *A. testaceus* ranges into the southern tip of Ontario in eastern Canada. The more extensive distribution of the Nearctic species is due to the more complete faunal exploration of this region of eastern United States. On the other hand the map reveals large land gaps existing between the isolated distribution of the Asiatic species. As time progresses and the fauna of China and Siberia becomes more completely known these gaps will be filled up by the more extensive distribution of the various species as well as by those of new species. It would appear the China is by no means exhausted of new species, despite the descriptions of seven new species, rather it would seem to be just scratched. The fact that both Tien Mu Shan in Chekiang, and Mt. Kuling in Kiangsi provinces, each possess two species of *Atlanticus*, would indicate that the mountainous areas of adjacent provinces, such as Hunan, Kweichow and Honan, must possess further new species unknown to science.

Comparing the Asiatic and North American species as two separate groups, we observe the much larger size of the Asiatic species, particularly of the Chinese species. Seven of the ten Chinese species have distinctly recurved ovipositors of various lengths whereas only one Nearctic species, *A. monticola*, has a recurved ovipositor. *Monticola* also

dwells at higher elevations in the Appalachian mountains than any of the other eight North American species. It is interesting to note that the only Asiatic species with an ovipositor gently decurved is *A. ussuriensis* of eastern Siberia and in this respect it is nearest to the eight North American species, with the exception of *A. monticola*.

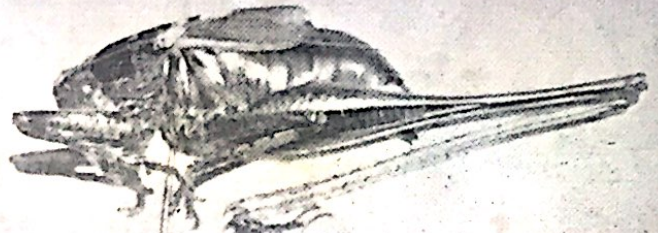
It is unfortunate so little is known about the biology and altitudinal distribution of the various species in China. It is hoped that some ardent student of Orthoptera in China will avail himself of the splendid opportunities for study in this interesting field.

Explanation of Plate I

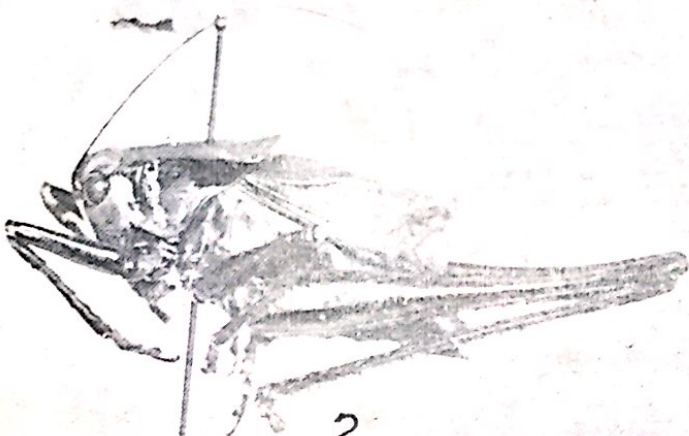
- All figures enlarged about Two and One-half Times
1. **Atlanticus kwangtungensis** n. sp. Type Male. Che Hing District, N. Kwangtung, S. China.
 2. *Atlanticus palpalis* REHN and HEBARD. Topotype. Male. Mts. bear Yenping, Fukien.
 3. **Atlanticus magnificus** n. sp. Type. Male. Tien Mu Shan, Chekiang prov., c. China.
 4. **Atlanticus changi** n. sp. Type. Male. Mt. Kuling, Kiangsi prov., central China.
 5. **Atlanticus hoffmanni** n. sp. Type. Male. Foochow Fukien, S. China.
 6. **Atlanticus pieli** n. sp. Type. Male. Tien Mu Shan. Chekiang prov., central China.
 7. **Atlanticus kulingensis** n. sp. Type. Male. Mt. Kuling, Kiangsi prov., central China.
 8. *Atlanticus a. americanus* (SAUSSURE). Male. Pine Barrens, New Jersey, North America.
-



1



5



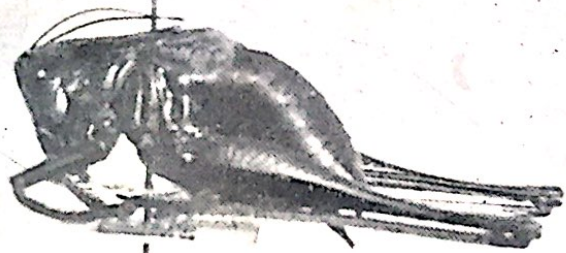
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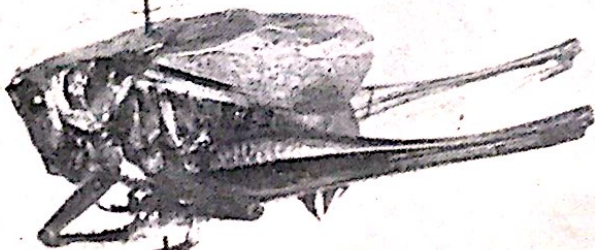
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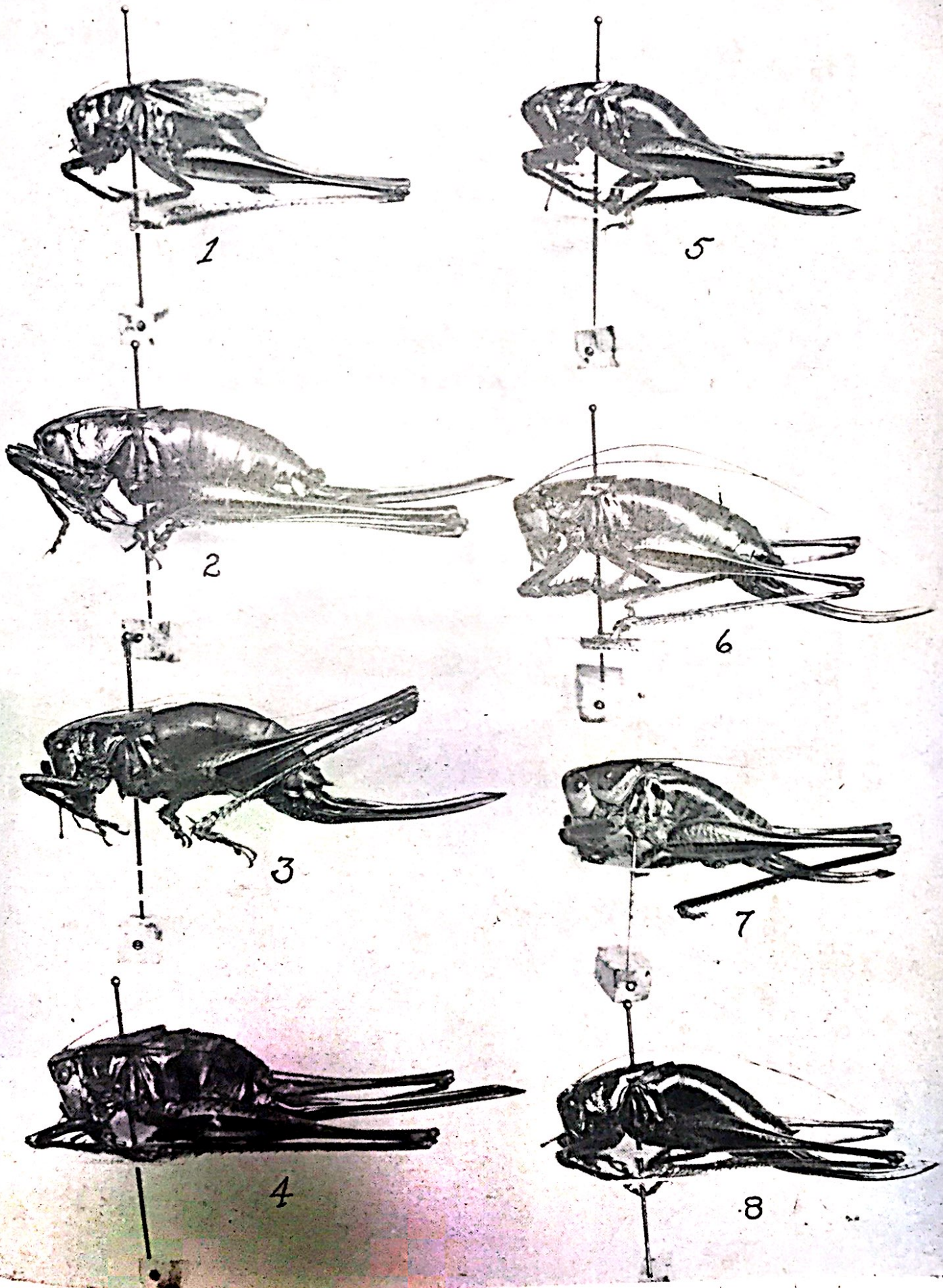


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Explanation of Plate II

All figures enlarged about two times natural size.

1. **Atlanticus pieli** n. sp. Type. Male. Tien Mu Shan. Chekiang, China.
 2. *Atlanticus palpalis* REHN and HEBARD. Topotype. Female. Yenping, Fukien, S. China.
 3. **Atlanticus grahami** n. sp. Type. Female. Kwanhsien, Szechwan, western China.
 4. **Atlanticus magnificus** n. sp. Allotype. Female. Tien Mu Shan, Chekiang, central China.
 5. **Atlanticus pieli** n. sp. Allotype. Female. Tien Mu Shan, Chekiang.
 6. **Atlanticus kulingensis** n. sp. Allotype. Female. Mt. Kuling, Kiangsi, China.
 7. **Atlanticus hoffmanni** n. sp. Allotype. Female. Canton, Kwangtung, S. China.
 8. **Atlanticus changi** n. sp. Allotype. Female. Mt. Kuling, Kiangsi, China.
-



Explanation of plate III

Atlanticus magnificus n. sp. Type Male : 1. dorsum of pronotum; 2. cercus; 3. supra-anal plate; 4. lateral view of pronotum and tegmina. Allotype Female; 5. ovipositor.

Atlanticus palpalis REHN and HEBARD. Type Male : 6. pronotum; 7. cercus; 8 supra-anal plate; 9. pronotum and tegmina; 10. ovipositor of Topotypic female.

Atlanticus kwangtungensis n. sp. Type Male : 11. pronotum; 12. cercus; 13. supra-anal plate; 14. pronotum and tegmina;

Atlanticus hoffmanni n. sp. Type Male : 15. pronotum; 16. cercus; 17. supra-anal plate; 18. pronotum and tegmina; 19. ovipositor of Allotype female.

Atlanticus pieli n. sp. Type Male : 20. pronotum; 21. cercus; 22. supra-anal plate; 23. pronotum and tegmina; 24. ovipositor of Allotype Female.

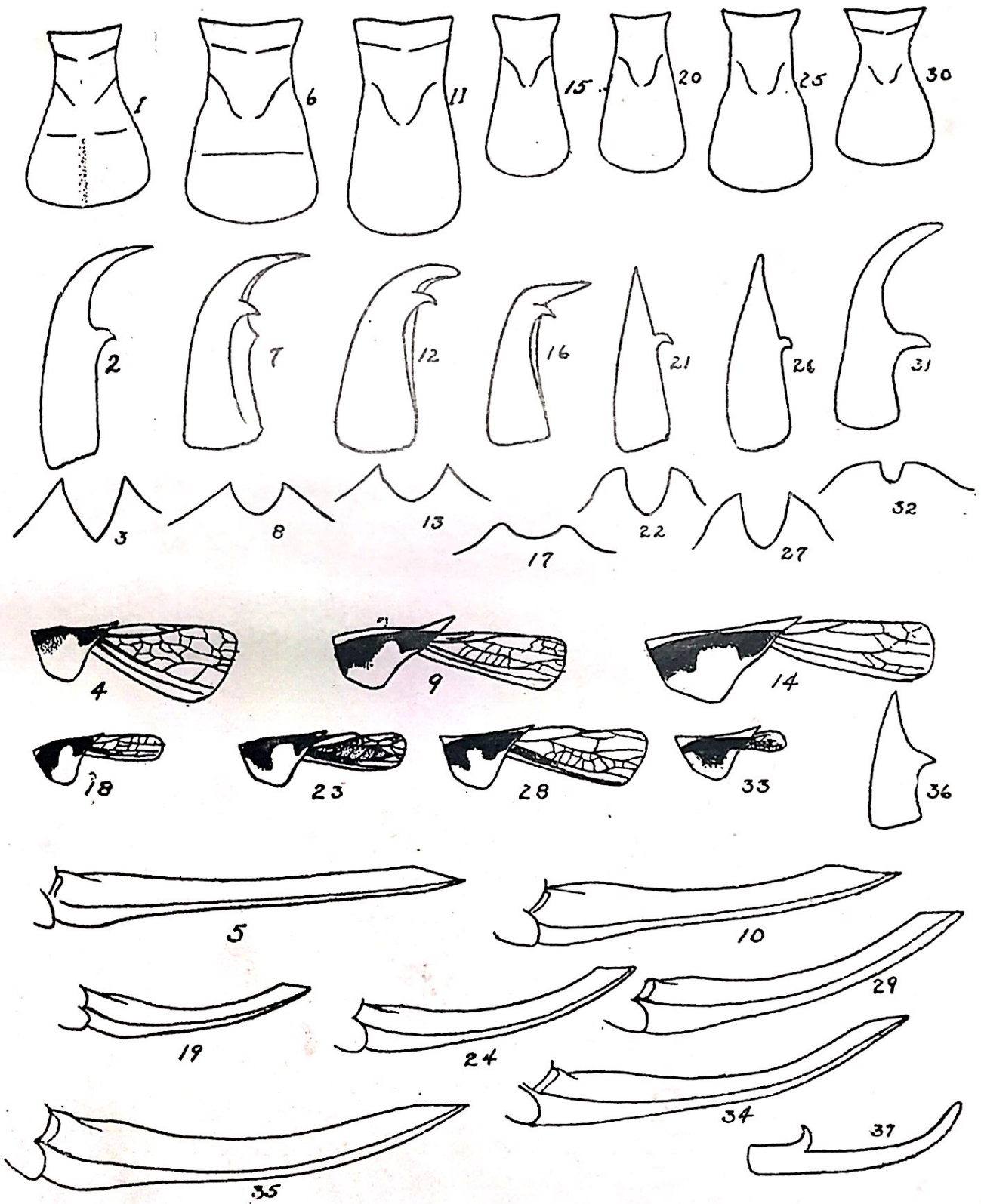
Atlanticus changi n. sp. Type Male : 25. pronotum; 26. cercus; 27. supra-anal plate; 28. pronotum and tegmina; 29 ovipositor of Allotype Female.

Atlanticus kulingensis n. sp. Type Male : 30. pronotum; 31. cercus; 32. supra-anal plate; 33. pronotum and tegmina; 34. ovipositor of Allotype Female.

Atlanticus grahami n. sp. 35. Ovipositor of Type Female.

Atlanticus sinensis UVAROV. 36. cercus of Type Male (after UVAROV).

Atlanticus brunneri (PYLNOV). 37. cercus of Paratype Male.



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