dickt, auch das 2. und 3. Tarsenglied ist etwas verdickt. Flügel gelblich, Randborsten spärlich und kurz, r_{4+5} und m etwas konvergent, gegen die Mündung zu parallel, ta hinter der Mitte der Diskoidalzelle und etwas vor der Mündung des r_1. Schüppchen und Schwinger weiß. 3—3.5 mm. Aus Askhabad.

Anatomical evidence that *Cylindracheta* is a Gryllotalpoid not an Embiid.

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(with plate 4)

On page 267 of the Victorian Naturalist, Vol. XLIV for January 1928, the editor, Charles Barrett Esq., refers to a suggestion by Mr. F. W. Edwards (Natural History Magazine, Vol. 1, No. 4, Oct. 1927, p. 115) that *Cylindracheta* may present a remarkable case of convergent evolution in which an embiid has taken on the general form and structure of a mole-cricket; and he concludes with the statement that Mr. Clark, who drew the figures illustrating the paper, considers that further study may support the oppinion of Giglio-Tos, that *Cylindracheta* may not be a mole-cricket (Gryllotalpoid) but a „web-spinner" (Embiid).

Giglio-Tos (Ann. Mus. Genova, Vol. 46, 1914, p. 81) was aware of the opinions of Gray, Kirby, de Saussure and Zehntner, etc., who placed *Cylindrodes*, or *Cylindracheta*, with the Gryllotalpids; and when an Orthopterist of the standing of Giglio-Tos proposes in all seriousness that *Cylindracheta* may be an embiid, others, who are not specialists in the group, are not to be blamed for thinking that *Cylindracheta* may possibly present a remarkable case of convergent evolution in which an embiid has come to resemble a mole-cricket in form and structure. It is most consoling, however, to the student of the grossly neglected subject of insect morphology, to realize that he can solve at a glance a problem that has puzzled an expert systematist, and the scorned subject of comparative anatomy may not be as useless as some would have us suppose!

If one will glance at the under side of the head of any embiid, such as the one shown in Fig. 7, it is immediately apparent that the gular region *gu* is fused with the head capsule, the cardines *car* of the maxillae are far removed from the cervical membrane *cm*, and there is no postgenal ridge (*pgr* of Figs. 11 and 14) in the head region of an embiid, which has a typically characteristic form and composition, unmistakable to anyone familiar with comparative morphology. In the ventral view of the head *Cylindracheta* (Fig. 11) on the other hand, the

gular region *gu* is a part of the submental plate *sm*, which is not fused with the head, and the sclerite in question is exactly like that of the Gryllotalpid shown in Fig. 14 (i. e. the sclerite bearing the labels *gu* and *sm*). The maxillary cardines *car* of *Cylindracheta* (Fig. 11) are not far removed from the cervical membrane *cm* as in the embiid shown in Fig. 7, and the maxillary cardines *car* of *Cylindracheta* (Fig. 11) are very near the cervical membrane *cm* exactly as is the case with the maxillary cardines *car* of the other Gryllotalpoid shown in Fig. 14. The maxillary galeae and laciniae of *Cylindracheta* (Fig. 11, *ga* and *la*) are long and slender as in the other Gryllotalpoid shown in Fig. 14, and the character of the labium in general in the two insects is essentially the same. Similarly, *Cylindracheta* (Fig. 11) exhibits a postgenal ridge *pgr* like that of the other Gryllotalpoid shown in Fig. 14, *pgr*, and is wholly unlike the embiid shown in Fig. 7 in this and all other characteristic features of the under side of the head (e. g. the presence of a hypostome, *hs*, etc.).

When one examines the head from the frontal aspect, it is equally clear that the head of *Cylindracheta* (Fig. 2) is Gryllotalpoid (Fig. 6), since both are pyriform, instead of being shaped like an embiid head; both *Cylindracheta* (Fig. 2) and the other Gryllotalpoid shown in Fig. 6, have the labrum 1 longer than broad (while the labrum is broader than long in the embiids); both have long slender mandibles *md* unlike the shorter more curved mandibles of embiids: both have the small sclerites *cli*, or clypeites, present in the anteclypeal region *ac*, though these are absent in embiids; both show traces of the epicraneal suture *ecs* absent in adult embiids; and both retain traces of the ocelli *oc* which are absent in all embiids I have examined.

Giglio-Tos seems to think that because the segments of the antennae of *Cylindracheta* are somewhat moniliform, that this indicates that *Cylindracheta* is an embiid; but the antennal segments of *Cylindracheta* are even more like those of certain termites, and the nature of the antennal segments is a worthless criterion for determining the position of any insect in its ordinal grouping. The only head structures of any value thus immediately show that *Cylindracheta* is a Gryllotalpoid, as soon as one glances at them, if he is at all familiar with comparative anatomy.

The evidence gained from a study of the thoracic structures indicating that *Cylindracheta* is a Gryllotalpoid is just as convincing as the evidence of the head structures is, to one familiar with the subject. Thus in a typical embiid (Fig. 12) the pronotum *pn* never grows down over the prothoracic pleural region *es* and *em*, etc.; the lateral cervicals *lc* have their own peculiar character not found in insects outside of the group *Embiidina;* the precoxal bridge *pr* is incomplete; the prosternum

ps is usually present; the coxae *cx* are widely separated by a broad basisternum *bs*, etc. In *Cylindracheta* (Fig. 5) on the other hand, the pronotum *pn* grows down over the prothoracic pleural region in the fashion characteristic of all saltatorial *Orthoptera* (Fig. 1), and carries the process to an even greater degree of peculiar specialisation along this typical line, by growing together behind the fore coxae, thus carrying to an extreme a marked tendency exhibited by all saltatorial *Orthoptera*, and not even hinted at in the embiids. In *Cylindracheta* (Fig. 5) the basisternum *bs* is connected with the pronotum *pn* (which has overgrown the pleural region) by a complete precoxal bridge *pr* extending from the basisternum *bs* to the pronotum *pn* in a fashion characteristic of all saltatorial *Orthoptera* (Fig. 1), but exhibited by no embiids. Unlike the broad prosternal region between the fore coxae in the Embiids (Fig. 12) the prosternal region between the fore coxae *cx* of the Gryllotalpoid shown in Fig. 1 becomes very narrow as the fore coxae become approximated, and this tendency is carried still further in the prothorax of *Cylindracheta* shown in Fig. 5, in which the fore coxae likewise tend to unite with the sternal region to some extent. No hint of the presternum *ps* of the embiid shown in Fig. 12 is exhibited by *Cylindracheta* (Fig. 5) which is just like the saltatorial *Orthoptera* in this region. Similarly, in the metathorax, the basisternum *bs* of an embiid (Fig. 8) is of a peculiar character, but the metasternum *bs* of *Cylindracheta* (Fig. 4) is nothing like that of the embiid (Fig. 8) but is essentially like that of the other Gryllotalpid shown in Fig. 3.

In the wingless embiids, the mesonota and metanota are elongated, rather simple plates, but in *Cylindracheta* the outline of the notal plates is clearly a modification of the Gryllotalpoid type, and the same is true of the pleural sclerites as well.

Giglio-Tos implies that the fossorial fore legs of *Cylindracheta* bear merely superficial resemblance to those of the Gryllotalpids through convergent evolution resulting from similar digging habits. Aside from the objection to this explanation which involves the discredited Lamarkian principle of the inheritence of acquired characters, it should be noted that the resemblance between the fossorial fore legs of *Cylindracheta* and the other Gryllotalpoids is not merely superficial and general, but both exhibit the same peculiar and characteristic modifications in their minuter details. Thus the prothoracic trochanters project in the same peculiar way in both *Cylindracheta* and the other Gryllotalpoids, the union of the prothoracic trochanters with the femora is of the same peculiar type in both, as is also true of all of the other details of the fore legs. In other fossorial insects such as certain *Coleoptera*, *Hymenoptera*, etc., the details of the fore legs do not correspond

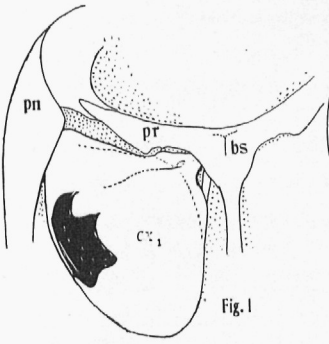

Fig. 1

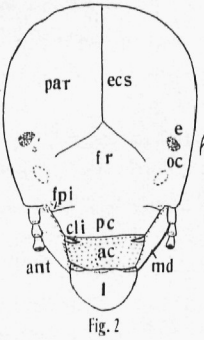

Fig. 2

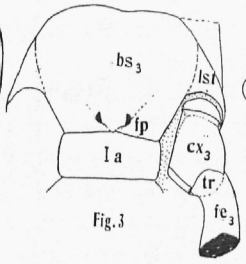

Fig. 3

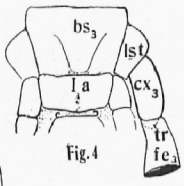

Fig. 4

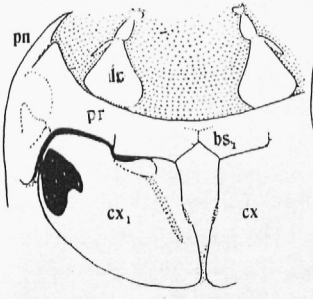

Fig. 5

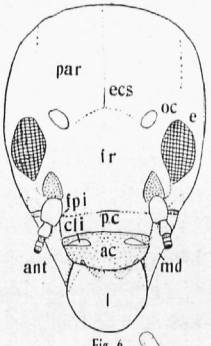

Fig. 6

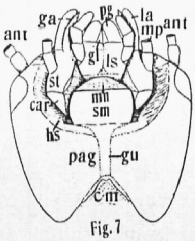

Fig. 7

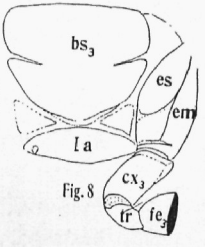

Fig. 8

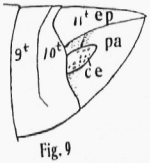

Fig. 9

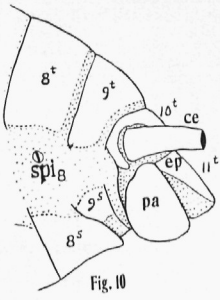

Fig. 10

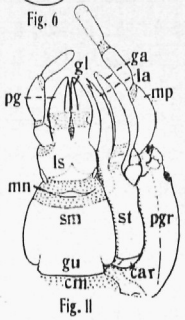

Fig. 11

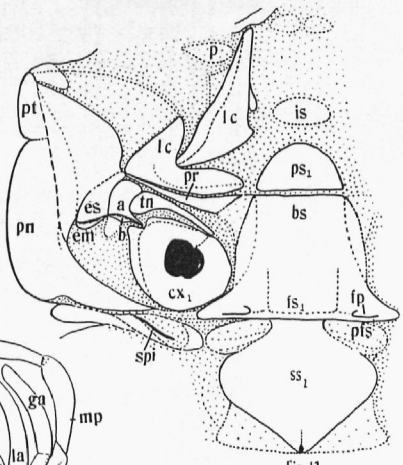

Fig. 12

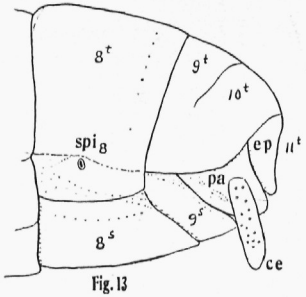

Fig. 13

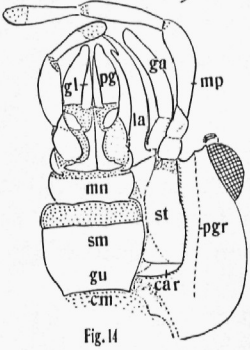

Fig. 14

G. C. Crampton, Anatomical evidence that *Cylindracheta* is a Gryllotalpoid not an Embiid.

with those the Gryllotalpoids minutely, and it is impossible to attribute such minute correspondence in detail to mere convergence — it must be due to consanguinity in the case of *Cylindracheta* and the other Gryllotalpoids.

Whoever has attemted to demonstrate the presence of a trochanter in the hind leg of a saltatorial *Orthopteron* to beginning students in insect morphology, knows that in this group of *Orthoptera* the trochanter of the hind leg is vestigial and tends to become indistinguishably united with the femur, in a very characteristic way. In the embiids (Fig. 8) on the other hand, the hind trochanter is distinct, well developed, and easy to detect. When one compares the hind leg of *Cylindracheta* (Fig. 4) with an embiid (Fig. 8) and with a Gryllotalpoid (Fig. 3) it is at once apparent that instead of being like the trochanter of an embiid, the trochanter of *Cylindracheta* is vestigial and tends to unite with the femur in the fashion characteristic of the other Gryllotalpoids, and the legs are not built on the embiid plan, but on the Gryllotalpoid plan in *Cylindracheta*. The basic plan of all of the thoracic structures of *Cylindracheta* is thus in full accord with the fundamental make up of the head structures in proclaiming, in absolutely unmistakable terms, that *Cylindracheta* is a Gryllotalpoid, not an embiid; and Giglio-Tos' suggestion that the resemblances between the two groups is due to convergent evolution, instead of consanguinity, is based upon insufficient knowledge of comparative anatomy and a lack of appreciation of what is fundamental as opposed to mere superficial resemblances.

Mr. A. N. Caudell very kindly loaned me a specimen of *Cylindracheta spegazzinii* so that I might include its structural modifications in a series of drawings depicting the modifications of various parts of the body throughout the orders of insects, for which purpose one specimen was sufficient. Although in such a discussion as the present one, it would have been preferable to be able to depict the terminal structures of both sexes of *Cylindracheta*, the one specimen I chanced to have on hand is sufficient to illustrate the points I wish to bring out concerning the non-embiid character of the abdominal structures in general in *Cylindracheta*.

In *Cylindracheta* (Fig. 13) the ninth sternite 9^s is very narrow, as is the case with the ninth sternite 9^s of the other Gryllotalpoid shown in Fig. 10, and both of these insects differ in this respect from the embiids, in which the ninth sternite is well developed. The cerci *ce* of *Cylindracheta* (Fig. 13) are composed of but one segment, like the cerci *ce* of a typical *Orthopteron* shown in Fig. 9, while the cerci of embiids are typically composed of two segments. In *Cylindracheta* (Fig. 13) there is a marked tendency for the ninth tergite 9^t to unite with the tenth tergite 10^t just as is the case in the saltatorial *Orthopteron* shown in

Fig. 9, and this feature is peculiar to the saltatorial *Orthoptera* so far as I am aware — at least it is not exhibited by any embiid I have ever seen. The character of the male genitalia of embiids, however, is the most convincing thing about the abdominal structures of the two groups of insects clearly proving that *Cylindracheta* is a Gryllotalpoid, not an embiid. Thus the male genitalia and terminal structures of every embiid are built upon one typical plan characteristic of all members of the group, and such tentencies are exhibited by no other group of insects I have ever seen, and if *Cylinoracheta* were the least bit related to the embiids, it could not help exhibiting some tendencies at least toward the development of these basically fundamental modifications exhibited by every embiid and peculiar to them alone. These peculiarly characteristic features of the terminal structures of male embiids are the modifications of the terminal tergite with its peculiar formation and its frequent demarcation into hemitergites (partially divided tergites) and the peculiar development of the male genitalia with their asymmetrical projections and modifications of the adjacent parts, characteristic of every embiid I nave seen.

It would be a useless waste of time and space to list every detail in which *Cylindracheta* proclaims its Gryllotalpoid character and differs from the embiids, and I have therefore referred merely to the most striking and easily seen basically fundamental features, which anyone can see at a glance. An examination of these featrures is so easily made, and is so convincing at the very first look, that I can only conclude that Giglio-Tos did not make a comparative anatomical study of the *Orthoptera* and embiids, and I would use this opportunity to again urge all systematists to know a little of comparative anatomy and a great deal of the special anatomy of the groups of insects with which they are dealing, since it is only by so doing that they can hope to build in a way that will be well grounded and lasting. If this is done comparative anatomy will be rescued from the utter neglect into which it has fallen, and taxonomy will be placed upon a more truly scientific basis through the replacing of the present more or less haphazard methods of grouping insects, by methods based upon a tnorough understanding of what is basic and fundamental — which can bo gained only by studying comparative morphology!

Abbreviations.

a. = Antetrochantin	fr. = Frons	p. = Precervicals
ac. = Anteclypeus	fs. = Furcasternum	pa. = Paraproct
ant. = Antenna	ga. = Galea	pag = Paragula
b. = Postrochantin	gl. = Glossa	par. = Parietals
bs. = Basisternum	gu. = Gula	pc. = Postclypeus
car. = Cardo	hs. = Hypostoma	pfs. = Postfurcasternum

ce. = Cercus	Ia. = First abdominal sternite	pg. = Paraglossa
cli. = Clypeites	is. = Intersternite	pgr. = Postgenal ridge
cm. = Cervical membrane	l. = Labrum	pn. = Pronotum
cx. = Coxa	la. = Lacinia	pr. = Precoxale
e. = Compound eye	lc. = Lateral cervicals	ps. = Presternum
ecs. = Epicraneal suture	lst. = Labiostipes	pt. = Pretergite
em. = Epimeron	lst. = Laterosternite	sm. = Submentum
ep. = Epiproct	md. = Mandible	spi. = Spiracle
es. = Episternum	mn. = Mentum	ss. = Spinasternum
fe. = Femur	mp. = Maxillary palpus	st. = Stipes
fp. = Furcal pits	oc. = Ocellus	tn. = Trochantin
fpi. = Frontal pits		tr. = Trochanter

Explanation of Plate 4.

Fig. 1 = Ventral view of dextral half of prosternum and propleuron of *Gryllotalpa*, spread out in one plane.
Fig. 2 = Frontal view of head of *Cylindracheta spegazzinii*.
Fig. 3 = Ventral view of metasternum and first abdominal sternite of *Gryllotalpa*.
Fig. 4 = Ventral view of metasternum of *Cylindracheta*.
Fig. 5 = Ventral view of prosternum of *Cylindracheta*.
Fig. 6 = Frontal view of head of *Gryllotalpa*.
Fig. 7 = Ventral view of head of *Embia major*.
Fig. 8 = Ventral view of metasternum of *Embia*.
Fig. 9 = Lateral view of terminal abdominal structures of *Dissosteira carolina*.
Fig. 10 = Lateral view of terminal apdominal structures *Gryllotalpa*.
Fig. 11 = Ventral view of sinistral half of head of *Cylindracheta*.
Fig. 12 = Ventral view of dextral half of prothorax of *Embia*.
Fig. 13 = Lateral view of terminal abdominal structures of *Cylindracheta*.
Fig. 14 = Ventral view of sinistral half of headof *Gryllotalpa*.

Neues über Hirschkäfer (Coleopt. Lucanidae).

Von P. Nagel, Hannover.

(Mit 3 Figuren)

Metadorcus rufolineatus (nov. spec.): ♂ ignotus. — ♀ (Fig. 1) Niger, nitidus. Caput transversum, dense fortiterque punctatum, margine antico perpaulo excavato, angulis anticis rotundatis, cantho oculos $^1/_3$ dividiente, ante oculos tuberculo instructum, mandibulis magnis, supra costa singulare armatis. Prothorax capite latior, nitidissimus, in disco disparse sed distincte, ad margines dense punctatus, angulis anticis productis acutis, lateribus rotundatis et postice divergentibus, angulis posticis curvatis et in unco parvo finientibus. Scutellum cordiforme punctatum. Elytrae prothoracis latitudine, angulis anticis denticulo parvo armatis, 8 striis punctatis et ab humeris fere usque ad apicem stria rufo-lutea ornatae. Subtus nitidus; mentum transversum et dense punctatum, margine antico excavato; in gula sparsim, circum oculos dense punctatus. Metasternum sparsim sed profunde, epipleurae et segmentes abdominalis dense pro-

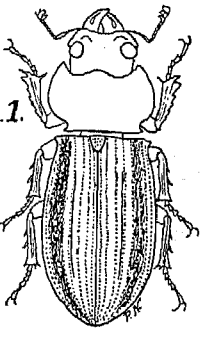
Fig. 1.