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epiplastra). The name "proscapula," as suggested by Baur*, may be applied to this process both in the Chelonia and in the Sauropterygia; but since, as Professor Howes has pointed out to me, the use of the term as a substantive is open to the objection that it implies the existence of a distinct element, it will be better to speak of it as the "proscapular process."

XLIII.—*Report upon the Chilopoda and Diplopoda obtained by P. W. Bassett-Smith, Esq., Surgeon R.N., and J. J. Walker, Esq., R.N., during the Cruise in the Chinese Seas of H.M.S. 'Penguin,' Commander W. U. Moore commanding. By R. I. POCOCK, of the British Museum of Natural History.*

[Plate XI.]

THE following report is based primarily upon the species of Chilopoda and Diplopoda obtained by Messrs. J. J. Walker and P. W. Bassett-Smith during the cruise of H.M.S. 'Penguin' in the Chinese Seas. But, to render the account of further interest and value, notices have been incorporated of all the Japanese and Chinese species of these two groups that are contained in the British Museum, including descriptions of a large number of new forms obtained by Mr. Holst principally in the islands of Loo-Choo and in Formosa. It is hoped that by this means the paper may prove to be an index of the affinities of the Chilopod and Diplopod fauna of the Chinese area.

So far as can at present be judged from the material at my disposal, this fauna is a most curious mixture, being identical in most of its features with that of the central and southern part of the United States of America, with an infusion from the Indo-Malayan area of the Oriental Region and from the southern and central portions of the Palæarctic.

Taking first the Chilopoda, it seems evident that such forms as *Scutigera clunifera*, *Scolopendra morsitans* and *subspinipes* (with its varieties), and the species of *Otostigmus* are migrants from the Oriental Region; the Lithobiidæ are both Palæarctic and North American, while *Otocryptops sexspinosus* is essentially a North-American species. In the Diplopoda the species of *Polydesmus* and of *Iulus* show affinities with both

* Proc. Acad. Nat. Sci. Philadelphia, 1891, p. 421.

the Palæarctic and North-American areas; the species of *Orthomorpha* and *Strongylosoma* seem to indicate an Oriental infusion, while *Fontaria*, *Paraiulus*, and *Spirobolus* are decidedly North-American elements.

Thus, on the whole, the North-American character predominates in the Chinese fauna; but it is interesting to note that Dr. Wood long ago described from Hong Kong a species of the genus *Glomeris*, which belongs to a family that is wholly unknown in North America, but is abundant in the temperate parts of Europe. The genus *Glomeris* is also found in South Burma, Sumatra, and Borneo; and the fact of its having been turned up in Hong Kong seems to point to the conclusion that it has made its way southwards into the Indo-Malayan area by the Chinese route.

CHILOPODA. (CENTIPEDES.)

Family Scutigeraidæ.

Scutigera longicornis (Fabr.), subsp. *clunifera* (Wood).

For descriptions and the synonymy of *longicornis* and *clunifera* see Haase, 'Die Indisch-Australischen Myriopoden,' pt. i. pp. 17-19.

Loc. Hong Kong (in a drain-pipe); Hang Chau in Che Kiang (*J. J. Walker*); Fatshan, 20 miles up the Pearl River beyond Canton (*Bassett-Smith*).

The wide-ranging Oriental species *S. longicornis* is the largest of the genus, and it appears to attain to its greatest dimensions in China and Japan. The specimen obtained by Mr. Bassett-Smith at Fatshan is, I believe, the largest on record; it is 63 millim. (over $2\frac{1}{4}$ inches) in length.

The prevailing colour of the upper surface appears to be a deep green, often tinged with or passing into brown; the saddles are very conspicuous on account of their large size and their yellowish-red colour; the legs are either pale or deep green or brown, sometimes obscurely annulate, with ferruginous tarsi.

Dr. Haase regarded *clunifera* and *longicornis* as distinct species. I cannot, however, at present quite adopt this view; but, upon the possibility of the species being ultimately capable of division into local races, I provisionally retain Wood's name for the Chinese form of it.

In addition to the specimens obtained at the above localities, the British Museum has others from the following places in

the Chinese area:—Central Japan, Oö-Sima (Loo-Choo), Shanghai, Kinkiang, Kinkiang Mountain.

Scutigera tuberculata (Wood).

Cermatia tuberculata, Wood, J. Ac. Philad. (2) v. p. 12 (1863).

Scutigera cæruleo-fasciata, L. Koch, Verh. z.-b. Wien, 1868, p. 787.

Loc. Hang Chau, province of Che Kiang (under loose bark) (*J. J. Walker*).

This species may be readily recognized from the preceding by its much smaller size (20–25 millim.), its variegated green and whitish colouring, its low and inconspicuous saddles, short tracheal apertures, &c.

I have also seen specimens of this species from the following places:—Tsu-Shima (*P. A. Holst*); Corea (*J. Kalinowski*); S.E. Corea (*A. Carpenter*); Che Foo, N. China (*Miss Macomish*).

In the bottle containing the specimens collected by Commander Alfred Carpenter there is a label stating that when living this species is “mottled white and bluish grey.”

Family *Lithobiidæ*.

Lithobius asperatus, L. Koch.

Lithobius asperatus, L. Koch, Verh. z.-b. Wien, xxvii. p. 788 (1878).

Lithobius thetidis, Karsch, Zeitschr. f. Nat. Halle, liii. p. 848 (1880).

Loc. Da-zeh Valley, 60 miles inland of Sam-Moom Bay, Che Kiang (*P. W. Bassett-Smith*).

The British Museum also has specimens from S.E. Corea (*A. Carpenter*).

Lithobius, sp.

A single mutilated example of this genus, obtained by Mr. Bassett-Smith in Da-zeh Valley, cannot be satisfactorily determined. The antennæ and most of the legs are gone. Eyes of about 9 ocelli, in a subcircular cluster. The ninth, eleventh, and thirteenth tergites have their posterior angles produced, the angles of the rest are nearly squared and the posterior borders not or hardly emarginate. Coxal teeth of the maxillipedes are strongly produced and furnished with 2+2 large teeth and a smaller external tooth. Coxal pores rounded, uniserial, 3 or 4 in number.

Length 12 millim.

*[*Lithobius shimensis*, sp. n.

Pale-coloured, of very small size.

Antennæ composed of 19 segments.

Eyes composed of a small number of ocelli (5 or 6) arranged in two rows.

Coxæ of maxillipedes anteriorly truncate, armed with 4 + 4 acute subequal teeth.

Terga rather strongly wrinkled, the eighth, tenth, twelfth, and fourteenth posteriorly emarginate, the ninth, eleventh, and thirteenth with their posterior angles dentate.

Coxal pores few in number, circular, and arranged in a single series.

Anal legs moderately robust; claw single; armed beneath 0 (coxa), 1, 3, 2, 0.

Generative forceps of the female armed with two pairs of spurs and with trilobate claw.

Length 7 millim.

Loc. Tsu-Shima (*Holst Coll.*.)]

[*Lithobius Holstii*, sp. n.

Colour castaneous, pale yellow below.

Antennæ hirsute, composed of 19 to 21 segments.

Eyes composed of about 6 ocelli arranged in two rows.

Coxæ of maxillipedes produced and armed with 2 + 2 conspicuous teeth.

Tergites moderately smooth, all the angles squared or nearly so.

Coxal pores round, in a single series, 3, 4, 4, 4.

Anal legs armed beneath 0, 1, 3, 2, 0; claw with a basal spur.

Generative forceps of the female with two large diverging basal spines and the claw obsoletely trifold.

Loc. Ashinoju, Japan (*Holst Coll.*). Also a mutilated specimen of what is possibly the same species from Tsu-Shima.]

The three species here named may be recognized as follows:—

- a. Coxal pores very numerous and arranged in several series..... *asperatus*, L. Koch.
- b. Coxal pores few in number and arranged in a single series.
- a¹. *Terga* wrinkled, mostly emarginate, the ninth,

* Species not obtained during the cruise of the 'Penguin' are placed within brackets.

- eleventh, and thirteenth with their posterior angles acutely produced; coxal teeth 4+4 . . . *shimensis*, sp. n.
 b¹. Terga not or hardly wrinkled, their posterior angles squared and not produced; coxal teeth 2+2 *Holstii*, sp. n.

Family **Scolopendridæ**.

Scolopendra subspinipes, Leach, subsp. *De Haanii*, Brandt.

Loc. Hong Kong (*J. J. Walker*). A single example obtained under a stone near the summit of the island, 1700 feet alt.

Subsp. *mutilans*, L. Koch.

Loc. Tung Yung Island; Chusan and Hong Kong (*J. J. Walker*).

The *mutilans* form of *S. subspinipes*, characterized by the deep green colour of the body and the chestnut tint of the head and first segment, takes the place in China and Japan of the typically coloured southern form, *subspinipes*, s. s.

The British Museum has specimens from the following localities:—S.E. Corea; Japan, S. Japan, Nikko (Central Japan), Yokohama; Snowy Valley in Ningpo, King Kiang, Chung Yung, Kwan Gan-kway, in China; Great Loo-Choo, Tsur Island, and Formosa (*Holst Coll.*).

Of the form *japonica*, L. Koch, which differs from *mutilans* in having the head and first tergite entirely green like the rest of the body, the Museum has examples from Oö-Sima, Loo-Choo (*A. Carpenter*); Tokio, Japan, and Tsu-Shima (*Holst*).

[*Scolopendra morsitans*, Linn.

Loc. Great Loo-Choo (*Holst Coll.*)]

Otostigmus orientalis, Porath.

Otostigmus orientalis, Porath, Bih. Sv. Vet.-Akad. Handl. iv. no. 7, p. 19.

Loc. Manilla (*J. J. Walker*).

[*Otostigmus scaber*, Porath.

Otostigmus scaber, Porath, Bih. Sv. Vet.-Akad. Handl. iv. no. 7, p. 20.
Otostigmus carinatus, id. *ibid.*, and of all authors.

Loc. Oö-Sima (*A. Carpenter*); Hong Kong (*J. C. Bowring*).

This species has generally been known under the name

carinatus ; but there seems to me to be no satisfactory reasons for regarding *scaber*, which was described first, as a distinct form.]

[*Otostigmus aculeatus*, Haase.

Otostigmus aculeatus, Haase, Die Ind.-Austral. Chilopoden, p. 71, pl. iv. fig. 69.

Loc. Hong Kong (*J. C. Bowring*).]

[*Otostigmus politus*, Karsch.

Otostigmus politus, Karsch, Berlin. ent. Zeitschr. xxv. p. 219 (1881).

Loc. Pekin.]

[*Otocryptops sexspinosus* (Say).

Scolopocryptops sexspinosus (Say), Newport, Wood, Bollman, Meinert, &c.

Otocryptops punctatus, Pocock, Ann. & Mag. Nat. Hist. (6) viii. p. 159 (1891).

Loc. S.E. Corea (*A. Carpenter*) ; Tsu-Shima (*Holst*).

This species furnishes a remarkable instance of resemblance between the fauna of China and Japan and that of the United States of America.]

[*Otocryptops rubiginosus* (L. Koch).

Scolopocryptops rubiginosa, L. Koch, Verh. z.-b. Wien, 1878, p. 792.

Scolopocryptops Confucii, Karsch, Abh. nat. Ver. Bremen, ix. p. 65.

Otocryptops rubiginosus, Haase, Die Indisch-Austral. Myriopoden, p. 97.

Loc. Japan ; Ashinoju, Japan (*Holst*) ; Great Loo-Choo (*Holst*) ; Corea (*Kalinouski*).]

Family Geophilidæ.

Mecistocephalus Smithii, sp. n.

Colour yellow, head and maxillary somite castaneous.

Head not twice as long as wide, gradually narrowed posteriorly, coarsely punctured, biimpressed behind ; maxillipedes thickly punctured ; coxæ bidentate anteriorly, the femur armed with two strong teeth and the two following segments with a small one each ; claw unarmed.

Tergites smooth, polished, the first and second not sulcate.

Sternites at the anterior half of the body, with a median, anteriorly abbreviated, deep longitudinal groove.

Anal somite of normal form ; the pre-tergal sclerite very

short and wide, more than twice as wide as long; the *pleuræ* only moderately inflated, thickly covered, except close to the tergite, with larger and smaller pores; *sternite* small; *legs* long and slender, clothed with fine hair.

Number of pairs of legs 59.

Length up to 80 millim.

Loc. Da-laen-Saen, 30 miles S.W. of Ningpo, 500–2500 feet alt. (*J. J. Walker*); Wo Lee Lake, 25 miles S. of Ningpo (*Bassett-Smith*).

[*Mecistocephalus mirandus*, sp. n.]

Nearly allied to *M. Smithii*, but differing apparently in having the maxillipedes and head almost smooth; the head narrower, being more than twice as long as wide; the pretergal plate of the anal somite narrower, *i. e.* about twice as wide as long; the anal *pleuræ* more inflated and more densely porous; and, lastly, as many as 65 pairs of legs.

Length up to 99 millim.

Loc. Great Loo-Choo (*Holst Coll.*).

Two examples (♂, ♀.)

[*Geophilus* (?) *Holstii*, sp. n. (Pl. XI. figs. 1, 1 a.)

Colour pale yellow, head pale castaneous.

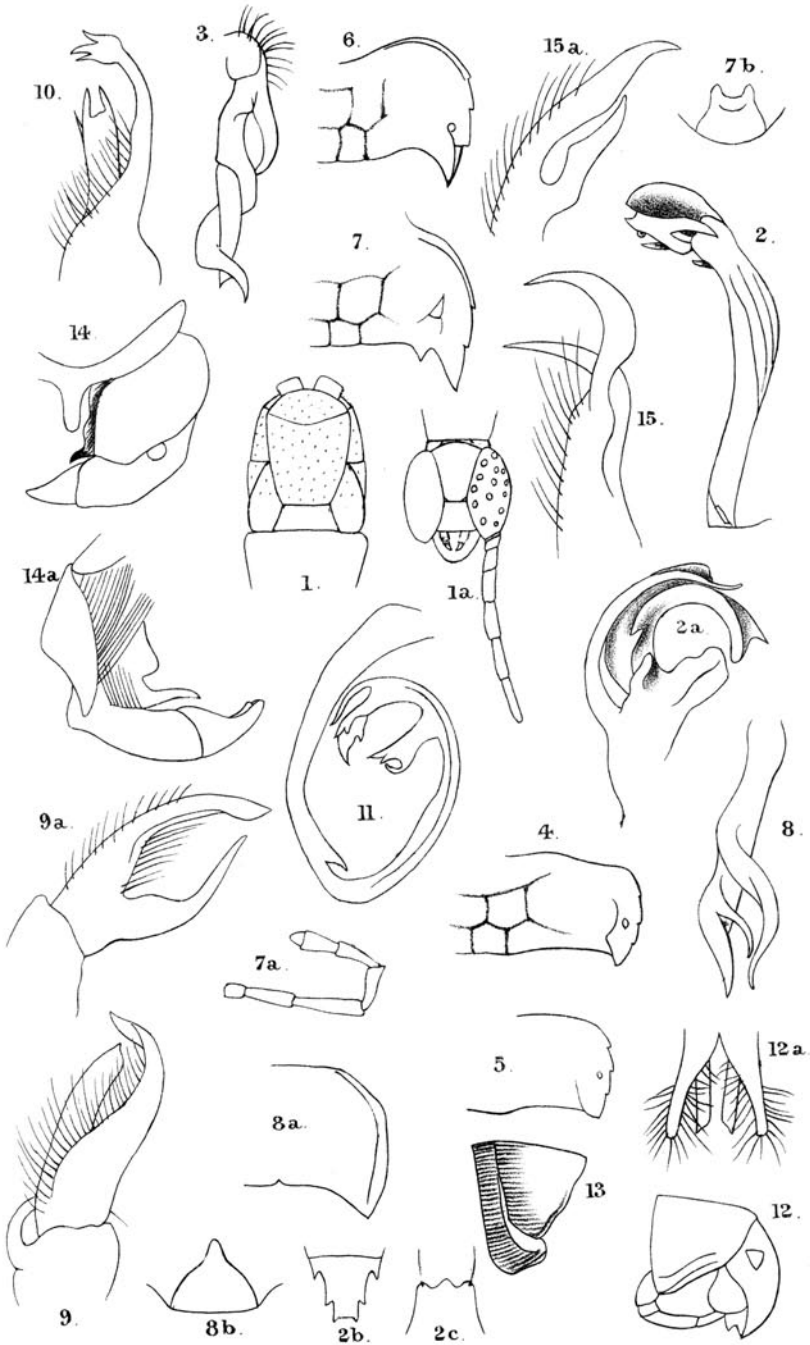
Head coarsely punctured, studded with short setæ, narrow, much longer than wide, wider in front than behind, with widely rounded anterior angles, with two posterior longitudinal impressions; frontal plate distinct; *basal plate* narrow, wider than long, about as wide as the head, but much narrower than the first tergite, its sides converging.

Antennæ moderately long, hirsute, rather robust. *Coxæ* of *maxillipedes* not covered below by the *pleuræ*, punctured, hairy, the anterior border mesially notched, bidentate, the femora largely overlapping the head at the sides, but the joint of the claw falling short of the anterior angle of the head, armed internally with a strong tooth; claw basally armed with a small tooth. The *pleuræ* of the maxillipedes leaving the external angle of the coxa uncovered above, but with their inner edge not raised and thickened where it touches the basal plate and the head.

Terga bisulcate, punctured, hairy.

Sterna with a median impression at the anterior end of the body.

Anal segment small; the *tergite* much longer than wide, not covering the *pleuræ*, and nearly parallel-sided; *pleuræ*



not strongly inflated, studded below and laterally with more than a dozen large scattered pores, the upper surface not porous; *sternite* narrow, longer than wide, narrowed posteriorly; *legs* long, slender, without claw.

Generative appendages present.

Legs hairy, the first pair the smallest; 41 pairs.

Length about 20 millim.

Loc. A single (? ♂) example from Ashinoju, Japan (*Holst Coll.*).

I am rather divided in opinion as to whether this species should be referred to *Mecistocephalus* or *Geophilus*; and since there is only one specimen, I refrain from putting it to the necessary anatomical examination of the mouth-parts to settle the point. But since I can detect no definite external characters which absolutely sever it from *Geophilus*, and since there is no trace of the thickening of the inner edge of the pleura of the maxillipedes, such as is seen in the other species of *Mecistocephalus*, and the basal plate is wider than in that genus, I decide to refer it provisionally to *Geophilus*.

Possibly it is a young example of *Mecistocephalus*.]

Orphnæus brevilabiatus (Newp.).

Loc. Hong Kong (*J. J. Walker*).

DIPLOPODA. (MILLIPEDES.)

Suborder POLYDESMOIDEA.

Family Polydesmidæ.

Orthomorpha roseipes, sp. n. (Pl. XI. figs. 2-2 c.)

♂.—*Colour.* Head and upper surface of body pitch-black, fading to ferruginous on the under surface; keels and caudal process light yellow; antennæ ferruginous, with black apical segment; legs reddish yellow, with nearly white tarsi.

Antennæ longish, slender; segments 3, 4, 5 long and subequal, 2 and 6 shorter but about equal.

Segments coriaceous above, not polished; the transverse sulcus faint but long, beginning on the fourth and just visible on the eighteenth; the constriction not beaded; the keels rising above the middle of the side, small, with rounded anterior angles, and the posterior scarcely produced even at the hinder end of the body; the keel of the second segment large, below the level of that of the first and third, rounded in front and behind. *Caudal process* rather wide, truncate,

with an acute anterior spine on each side and four tubercles round the distal extremity. *Anal sternite* triangular, with two very large tubercles on each side. Lateral surface of segments very finely granular, much more coarsely so in front, the tracheal tuberosities prominent; the inferior keel strong on the anterior segments, but gradually dying out towards the hinder end of the body, just visible on the seventeenth; even on the fourth segment it is represented by a flattened excrescence, projecting behind the posterior stigma.

Sterna normal, not spined, that of the eighth with a long linguiform process directed downwards and a little forwards.

Legs longish, hairy; femur longer than the tarsus, about twice as long as trochanter, but not twice as long as the tibia, which is only a little shorter than the tarsus; a tuft of white hairs on the apex of the lower surface of the trochanter, and the last two segments thickly clothed beneath with white hairs; claw conspicuous.

Copulatory feet long, slender, the terminal portion bent strongly downwards, terminating in an external short, truncate, spatulate piece, with the flagellum and its sheath rising on the inner side of this, both being strongly curved and directed inwards, downwards, and outwards; the flagellum simple, the sheath apically bifid, with two short processes near its base.

Length 44 millim.; width across keels 5, width between the keels 3.5.

Loc. A single male example from Chusan Island (*J. J. Walker*).

[*Orthomorpha gracilis*, C. Koch.]

Loc. Great Loo-Choo (*Holst Coll.*.)

[*Strongylosoma Swinhoei*, sp. n.]

♀.—*Colour* black or very deep brown, the posterior half of each tergite with a yellow transverse band, which (except on the first four segments) spreads on to the posterior half of the keel; antennæ black; legs black distally.

Body nearly smooth, polished, finely striolate above, the first tergite subgranular; *keels* very small, situated above the middle of the sides, defined above by a sulcus, without distinct anterior and posterior angles; that of the second segment below the level of those of the first and third, with its anterior angle strongly produced; almost absent on the nineteenth; the transverse sulcus beginning on the fifth and extending to the

eighteenth segment, not beaded. The sulcus marking the constriction not sculptured.

Caudal process truncate, triangular, not conspicuously tubercular.

Anal sternite oval, the two tubercles not projecting beyond the edge.

The *lateral surface* lightly wrinkled, the inferior keel distinct to the hinder end of the body, crescentic.

The *sterna*, except at the anterior end of the body, with two pairs of backwardly directed blunt spines, one at the base of each leg.

Legs with distinct claws, normally hairy; femora about as long as the tarsi, twice as long as the trochanters, but not twice as long as the tibiæ.

Length 35 millim.; width across keels 3·8, width between keels 3.

Loc. A single female example from Chee Foo (*Swinhoe Coll.*).

This species is perhaps allied to the Japanese *Oxyurus flavo-limbatus* of L. Koch (Verh. z.-b. Wien, xxvii. p. 795, 1878), but the latter seems to have better developed keels and to be differently coloured; for the keels, including those of the first segment, are said to be yellow, whereas in this new form the first tergite is not yellow laterally and only the posterior portion of the keels of the rest of the segments is this colour.

In colouring *S. Swinhoei* presents a strong likeness to two other species, namely *S. transverse-tæniatum* of L. Koch, from Australia, and *S. Phipsoni*, Pocock, from India. But in neither of these two species are the sterna spined; moreover, in *Phipsoni* the first tergite is entirely bordered with yellow, and in *transverse-tæniatum* the yellow band on the tergites does not extend on to the keels.]

[*Strongylosoma Holstii*, sp. n. (Pl. XI. fig. 3.)

♀.—*Colour.* Head and antennæ black, the segments with yellow just above and on the keels, and a large yellow spot on the middle of each; this yellow spot extends on to the anterior part of the segments, and thus the series of them forms a continuous median dorsal stripe; the lateral surface black above, yellow below; legs and sterna yellow.

Antennæ incrassate, with segments increasing in length from 2 to 6, the sixth being noticeably longer than the second.

Body smooth above; the *keels* small, just above the middle

of the side, without any anterior angle, and the posterior angle scarcely spiniform even quite at the hinder end of the body, and not projecting beyond the posterior border of the somites, rather deeply excavated for the pore; those of the second segment below the level of those of the first and third, larger, with squared angles. The transverse sulcus extending from the fifth to the eighteenth segment, not beaded, but the furrow separating the anterior and posterior halves of the segments finely beaded; *caudal process*, *anal sternite*, and *sterna* of the other segments normally formed. The lateral surface of the segments smooth, the inferior keel practically absent on the segments succeeding the fourth.

Legs distinctly clawed; femur nowhere twice as long as the trochanter or tibia, sometimes only a little longer, and barely twice the length of the patella.

♂.—Smaller and thinner than the female, with the keels a little larger and a prominent process on the sternum of the fifth segment.

Tarsi of anterior legs more thickly hairy below.

Copulatory feet rather short; the flagellum and its sheath distinct almost from the base; the sheath twisted on itself like a corkscrew, and giving the appearance of being itself divided into two branches and terminating in a divided apex.

Length of female 20 millim., width across keels 2; of male 15.5, width 1.5.

Loc. Great Loo-Choo (*Holst Coll.*.)

Polydesmus Moorei, sp. n. (Pl. XI. fig. 4.)

Colour fuscous on the middle of the dorsum, paler on the keels, fuscous beneath the keels; sternal surface flavous; legs flavous, with the distal segment fuscous; antennæ fusco-flavous, the three distal segments fuscous.

Antennæ incrassate; segments 1 and 2 about equal, third more than twice the second and about twice the fourth; fourth to sixth gradually increasing in length and thickness, the latter shorter than the third.

Body nearly flat, smooth, polished, wide, not manifestly narrowed in front or behind; the first tergite distinctly sculptured, wide, much wider than the head, with a distinct keel, of which the anterior angle is rounded and the posterior nearly squared. The rest of the segments with strong sculpturing; the keels very wide, those in the middle of the body wider than long, nearly oblong anteriorly, the posterior border of the fifth in approximately the same straight line as the posterior border of the tergite; the border

becomes gradually and slightly more and more emarginate towards the hinder end of the body, but is never strongly so, for it is only in about the last four keel-bearing segments that the posterior angle of the keel is produced into a point which surpasses the posterior border of the tergite; the lateral border of the keels very lightly convex and very finely denticulate, the anterior angle rectangularly or posteriorly obtusely rounded; the anterior border very lightly sinuate, being lightly convex in its basal half and nearly straight in its distal half, the upper surface of the keel sculptured. The *caudal process* with a spiniform tubercle in the middle of its length, the tip truncate. *Anal sternite* not distinctly tubercular.

Legs stoutish; femur a little longer than the trochanter, but distinctly shorter than the tarsus; tibia much shorter than trochanter, almost twice as long as patella, but barely (except on the last somite) half the length of the tarsus.

Total length 17 millim.; width across keels 3·3, between them 1·8.

Loc. Da-zeh Valley, 60 miles inland of Sam-Moom Bay, Che Kiang, China (*Bassett-Smith*).

Polydesmus paludicola, sp. n. (Pl. XI. fig. 5.)

Very nearly allied to the preceding species in all its characters, but with the sculpturing stronger and the keels much narrower, being in fact in the middle of the body scarcely wider than long, with the anterior border not sinuate but straight. The colour, too, is more of a uniform slate-grey, there being less red about the keels and less fuscous on the legs and back.

Length 15 millim.; width across keels 2·6, between keels 1·6.

Loc. Wo Lee Lake, 25 miles S. of Ningpo (*Bassett-Smith*).

[*Polydesmus compactus*, sp. n. (Pl. XI. fig. 6.)

Colour a slate-grey, slightly tinged with red; margin of the keels reddish; legs reddish yellow.

(*Antennæ* fractured.)

The keel-bearing parts of the segments in contact, the keels overlapping each other. The dorsal surface polished; the first tergite large, not sculptured, its anterior border evenly convex, its posterior border very lightly emarginate mesially, and at the sides directed obliquely forwards, its angle acute. The rest of the segments nearly flat above, lightly convex; the sculpturing into polygonal areas is weak and does not

extend on to the keels; keels with widely rounded, strongly convex anterior angles, very finely denticulate lateral edges, and concave posterior edge; the posterior angle acutely produced, even as far forwards as the fifth projecting beyond the posterior edge of the tergite. *Caudal process* narrow, triangular, truncate, with two spiniform tubercles on each side near the base. *Anal sternite* trifid, the two tubercles projecting on each side beyond the posterior edge.

The *sternal areas* rather high, conspicuously sulcate transversely; the distance between the posterior coxæ equal to the length of one of them.

Legs as in *P. dentiger*.

Length 29 millim.; width across keels 5, width between keels 2·7.

Loc. Tsu-Shima (*Holst Coll.*.)

[*Polydesmus dentiger*, sp. n. (Pl. XI. figs. 7-7 b.)

Colour as in *P. compactus*, but without the reddish tinge.

Antennæ long and slender; first segment half the second, second nearly half the third and about equal to the fourth, which is a little shorter than the fifth, but about equal in length to the sixth, but thinner.

Body much thinner than in *compactus*, with the sculpturing more strongly defined, being visible on the first tergite, and on the nineteenth passing into ridges which project as spiniform processes beyond the edge of the plate. The *keels* smaller, with the anterior angle in all but the anterior segments not projecting forwards, but widely and obtusely rounded; the lateral margin finely denticulate; the posterior angle acute, spiniform, and from the fifth segment projecting beyond the edge of the tergite; the posterior margin bearing a strong triangular tooth, which is separated by a deep notch from the angle of the keel.

Anal tergite not so distinctly denticulate as in *compactus*, but the *sternite* distinctly bifid owing to the large size of the lateral tubercles.

Sternal areas almost as in *compactus*, but those at the hinder end of the body are less compressed, so that the space between the basal segments of the legs of the last pair is considerably greater than the length of one of the said segments.

Legs covered with fine white hairs; tarsus much the longest segment, longer than the femur by about one third of its length; femur correspondingly longer than trochanter, which is quite three times the length of the coxa and almost as long as the patella and tibia taken together, the latter not very unequal.

Length 27 millim.; width across keels 3·8, width between keels 2·6.

Loc. Ashinoju, Japan (*Holst Coll.*.)]

These four species may be recognized as follows:—

- a. Of large size, with long legs and antennæ; the anal sternite furnished with two very large tubercles; the anterior angles of the keels rounded and convex.
- a¹. The anterior border of the keels convex and produced forwards beneath the keel of the preceding segment, the posterior border evenly arched; very wide *compactus*, sp. n.
- b¹. The anterior border of the keels not produced forwards, but running backward from their point of origin; the posterior border armed with a triangular tooth; much narrower *dentiger*, sp. n.
- b. Not so large, legs and antennæ shorter; anal sternite oval or convex, not bifid; anterior angles of the keels squared.
- a². Keels very wide, with the anterior border convex in its basal half. *Moorei*, sp. n.
- b². Keels much narrower, the anterior border straight or nearly so from the base to the angle. *paludicola*, sp. n.

Polydesmus cruentatus, L. Koch (Verh. z.-b. Wien, 1878, p. 795), from Japan, appears to belong to the same category as *P. compactus* and *dentiger*, inasmuch as its author mentions the enlarged tubercles on the anal sternite. In measurements it agrees closely with *dentiger*; but no tooth is described as occupying the posterior border of the keels, while from *compactus* it seems to be separable by its more slender build and by the sculpturing of the first dorsal plate.

Fontaria lacustris, sp. n. (Pl. XI. figs. 8–8 b.)

Colour (? faded) pale yellowish white throughout.

Terga smooth, laterally above the keels lightly wrinkled or coriaceous; keels rather large, the anterior angle rounded, the posterior rectangular or acute, but not dentiform; the anterior edge of the keel with a small basal shoulder, the posterior edge emarginate, with a larger basal shoulder.

Sterna and coxæ of the legs studded with long hairs. *Anal sternite* furnished with a median backwardly projecting spiniform process.

Copulatory feet diverging externally from the base, each terminating in two processes—the inferior simple, pointed, curved like an S, the superior inwardly directed, bifid.

Length 20 millim.; width across keels 3·5, width across cylindrical part of segment 2·5.

Loc. Wo Lee Lake, 25 miles S. of Ningpo (*Bassett-Smith*).

[*Fontaria Holstii*, sp. n. (Pl. XI. figs. 9, 9 a.)

♀.—*Colour* olive-green, the middle of the dorsum slightly paler, the borders of the keels and of the labrum, the distal ends of the antennal segments, and the tarsi flavous.

Body smooth and polished, very slightly wrinkled just above the keels; dorsum evenly arched from its summit to the edge of the keel; keels small, rising above the middle of the side, directed slightly upwards and backwards, the posterior angle spiniform; the posterior border of the keels directed slightly forwards in segments 1 to 6, and slightly backwards in segments 14 to 19, the margin moderately thickened. *Caudal process* triangular, apically truncate, and laterally bituberculate.

Anal sternite semicircular, bituberculate.

Legs with the spine slender, elongate, and acute.

♂.—Less robust, but with larger keels.

Copulatory feet rather small, each dividing distally into an anterior or upper and posterior or lower ramus; the latter pointed, strongly curved internally and furnished along its inner edge with a series of long thickly-set hairs, the former flattened antero-posteriorly and strongly curved when viewed from the side, shorter than the other.

Length of female 47 millim.; width across keels 9·5, across cylindrical part of segment 7.

Length of male 47 millim.; width across keels 9, across cylindrical part of segment 6.

Loc. Great Loo-Choo (*Holst Coll.*.)]

[*Fontaria neptunus*, sp. n. (Pl. XI. fig. 10.)

♂.—*Colour* pale yellow; lower surface, antennæ, and legs a uniform pale colour; an olivaceous spot on the front of the head and two connected by a transverse band on each segment, the cylindrical part of each segment clouded above with yellow, a central spot being darker.

Copulatory feet resembling in construction those of the preceding species; the two rami, however, closer together, and each of them is tridentate at the apex.

Length 40 millim.; width across keels 7·5, between keels 5·5.

Loc. Great Loo-Choo (*Holst Coll.*). Several male specimens.

This species differs from the preceding in being slightly smaller, differently coloured, and in having the copulatory foot differently formed.]

[*Fontaria variata*, sp. n. (Pl. XI. figs. 15, 15 a.)

♂.—*Colour*. Upper surface rather thickly clouded with fuscous, with a clearer spot on each side above the keels; the keels and the posterior border of the tergites, the legs, antennæ, and lower surface flavous; a fuscous patch on the face.

Allied to the two preceding species, but with the keels a little larger and rather more produced posteriorly.

Copulatory feet terminating in two nearly contiguous, undivided, pointed, strongly curved processes.

Length 29 millim.; width across keels 6, across cylindrical part of segment 4.

Loc. Great Loo-Choo (*Holst Coll.*). A single specimen.

Differs from the two preceding in colouring, size, shape of keels, and structure of copulatory feet.]

[*Fontaria coarctata*, sp. n. (Pl. XI. fig. 11.)

Colour (dry example) almost entirely pale testaceous, the segments at the hinder end of the body tinted with yellowish red.

The segments of the body not pressed together with contiguous keels; the keels above the middle of the sides moderately large, with the anterior and most of the posterior angles rounded; the posterior angles nowhere acute and only projecting backwards beyond the border of the tergite in about the seven posterior keel-bearing segments; the keel-bearing area lightly impressed transversely on its upper surface; the *caudal process* not laterally spiniform, but apically distinctly bifid; the *anal sternite* posteriorly spiniform, as in *F. lacustris*.

Legs with long spines; the distance between the posterior coxæ greater than the length of one of them.

The *copulatory foot* enormously long and slender, completely curled backwards upon itself, with a distinct spine on its inner surface just before the bend; on its outer side near the end it bears an elongate inwardly directed lamina, which ends distally in three processes, two short and contiguous and one longer and curved; the end of the organ is divided into three processes, the internal being styloform, the median stout, more or less spatulate and bifid, and the external thin, compressed, pointed at the apex, and furnished with an acute process in front of the apex.

Length about 40 millim.; width across keels 6, width between keels 4.

Loc. Japan (*J. H. Leech*). A single male example.

This species is very nearly related to *F. Dænitzi* of Karsch (Zeitschr. Naturwissen. (3) v. p. 848, 1880), which is also a Japanese form. The two agree apparently in length, in proximity of the keels, colours, and in a general way in the form of the copulatory apparatus; but in Karsch's description of this latter structure no mention is made of a spine halfway along the length of the organ, and the apex is said to be acute, without any word to imply that it presents the complicated trifurcate extremity presented in this new form.

Fontaria Mariensii, Peters (Mon. Ak. Wiss. Berlin, 1864, p. 536), from Yokohama, is, like *Dænitzi*, unknown to me; but judging from its description and from what Karsch (*loc. cit.*) has said about it, there seems to be no reason for supposing it to be identical with any of the species described below.]

[*Fontaria*, sp.]

Loc. S.E. Corea (*Alfred Carpenter*).]

[*Fontaria*, sp.]

Loc. Tsu-Shima (*Holst Coll.*).]

These two species are represented in the collection by solitary female examples. I consequently refrain from describing them.

I have entirely failed to identify the following species of Polydesmidae:—

1. *Strongylosoma carinulatum*, Motschulsky, Bull. Nat. Mosc. xxxix. (1866) p. 200. From Japan.
2. *Strongylosoma japonicum*, Peters, Mon. Ak. Wiss. Berlin, 1864, p. 536. From Yokohama.
3. *Paradesmus pekinensis*, Karsch, Arch. Nat. 1881, p. 39. From Pekin. Certainly differs from any that I have described in the granulation of its first tergite.
4. *Oxyurus flavo-limbatus*, L. Koch, Verh. z.-b. Wien, xxvii. p. 795. From Japan.
5. *Oxyurus rosulans*, Tömösvary, Term. füzetek, ix. p. 69. From Japan.

I have not seen a single example of the genus *Oxyurus* from the Chinese region. Perhaps the species named *rosulans* is a *Fontaria*.

Suborder IULOIDEA.

Family Cambalidæ.

In vol. xxxiii. of the Ann. Mus. Genova, pp. 388-389, I proposed to unite the genera *Cambala*, *Glyphiulus*, and *Trachyiulus*. But provisionally, at all events, perhaps they may be recognized until more intermediate forms come to light. Moreover, I have thought it admissible to add two more genera to the series. The five that are now known may be recognized by the following key:—

- a. The segments of the body furnished with as many as 20 longitudinal crests, the crests on each side extending to the base of the legs; first tergite at most only carinate behind; with 4 or 5 crests on the dorsum of the segments.
 - a¹. With 4 dorsal crests, the median one obsolete; all the crests undivided, the areas between them smooth and polished *Cambala*, Gray.
Type *annulata* (Say).
 - b¹. With 5 dorsal crests lying between the pore-bearing crests.
 - a². First tergite as in *Cambala*, not carinate above *Cambalopsis*, nov.
Type *calvus* (Poc.).
 - b². First tergite carinate above in its posterior half *Trachyiulus*, Pet.
Type *ceylonicus* (Pet.).
- b. Segments furnished with from 9 to 12 keels, the area above the base of the legs not keeled; first tergite completely covered with carinæ; with 3 (4) crests on the dorsum of the segments.
 - a³. Segments with 11 (12) bituberculiform crests—three on each side below the poriferous crest, and on the dorsal area three tubercles behind and four in front. *Glyphiulus*, Gerv.
Type *granulatus*, Gerv.
 - b³. Segments with only 9 crests, three between the poriferous crests and two on each side below them *Cambalomorpha*, nov.
Type *formosa*, sp. n.

The genera *Cambala* and *Trachyiulus* contain, I believe, but one species each. In addition to *calvus*, I refer to *Cambalopsis* the Sumatra species *cavernicola* and *dentata* recently referred by me to the genus *Cambala*. *Cambalomorpha* contains the three enumerated below.

Cambalomorpha formosa, sp. n.

Colour mostly orange-yellow, with a wide black band on each side extending from the second segment to the end of the body; the upper half of the head and of the second, third, and fourth segments fuscous, but the first tergite or collum entirely yellow; antennæ and the distal half of the legs palely fuscous.

Head smooth; eyes composed of about nine ocelli arranged in two rows.

Collum furnished with nine complete high keels, extending from the anterior to the posterior margin. On the rest of the segments the so-called keels are represented by two transverse rows of tubercles, of which the tracheal tubercle is the largest and rounded at the summit, while the rest are lower and more spiniform; there are nine rows of these tubercles or carinæ, three rows lying between the tracheal carina and two on each side beneath it; the areas between the keels are densely sculptured with impressions which form anastomosing ridges arranged in a reticulated pattern; the cylindrical part of the segments are densely punctured in front, but behind they have the appearance of being gouged out into longitudinal furrows.

Anal tergite with a single median dentiform tubercle, sculptured with a widely rounded posterior border, which distinctly overhangs the valves; *valves* sculptured, hairy, impressed on each side of the borders.

Legs hairy.

Number of segments 72.

Length about 50 millim.

Loc. Hong Kong (*J. J. Walker*).

C. formosa is most nearly allied to *C. Doriæ*, Pocock (Ann. Mus. Genov. (2) xiii. p. 389), from Pegu. It resembles that species in having more than one series of ocelli, the collum carinate above, and only nine rows of tergal keels, each keel being completely divided into an anterior and a posterior tubercle. It may be at once recognized from *Doriæ* by the fact that in the latter species the keels of the collum are divided into an anterior and a posterior series.

The species of this genus known to me may be recognized as follows:—

- a. Keels on the collum entire, as in *Glyphiulus granulatus*. . *formosa*, sp. n.
 b. Keels on the collum divided into an anterior and a posterior row.
 a¹. Eyes nearly obsolete, only about two ocelli on each side of the head *Fecæ*, Poc.
 b¹. Eyes well developed, 7 or 8 ocelli on each side of the head *Doriæ*, Poc.

Family Iulidæ.

Paraiulus coreanus, sp. n. (Pl. XI. figs. 12, 12 a.)

♀.—*Colour* black (when dry banded with pale green), the lower half of the face ochraceous; antennæ and legs testaceous-fuscous.

Face smooth, with a strong transverse groove between the eyes.

Collum with its inferior portion strongly narrowed and reaching behind the gnathochilarium almost to the base of the first pair of legs, the anterior border of this lateral portion strongly emarginate, deeply sulcate, like the rest of the segments. The rest of the segments with a very deep and complete transverse sulcus, the area behind which is dorsally elevated and for the most part smooth, but laterally it is strongly striate or ridged nearly up to the pore in the front of the body, but not so high behind, while the area behind it is transversely ridged from summit to base and is furnished with a fine median dorsal carinule. *Pores* conspicuous, situated above the middle of the body and nearly halfway between the sulcus and the posterior border.

Anal tergite scarcely at all produced behind, its posterior border being widely rounded; *valves* convex, with edges not compressed; *sternal plate* widely convex.

♂.—Thinner than the female, the collum laterally stouter, the second segment of the mandible squared and notched, and a small tooth-like outgrowth on the pronotum of the gnathochilarum; the legs of the first pair long, thick when seen from behind, but rather slender in profile. The protruded portions of the copulatory apparatus consisting of two pairs of processes—an anterior, each half of which is thickly clothed internally and for half its length externally with long setæ, and a posterior pair, which consists of two simple, shorter, tongue-like pieces.

Number of segments in female 58, in male 55.

Length of female 46 millim., width 3.

Length of male 39 millim., width 2.

Loc. S.E. Corea (*Alfred Carpenter*).

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ANAULACIULUS, gen. nov.

Ocelli conspicuous; forehead with punctures. *Pores* behind the sulcus, and receding further and further from it towards the hinder end of the body, not touching it even on the sixth segment. *The division between the halves of the segments very faint on the summit of the dorsum on segments 2 to 5, on the rest of the segments only extending as a faint crenulate ridge laterally a little higher than the pore. The posterior half densely and closely striate; the whole of the dorsal area of the segments sulcate, except just the anterior covered portion; the lateral portion of the anterior half also finely striolate longitudinally. Caudal process short, just surpassing the valves.*

♂. With the first legs hook-like and without processes on the coxæ of the second.

Anaulaciulus paludicola, sp. n.

Colour brunneo-flavous, with three distinct longitudinal black bands, one running along the middle line of the back, the others on a line with the pores on each side; head clear yellow below, infusate above, with a darker band between the eyes; first segment with a darker anterior border; legs flavous; segments of antennæ distally infusate; anal tergite fuscous, valves paler.

Eyes composed of about 7 rows of ocelli. *First tergite* finely striolate along its posterior border, above the lateral angle the striæ extend from anterior to posterior border; segments 2 to 6 distinctly striate above. The pores at the hinder end of the body separated from the divisional line between the segments by a space which is equal to at least twice their diameter.

Anal valves not margined, hairy, scarcely surpassed by the caudal process, which is rectangular.

Number of segments 64.

Length 30 millim., width 2; of immature male with last five segments apodous, length 20 millim., width 1.5.

Loc. Wo-Lee Lake, 25 miles S. of Ningpo (*Bassett-Smith Coll.*).

Iulus (? s. s.) *vallicola*, sp. n. (Pl. XI. fig. 13.)

Colour. Body longitudinally banded as in *sabulosus*, Linn., but the flavous stripes wider and occupying the whole of the dorsal area, except for the narrow median series of black spots; the lower half of the lateral surface of the segments flavous, although more or less clouded with fuscous; the

black stripe separating this lower flavous area from the dorsal flavous stripe narrow, consequently the body might with some accuracy be described as flavous, with three black bands; these three black bands fusing together anteriorly, so that the front of the body, *i. e.* about the first three segments, and the upper half of the head are fuscous; a darker band between the eyes; lower half of head and legs fulvous; anal segment fuscous; antennæ infuscate, pale at the base.

Eyes well developed, composed of six transverse rows of ocelli.

Head smooth, without frontal setæ.

Antennæ practically as in *I. sabulosus*.

First segment larger than in *sabulosus*, its lateral angle much less narrowed, with its thickened antero-lateral border not emarginate; the lateral portion also striate right across, with fine striæ extending along the posterior border up to the summit; second segment also larger than in *sabulosus*, its inferior portion much larger and produced forwards towards the mandible. The rest of the segments closely and densely striate from base to summit; most of the striæ complete, *i. e.* extending from the sulcus to the hinder border, some of them falling short; on segments 2 to 6 the two striæ on the summit sensibly diverging from before backwards, and leaving a triangular space, which on the posterior segments becomes filled in with striæ. *Pores* at anterior end of the body close behind the sulcus, though barely touching it, posteriorly gradually receding, until at the hinder end the space between the two is greater than the diameter of the pore; the sulcus scarcely sinuate opposite the pore. The anterior half of the segments only finely striolate.

Anal valves and sternite as in *I. sabulosus*.

Caudal process acutely angular, but only surpassing the valves a little, not upturned apically.

Legs as in *I. sabulosus*.

Number of segments 59.

Length 31 millim., width 2.3.

Loc. Da-zeh Valley, Che Kiang (*Bassett-Smith*).

Family Spirobolidæ.

Spirobolus Walkeri, sp. n. (Pl. XI. figs. 14, 14 a.)

♀.—*Colour* deep olivaceous, with the posterior border of the segments yellowish red; the anterior border of the collum and the posterior half of the caudal process yellowish red; antennæ and legs fuscous, in young examples yellowish; the anterior two pairs of legs always yellow.

Head striolate-punctate and mesially sulcate below, finely striolate above, with from 3 to 6 labral pores on each side; *eyes* large, separated by a space which is rather less than twice a diameter, composed of six transverse rows of ocelli.

Antennæ short, when extended laterally not reaching the posterior border of the collum.

Collum punctulate and striolate above, laterally narrowed to an angle of about 45° , the apex rounded, the anterior margin obliquely cut away from a point nearly on a level with the eye, sulcate, the second segment projecting below the level of the first; the rest of the segments longitudinally striate halfway up to the pore on the anterior segments, and not so high posteriorly; the upper surface very closely and finely transversely striolate in front and densely punctulate and lightly longitudinally striolate behind; scobina absent; the transverse sulcus is very weak laterally and absent on the dorsal surface, it scarcely ascends, in fact, above the pore. The *pore* rather small, just behind or almost upon the transverse sulcus, above the middle of the side. *Sterna* striate.

Anal tergite produced into an acute or rectangularly angled process, which just covers, without overlapping, the summit of the valves; *valves* with rather strongly compressed borders, lightly punctulate; *sternal plate* obtusely angled.

Legs longish, with a single seta on the distal end of the lower surface of each segment.

♂.—Thinner than the female, with the sixth and seventh segments swollen and the legs longer; the distal segments of the legs of the third to the seventh pairs inferiorly produced.

Copulatory apparatus on the same type as that of *S. americanoborealis*; the unpaired median lamina with very slender arms, the inferior angle produced into a truncate subcylindrical process projecting between the two halves of the anterior lateral laminae; the latter short, with straight inner border, and widely but unevenly convex latero-inferior border; the posterior lateral lamina strongly convex externally, lightly concave internally, with its apex narrowed and bent into a strong hook; protrusible portion very stout and long, consisting of four distinct externally convex and internally hollowed segments, from the second of which there projects inwards a sclerite which ends below in an inwardly directed pointed process, while the distal is pointed, fringed in front with a series of short hairs, and is furnished apically with a short tongue-like process.

Number of segments in female 50 to 51 and 56; in male 49 to 53.

♀. Length 82 millim., width 8.

♂. Length 85 millim., width 6.3.

Loc. Chusan Island (*J. J. Walker*, 2 ♂, 2 ♀); Da-laen-Saen, 30 miles S.W. of Ningpo, 500–2500 feet alt. (*J. J. Walker*, 1 ♀).

The example from the latter locality has fifty-six pairs of legs, but otherwise does not appear to differ from those that were taken at Chusan Island.

This species is evidently nearly allied to *S. exquisitus* of Karsch (*Zeitschr. Naturwissen.* (3) vi. p. 57) from Peking; but Karsch says of the latter: "*annulis profunde segmentatis*," and asserts that the pores are situated "*ante sulcum sat profundum longitudinalem partis posticæ*."

In *S. Walkeri*, however, there is only sometimes a trace of this latter sulcus, and the transverse sulcus, which Karsch describes as profound, is entirely obsolete dorsally and very weak at the sides.

Spirobolus Bungii of Brandt, also from Peking, may be identical either with *exquisitus* or *Walkeri*. In fact, were it not for the difference of locality, I should scarcely have felt justified in describing *Walkeri* as distinct from *Bungii*.

*Supplementary Note upon Herr Verhoeff's Subdivisions
of the so-called Genus Iulus.*

I feel that I cannot altogether pass over the genus *Iulus* without commenting upon a revision of the group that Herr Verhoeff has recently proposed (*Zool. Anz.* xvi. p. 479 &c., 1893; and *Verh. z.-b. Ges. Wien*, 1894, pt. ii. p. 137, &c., 1894). The anatomical part of this work is, it seems to me, worthy of all praise; and I cannot but congratulate the author upon the industry and perseverance he has shown in elucidating many points of morphological importance. But his supreme disregard for, or entire ignorance of, the fundamental principles of zoological nomenclature is certainly astonishing. It has resulted, moreover, in the creation of an immense amount of wholly unnecessary confusion, the unravelling of which will prove to be a task of no small difficulty. I have here taken upon myself to attempt to correct some of the more glaring errors, in order that they may penetrate no further into literature. Firstly, however, to avoid ambiguity, I venture to lay down the following propositions, which, I take it, will be generally admitted by most thoughtful systematic workers:—

A genus must contain one of the species originally referred