

Descriptions of two new exotic species of the genus *Chordodes*.

By

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With plates 21 and 22.

In the course of certain studies upon Gordiacea, I have determined two new species of *Chordodes* (CREPLIN), a genus closely allied to *Gordius*, from Borneo and Africa, and these forms are here described; the publication of the systematic results of my studies upon the american species of this group being postponed until I have an opportunity to compare more material.

1. *Chordodes furnessi* n. sp.

2 specimens, a male and a female, from the abdomen of two different species of leaf Mantids¹⁾; these were collected by Dr. W. H. FURNESS in Borneo, in honor of whom I have the pleasure of naming them.

Cuticle with three kinds of tubercles: 1) The largest are rounded at the apex, and usually about $1\frac{1}{3}$ times as long as they are broad; they vary considerably in shape, and while they are usually thickest at the base, are sometimes nearly square in outline, and sometimes thickest around the middle part. On the rounded apex occur short, curved hairs, the number and diameter of which varies on different tubercles. As seen on surface views in Canada balsam, these tubercles have the appearance of rings, with a darker outer

1) My colleague Dr. PHILIP P. CALVERT, of the University of Pennsylvania, has kindly identified for me the hosts of these two specimens of *Chordodes* as follows: the female specimen from the abdomen of *Hierodula* sp.; the male from the abdomen of *Deroplatys* sp.

zone and an inner clear spot; sections show that this central clear spot is not the opening of a pore or canal, but that it is merely a core of lighter and less refractive substance, which is surrounded by a darker and more deeply-staining peripheral layer. 2) Tubercles which are usually of less than half the height of the preceding, and are either hemispherical or of a rounded conical outline. These also bear hairs upon their apices, but the hairs are less numerous and more delicate than those of the preceding tubercles, and may be seen only by careful focussing with the immersion lens ($1/12$ of ZEISS). 3) Hyaline processes which are not seen upon surface views, and which are usually either club-shaped or finger-shaped; these processes which may represent sense-organs, are always slender in form, but may attain nearly the altitude of the first kind of tubercles.

The tubercles of the first order are arranged into two kinds of groups: 1) They occur in pairs, the two components of such a pair being in close contact, while the longitudinal axis of the two lies more or less in the transverse plane of the body. These isolated pairs — which are occasionally represented by groups of 3 or 4 — are usually placed at quite regular distances from one another, and the tubercles composing them are as a rule slightly larger than those which form the next kind of groups. 2) The greater number of these tubercles (of the first order) occur in groups of about 15 to 20, in which the individual tubercles are not in contact with one another; the number of these larger groups is not quite as great as that of the groups of twos. The second kind of tubercles are the most numerous of all, and are not arranged into groups. The third kind occur singly and sparingly, and are the least numerous of all, though they are somewhat more numerous on the ends of the body than elsewhere, especially on the posterior end of the female. Cuticular tubercles are wholly absent on the tip of the head.

Form. In the male the body is cylindrical, the anterior end gradually diminishing in diameter; the head is small, obtusely rounded at the apex, and narrower than the portion immediately preceding. The posterior end of the body (for the length of three-eighths of an inch) is narrower than the part preceding; the distal end of body, as seen on lateral view, is truncated, there is a slight ventral groove in the median line, which extends from the distal end to the cloacal opening, which is not terminal. Female of greater diameter and length than the male; the posterior end of the body (for the length of half an inch) is narrower than the part immediately preceding,

except the extreme distal end, which is swollen and rounded, and the cloacal end is termino-ventral; the anterior portion of the body is as in the male.

Color. (I give the color of the two specimens as seen in the concentrated glycerine in which they were placed; the worms became darker after they were transposed to alcohol.) In the male, the tip of the head is white; the body is a deep yellowish-brown anteriorly which becomes darker distally, and at the posterior end of the body (for the distance of half an inch) changes into a deep reddish color. In the female the tip of the head is white, while the rest of the body is uniformly deep olive brown.

	Length	Greatest diameter
Male	216 mm	1.25 mm
Female	268 „	2.— „

This appears to be a well-marked species without any close resemblance to the forms described by RÖMER (1896, in: Abh. Senckenberg. Ges. Frankfurt a. M., V. 23) from Borneo; it is especially characterized by the occurrence of pairs of tubercles on the cuticle, and by the shortness of their hairs.

The two type specimens are in the collection of the Wistar Museum of Anatomy, Philadelphia.

2. *Chordodes albibarbatus* n. sp.

One male, LEIDY collection no. 5218, in the possession of the Biological School of the University of Pennsylvania; collected by Dr. NASSAU at the Ogove River, Africa. The specific name proposed is compounded of the two adjectives *albus* and *barbatus*, and has reference to the white tufts of hairs seen on the cuticle with low powers of the microscope.

Cuticle. In Canada balsam on surface views and on sections, four kinds of tubercles may be distinguished: 1) The largest, which always occur in pairs, have a more or less prismatic form (oval on surface view), are but little longer than wide, and apically are obtusely rounded. The distal end of each tubercle is characterized by its hyaline, white appearance, while the remaining portion is darker and stains deeply with eosin; in none of the other kinds of tubercles is such a structurally differentiated portion of substance to be seen. The proximal portion of the tubercle consists of a peripheral, darker zone, and an axial, less deeply-staining portion, so that viewed from the surface these tubercles appear like dark rings. The hyaline,

distal cap of each tubercle bears a large number of densely-placed, thick, white hairs, which are not attenuated at their distal ends but are of equal diameter throughout; the most central of these hairs are somewhat longer than the tubercle itself. These hairs are not stiff in texture; they are densely grouped, covering the whole surface of the distal cap of the tubercle, and the laterally-placed ones are somewhat pendant, so as to partially cover over the apices of the contiguous tubercles. 2) Tubercles which are grouped around each pair of the preceding, there being from 20 to 30 in each group. On surface views these also appear as dark rings, but they are of only $\frac{1}{2}$ or $\frac{1}{3}$ the diameter of the preceding kind. Those nearest the centre of each group, i. e. those immediately adjacent to the central pair of tubercles of the first order, are higher than the more peripheral ones, and may be even of somewhat greater elevation than the tubercles of the first order; but they are always more slender in shape, and have a more or less pointed apex. The tubercles at the periphery of each group are of still smaller diameter, and are conical or pyramidal in outline. Each tubercle bears upon its apex a number of short, fine hairs. 3) Tubercles, the shortest and most numerous of all, of about the height of the lowest of those of the 2nd order. These have usually a squarish or hemispherical form, though they vary considerably in shape; they do not bear hairs nor do they appear like rings upon surface views. They are not arranged into groups, but occur close together, filling out the spaces between the groups of tubercles of the 2nd order; their color is yellowish-brown. 4) The last kind of prominences are delicate, club-shaped processes, which occur only sparingly, and which attain the height of the medium-sized tubercles of type 2; these are not seen upon surface views.

When studied in alcohol before clearing in oil, the cuticle has quite a different appearance from that just described. A system of intersecting lines, which apparently have their position in the fibrous cuticula of VEJDOVSKÝ (in: Z. wiss. Zool., 1886), are to be seen, between which lie rhomb-shaped spaces. Each of the groups of tubercles (formed of tubercles 1 and 2) appears merely as a high eminence covered with snow-white hairs, the latter completely covering and obscuring the tubercles of the 2nd order which lie beneath them. Between these white eminences are seen the tubercles of the third order, though the hyaline, club-shaped processes are not seen at all. But such alcoholic preparations show one kind of tubercle which is only very faintly marked on cleared preparations: namely,

interspersed among the tubercles of the 3rd order are small groups of three or four tubercles each, which differ from their neighbors merely in their darker color and slightly greater size. Accordingly, in these tubercles we have a fifth kind of cuticular tubercles.

Tubercles are absent on the tip of the head.

Form. The anterior end of the body is attenuated and somewhat pointed, while the tip of the head is obtusely rounded. The body is cylindrical without superficial grooves, and thickest in the posterior half. The extreme distal end is narrower than the part immediately preceding, with a deep median groove upon the termino-ventral aspect; to each side of this groove is a rounded, longitudinal ridge, these ridges extending only for a short distance upon the ventral surface of the body. Anterior to this groove, upon the ventral surface of the body, lies the cloacal aperture, which is slightly elongate in form. At each side of this aperture, and at a little distance from it, is a longitudinal row of hairs, which are shorter and more delicate than the hairs of the longest papillae (tubercles). Leaving out of consideration these rows of hairs, the posterior end has the shape characteristic for the males of this genus, which serves to easily distinguish them from the males of the allied *Gordius* (cf. JANDA, in: Zool. Jahrb., V. 7, Syst., 1893).

Color. Head a pale yellowish-white, and the ventral surface of the body in the region of the cloacal aperture the same color. Elsewhere of a yellowish-brown, thickly mottled with deep reddish-brown spots of irregular size and shape, which are easily seen with the naked eye.

This is apparently an immature individual, since spermatozoa are absent in the vasa deferentia in the middle body region.

Length 223 mm; greatest diameter 1,25 mm.

This species is apparently closely related to *C. bouvieri* of VILLOT, but differs from it in that the hairs of the tubercles of the 1st order are much dicker and longer, and are not directed downwards (cf. the figure given by VILLOT, in: Ann. Sc. Nat., 1887, Zool.). The hairs of the largest tubercles in our new species have nearly the massive form characteristic for those of *C. ornatus* (cf. GRENACHER, in: Z. wiss. Zool., 1868).

24th May 1897, Wistar Institute
of Anatomy, Philadelphia.

Explanation of the Plates.

(The outlines of all figures have been drawn with the camera lucida.)

Plate 21.

Fig. 1—6. *Chordodes furnessi* n. sp.

Fig. 1. Outline of the head end of the female (ZEISS, obj. A, oc. 2). *m* mouth.

Fig. 2. The same, male (*idem*).

Fig. 3. Outline of the posterior end of the female, ventral view (*idem*). *c* cloacal aperture.

Fig. 4. Posterior end of the male, lateral view (*idem*).

Fig. 5. Surface view of the cuticle, from a preparation in balsam (obj. C, oc. 4). *a* tubercles of the 1st order, *b* tubercles of the 2nd order.

Fig. 6. Transverse section of the cuticle (hom. imm. $\frac{1}{12}$, oc. 2). *a* tubercles of the 1st order, *b* of the 2nd order, *c* hyaline processes.

Plate 22.

Fig. 7—11. *Chordodes albibarbus* n. sp.

Fig. 7. Outline of the head end, lateral view (obj. A, oc. 2).

Fig. 8. Posterior end, oblique lateral view (*idem*). *c* cloacal aperture.

Fig. 9. Surface view of the cuticle, as seen in alcohol (obj. C, oc. 2). *a* tubercles of the 1st order, *b* of the 2nd order, *c* of the 3rd order, *d* hyaline processes (tubercles of the 4th order), *e* tubercles of the 5th order.

Fig. 10. Surface view of the cuticle, from a preparation in balsam (obj. C, oc. 4). Lettering as for Fig. 9.

Fig. 11. Transverse section of the cuticle (hom. imm. $\frac{1}{12}$, oc. 2). Lettering as for Fig. 9.

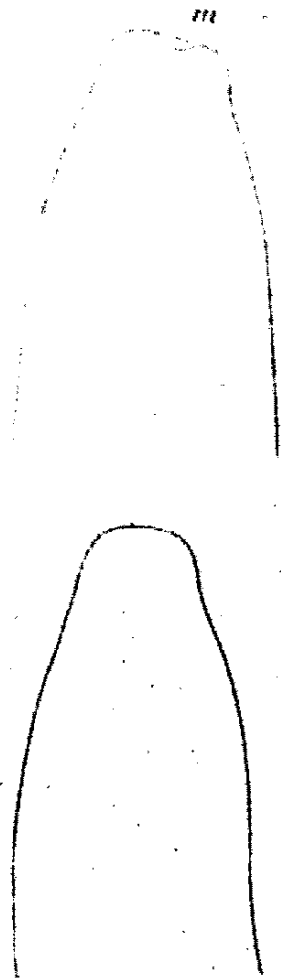


Fig. 1.

Fig. 2.

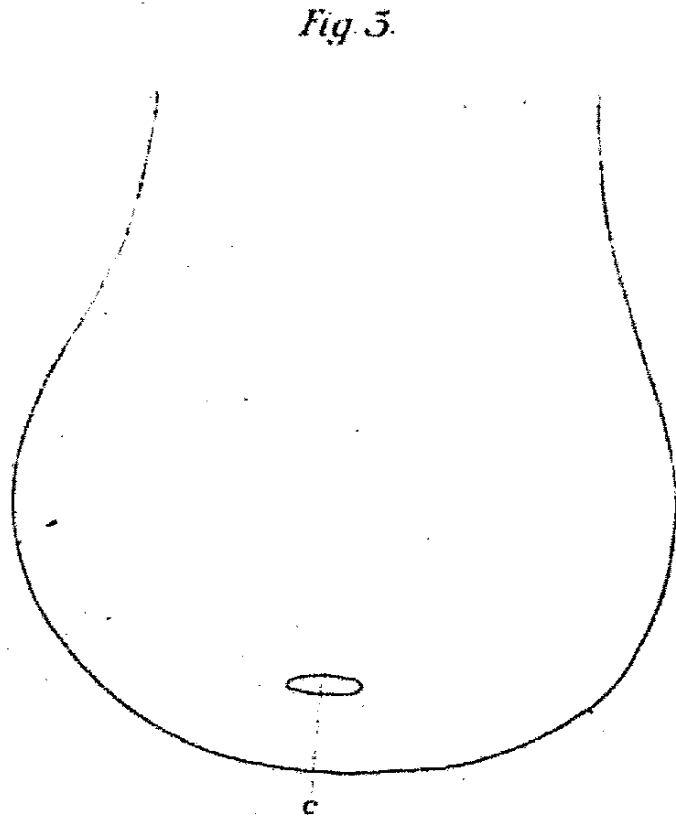


Fig. 3.

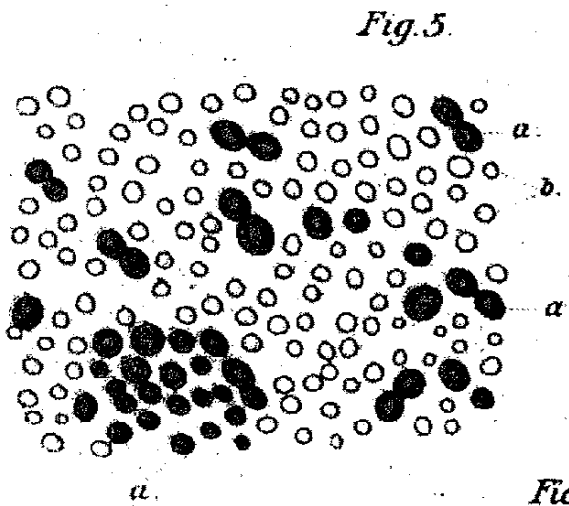


Fig. 5.

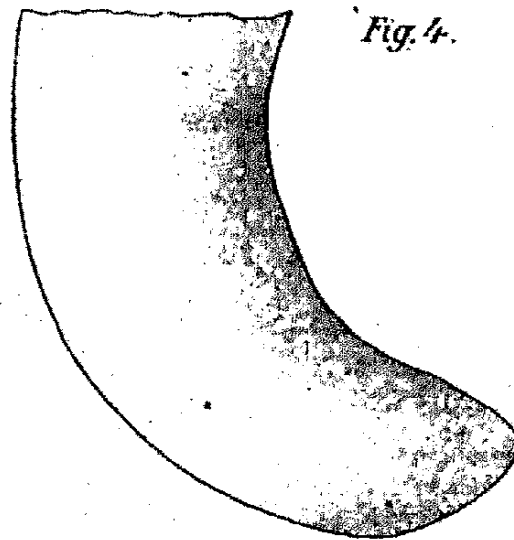


Fig. 4.

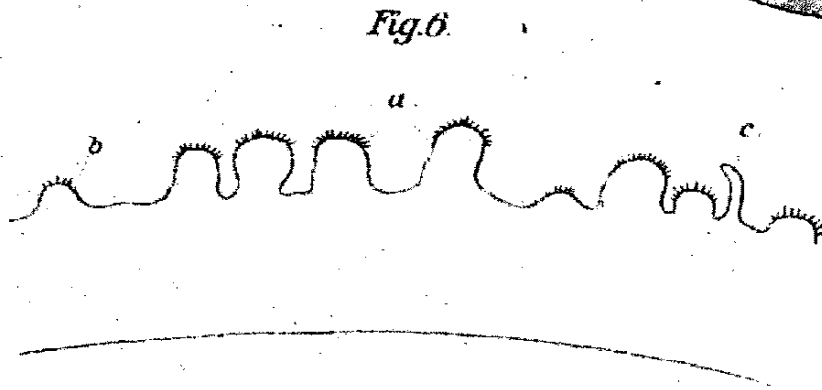


Fig. 6.

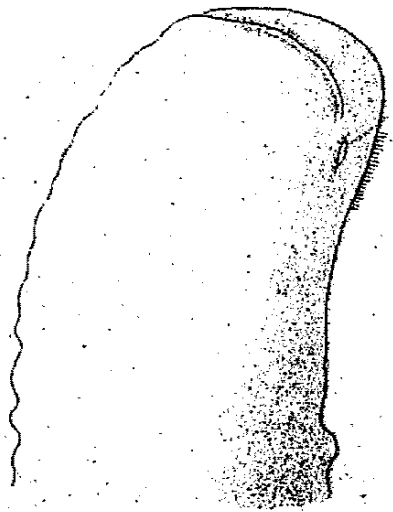


Fig. 8.

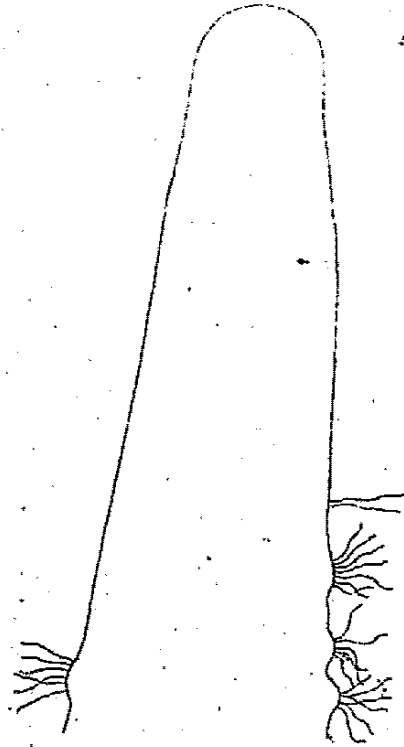


Fig. 7.

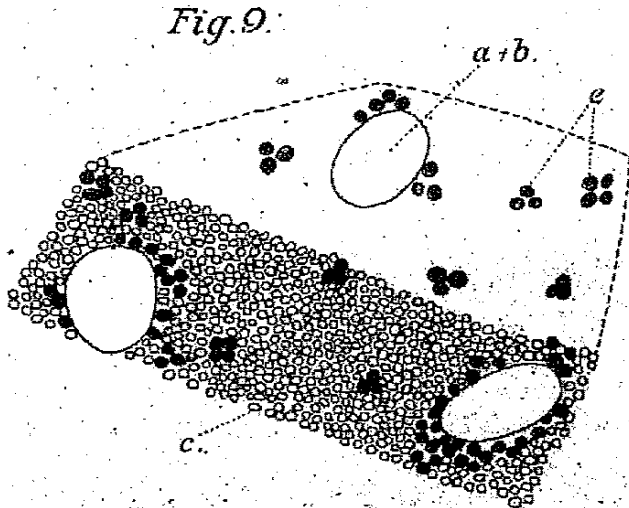


Fig. 9.

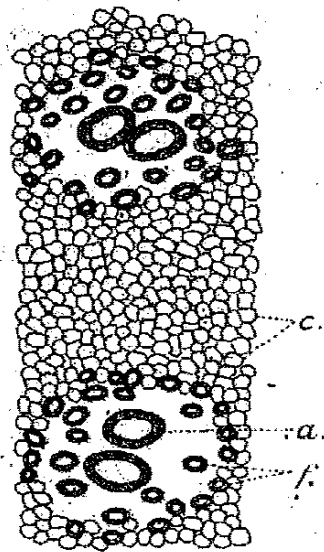


Fig. 10.

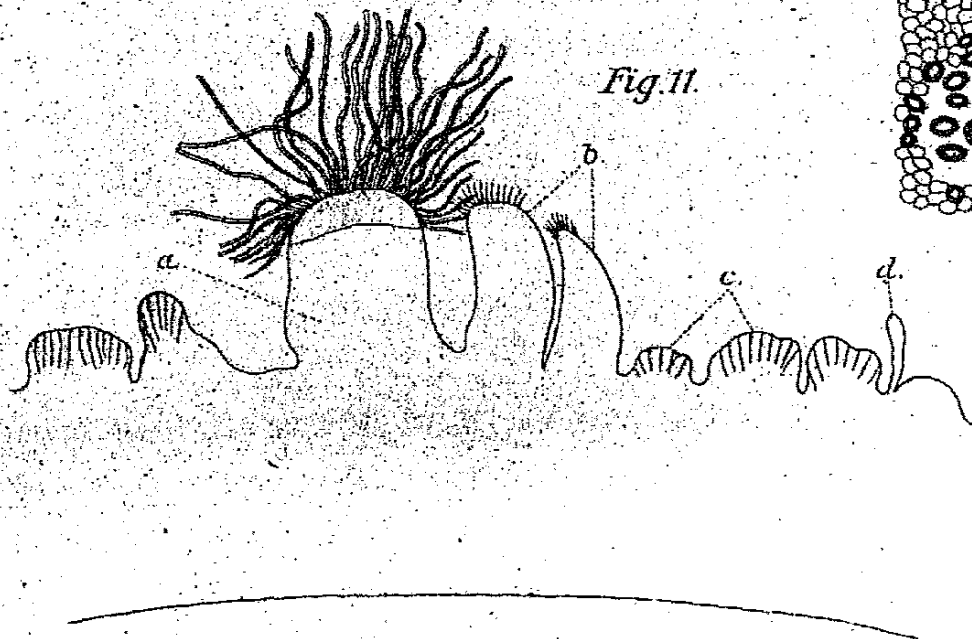


Fig. 11.