

ON SOME TERRESTRIAL ISOPODS IN THE UNITED STATES NATIONAL MUSEUM

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Having devoted much time to the study of the Trichoniscidae of northern Europe, I desired also to know something of the species of this family of terrestrial Isopods that had been found in North America. Through the friendly assistance of Dr. Waldo L. Schmitt, curator of marine invertebrates, a series of specimens was sent to me for study from the United States National Museum. My examination of this collection has given rise to the following article.

In the North American collection I have found three species more or less widespread in Europe, *Trichoniscus pusillus* Brandt, *Trichoniscus pygmaeus* Sars, and *Haplophthalmus danicus* Budde-Lund, and two species foreign to Europe, *Trichoniscus papillicornis* Richardson and *Brackenridgia cavernarum* Ulrich.

It is reasonably certain that at least two of the species first mentioned, *Trichoniscus pygmaeus* and *Haplophthalmus danicus*, have been brought to North America from Europe with garden produce, etc. In the greater part of their European ranges these species also bear an obviously synanthropic character and are to be found most frequently in hothouses, gardens, graveyards, etc.

With respect to *Trichoniscus pusillus* it is more difficult to arrive at a definite conclusion. Its presence and distribution in North America is first to be carefully considered. It seems, however, remotely possible that this species—occurring over the whole of central and northern Europe and being the most common of all the terrestrial Isopods found in the Scandinavian countries—may also be indigenous in the eastern parts of North America.

Trichoniscus papillicornis Richardson, which thus far has been found only in the extreme northern portion of the Pacific Ocean (Bering Island and Cook Inlet) has on a close examination been found not to be a *Trichoniscus*. It belongs to the family Scyphacidae and is nearly allied to certain species of terrestrial Isopods which

have hitherto been found only in antarctic regions. This species, therefore, is of unusually great zoogeographical interest, so I have given in the following pages a detailed description of it as well as a series of illustrations.

The specimens of *Brackenridgia cavernarum* Ulrich in the collection are in a very disjointed condition, and so I have refrained from a close examination of them. From Ulrich's description and illustrations (Richardson, 1905, p. 700), it is very doubtful whether this species belongs to the family Trichoniscidae (compare especially Richardson, 1905, fig. 740*d*). If it does, it occupies a very independent position. I leave it to my American colleagues to answer this question with the aid of fresh and better material.

So far as can be judged at present, it is rather uncertain whether North America possesses any terrestrial Isopods undoubtedly indigenous belonging to the family Trichoniscidae.

As a result of these studies *Trichoniscus papillicornis* (Richardson) is made the type of a new genus *Detonella*; the supposed identity of *Haplophthalmus puteus* Hay with the earlier species *H. danicus* Budde-Lund is confirmed, and a new variety of this latter, *H. danicus* var. *rotundatus*, is designated and briefly characterized.

Family TRICHONISCIDAE Sars, 1899

TRICHONISCUS PUSILLUS Brandt, 1833

Localities.—Niagara Falls, N. Y.; Haverford, Pa., H. Pratt, collector. On fern leaf from England, intercepted at New York City, January 22, 1924, Ivan Schiller, collector.

Remarks.—Richardson, 1905 (p. 695), mentions no definite North American localities for this species, but uses only the vague expression "North America." From the present collection no definite conclusion can be drawn. This species, which is very widespread, especially in the north of Europe, may very probably be indigenous at least in the eastern parts of North America. But it may also be possible that, as with so many other terrestrial Isopods and Diplopods, it was introduced from Europe and has since spread more or less independently. It is for North American zoologists to try to settle this question.

The European "*Trichoniscus pusillus*" has proved to constitute a collective species, containing a number of more or less nearly allied species and subspecies that are to be definitely distinguished only by means of the pleopods of the males. The greatest part of the European "*Trichoniscus pusillus*," however, comprises one species, the true *Trichoniscus pusillus* Brandt. This is definitely settled regarding western and northern Europe, and it is the most common

of all the terrestrial Isopods in the Scandinavian countries. It is remarkable that the males of this species are usually much rarer than the females. Only in southern France do males and females appear in about equal numbers. In central France males are more uncommon and in the northern part very rare. (See Vandel, 1923, p. 793.) In the south of Sweden I have, on an average, found only 1 male to each 100-200 females. In northern Europe, consequently, parthenogenesis seems to be the general rule and the uncommon males can be of no great importance in the perpetuation of the species. It would be of interest to learn the corresponding facts for the tribe of *Trichoniscus pusillus* inhabiting North America.

Whether the North American *Trichoniscus pusillus* is identical with the true *Trichoniscus pusillus* Brandt of west and north Europe can be made certain only after the discovery of a male, as comparison of females alone can not decide this point.

TRICHONISCUS PYGMAEUS Sars, 1899

Locality.—On lily bulbs from Scotland, intercepted at New York City, October 4, 1923, I. Schiller, collector.

Remarks.—This species is not rare in southern Sweden, but occurs only synanthropically in hothouses, gardens, and graveyards, and in Norway, Germany, and England it is found in similar locations. It will, on closer investigation, certainly be found, at least in hothouses, in the eastern parts of North America. Because of its concealed habitation, usually down in the earth, under stones, rotten wood, etc., it is difficult to discover. Like other species of Trichoniscidae, it is most easily collected during the early spring and the late autumn. The males of this species are almost as common as the females.

HAPLOPHTHALMUS DANICUS Budde-Lund, 1879

1899 *Haplophthalmus puteus* HAY, Proc. U. S. Nat. Mus., vol. 21, p. 871, pl. 86, figs. 1-15.

1905 *Haplophthalmus puteus* RICHARDSON, Bull. U. S. Nat. Mus., No. 54, p. 697, fig. 739.

Localities.—Plummer Island, Potomac River, Maryland, from deep layer of old leaves, May 6, 1924, H. S. Barber, collector. From soil about roots of asparagus from Germany, intercepted at Philadelphia, Pennsylvania, November 4, 1924, R. S. Cogswell, collector.

In 1899, Hay described a terrestrial Isopod from wells in Indiana as new to science, under the name of *Haplophthalmus puteus*. Verhoeff later (1908, p. 189) demonstrated that this species was certainly identical with *H. danicus* Budde-Lund which is widely distributed in Europe. Verhoeff points out that there is only a single character that distinguishes one species from the other, namely, the shape of the telson, but accentuates at the same time that this difference is probably not real but caused by an error of observation by Hay.

The telson of *H. danicus* is thin and pellucid, and Hay had obviously regarded the internal edge of the basal parts of the uropoda as an acute-angled incision into the telson: "Terminal segment of abdomen notched behind." Though I have had no opportunity to examine Hay's types, I admit without hesitation Verhoeff's construction.¹

Richardson includes *H. puteus* Hay in her monograph on the Isopods of North America, but gives only a reprint of Hay's description and reproductions. She declares: "Although the types (two or three fragments) are in the United States National Museum, they have been so mutilated through dissection that I have found it more satisfactory to quote the above."

The figures that Hay has appended to his original description are numerous and fairly good and make certain the identity of *H. puteus* and *H. danicus*. They are, however, somewhat schematic and present some minor errors. As *H. danicus* has not been minutely described and figured (the figures in Sars, 1899, being rather schematic) I have given here short descriptions and sketches of the parts most significant as far as classification is concerned. The descriptions and figures are from the specimens from Plummer Island, Maryland, with the exception of the mandibles, which are from Swedish specimens, as the American micropreparations did not show the proportions very well.

Description.—Antennulae (fig. 1*a*) with the basal joint short and broad, the second joint somewhat longer than the first but much narrower, the terminal joint as long as the second but very much narrower, carrying at the end five sensory filaments, one of which is placed a little lower than the others.

Antennae (fig. 1*b*) with the basal joint short and very broad, transverse, the second joint longer but rather broad, the third joint somewhat shorter than the second, the fourth joint more than twice as long as the third, concave at the outer side, the fifth joint somewhat longer than the fourth, narrow at the base and abruptly thickening upwards. The second and third joints carry a few, the fourth and fifth joints numerous, pointed tubercles formed of short lamellar bristles, and arranged in longitudinal rows. Flagellum shorter than the last joint of the peduncle, three-jointed, the last joint terminating in a dense bunch of long delicate hair-like bristles; all the joints covered with short lamellar bristles, the second joint also carrying a few olfactory setae (*Leydig'sche Borsten*).

Right mandible (fig. 1*c*) with the outer cutting edge formed of two large teeth, the inner cutting edge being represented by a cylindrical, somewhat curved prominence, ending in a crown of small teeth at the base of which is a single curved plumose seta.

¹Mr. C. R. Shoemaker, of the U. S. National Museum, has examined the cotypes of *Haplophthalmus puteus* Hay and writes that there is no incision in the telson.

Left mandible (fig. 1 *d*) with the outer cutting edge formed of four teeth and the inner of three. Near the base of the inner cutting edge are two curved plumose setae. The molar tubercle is large, prominent, and ridged.



FIG. 1.—HAPLOPHTHALMUS DANICUS BUDDE-LUND. *a.* ANTENNULA; *b.* ANTENNA; *c.* RIGHT MANDIBLE DRAWN FROM SWEDISH SPECIMEN; *d.* LEFT MANDIBLE DRAWN FROM SWEDISH SPECIMEN; *e.* FIRST MAXILLA; *f.* SECOND MAXILLA; *g.* MAXILLIPED; *h.* PENIS

First maxilla (fig. 1 *e*), outer lobe armed at the end with about six acute, curved teeth, the two external ones being the largest, the following gradually smaller. Between the teeth is a delicate curved seta, thickened at the end. Inner lobe with three brushlike setae,

the inner one being much larger than the others, which are almost subequal.

Second maxilla (fig. 1 *f*) distinctly bilobed at the apex, the inner lobe being somewhat longer and twice as broad as the outer. Both lobes are covered with delicate long and short setae, most of which are arranged in short transverse rows; they also carry a few stouter setae, two at the inner apex of the outer lobe, and about five at the apex and five at the inner distal margin of the inner lobe.

Maxillipeds (fig. 1 *g*), palp with the ischium distinct and armed on the outer side with two short spines. The inner margin of the palp with lobes which bear numerous short and long, stout and fine setae, and the outer margin bearing a few stout setae. The terminal part of the palp is distinctly segmented, the segments being mostly marked only through the lobes at the inner and the scut setae at the outer margin. Masticatory lobe narrow, oblong, and ending in a great conical obscurely segmented, densely hairy appendage.

Legs (fig. 2 *a-b*); in the male the distal joints of the legs are shorter and broader than in the female, and the spines of these joints are arranged in a somewhat different way in the two sexes. The general shape of the joints and also the arrangements of the setae in the males can be best made out from the accompanying figures.

Pleopoda (fig. 2 *c-d*); in the male the first pleopod has the basal portion large and somewhat expanded laterally. The exopodite is lengthened triangularly, at the middle abruptly narrowing through a break on the lateral margin. The endopodite is two-jointed and slender, the terminal joint being somewhat longer and slenderer than the basal joint, almost linear and rather abruptly narrowing toward the apex.

The second pleopod has the basal portion much smaller than the first and triangularly produced at the postero-lateral angle. The exopodite is transversely rectangular with the posterior margin concave and the angles rounded. The inner and posterior margins are fringed with very fine short setae and near the inner posterior angle there is also a single stouter seta. The endopodite has the basal joint short and broad, broader at the base, the terminal joint being very long and gradually tapering toward the middle from a rather broad base, then forming a straight needle.

Remarks.—I have examined a great number of specimens of this species from various parts of south Sweden and find that the first and second pleopoda of the male are subject to a certain variability. Amongst the pleopoda I regard that form as typical which I have described and reproduced above. In rare cases I find, in the first pleopoda, a very short, rounded, heart-shaped exopodite, the back

edge of which does not even reach the terminal joint of the endopodite. I designate this form as variety *rotundatus*, new variety.

Lundblad (Entomol. Tidskr. Stockholm, 1914) has described individuals of this species from Sweden with only four sensory filaments on the antennulae under a special varietal name, while Sars (1899, p. 169) gives six; but this variety can hardly be maintained, as the number of sensory filaments seems to vary between four and six. I have found that five is the most common number.

Haplophthalmus danicus is widely spread in Europe, including the Scandinavian countries. The species, however, can not be indige-

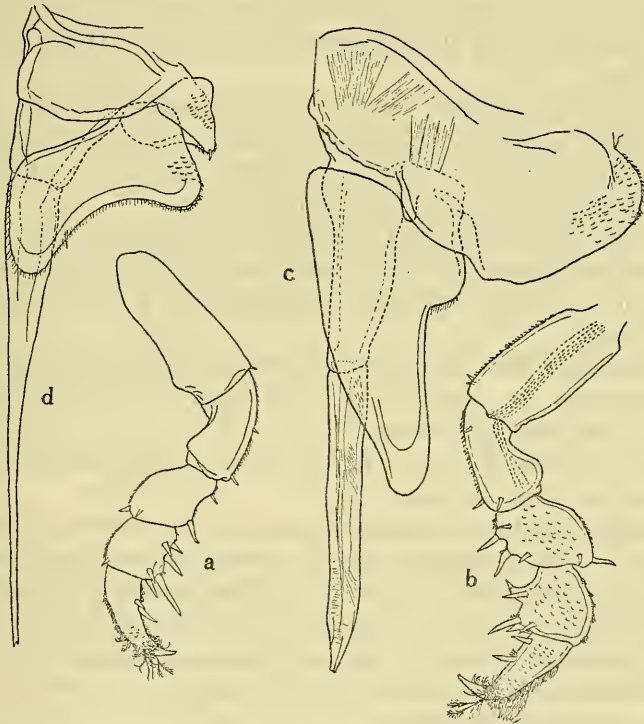


FIG. 2.—HAPLOPHTHALMUS DANICUS BUDE-LUND. MALE: a. FIRST LEG; b. SEVENTH LEG; c. FIRST PLEOPOD; d. SECOND PLEOPOD

nous within the greater part of its European range but has certainly been introduced through the agency of man. It has been transported with garden produce, etc., and under favorable conditions has spread farther independently afterwards. It is often to be found under very natural conditions in Scandinavia.

The genus *Haplophthalmus* probably originated in the south of Europe as Verhoeff (1908, p. 195) has demonstrated. *H. danicus* has undoubtedly been introduced into North America in the same manner as into the northern parts of Europe, as with garden produce, etc. There will perhaps be found still another species of this genus

in North America, *Haplophthalmus mengei* Zaddach. This species also is widely distributed in Europe which, in part at least, is due to the spread of culture, and in the south of Sweden the two species are not uncommonly to be found together. *H. mengei* is more fully discussed in Sars's excellent account (1899, pp. 167-168, pl. 72, fig. 1).

Family SCYPHACIDAE Chilton, 1901

DETONELLA, new genus

Body oblong oval, rather convex, epimera moderately developed. Pleon not abruptly narrower than pereion, last segment short, apex rounded. Dorsal surface with transverse rows of tubercles which are more developed in the male than the female. Head with large lateral lobes.

Eyes small but distinct and prominent, composed of few ocelli.

Antennulae with well-developed sensory plumose bristles at the second joint besides the usual sensory filaments at the third.

Antennae with four-jointed flagellum.

Mandibles with a bunch of stiff hairs at the base of the inner cutting edge, left mandible with three recurved brush-like setae and right with two. Molar process represented by a dense tuft of long plumose setae.

First maxillae with the outer lobe terminating in about 10 strongly chitinous spines, five of which are bifid, inner lobe bearing at the end two brush-like, subequal setae.

Second maxillae distinctly bilobed at the apex, outer lobe being much smaller than the inner.

Maxillipeds with palp longer than masticatory lobe. Palp lobed on the inner side, indicating that it consists of four joints, each lobe bearing a large number of stout setae. Masticatory lobe rectangular, rounded, truncate at the extremity, covered with fine setae and a few strong spines and bearing at its inner angle a plumose seta.

Legs rather short, increasing little in length posteriorly.

Penis bilobed at the apex.

Pleopoda simple, very different in shape and structure in male and female; in the former the inner dorsal surface of the exopodites bears a great number of long plumose setae which are lacking in the latter.

Uropoda produced, reaching considerably beyond the terminal segment, rami subequal in length but the inner one much the narrower.

Remarks.—The genus described above manifests in all essential characteristics so near an agreement with the genus *Deto* (Guérin) Chilton that I have created it only with some hesitation. Many differences, however, are to be found which seem to require the separation of the genus *Detonella*. It is also to be noted that all

representatives of the genus *Deto* hitherto known have a subantarctic range—New Zealand; Australia; St. Pauls Island, Indian Ocean; South Africa; South America. (Chilton, 1914, p. 439.) Even if a close agreement between *Deto* and *Detonella* is indisputable, I find it rather difficult, because of the wide geographical difference in their ranges, to suppose a very near phylogenetic affinity between them. The species of the two genera seem to live under rather similar conditions and might be said to supply one another's places respectively in subarctic and subantarctic regions. Therefore it is not impossible that several conformities are convergences. *Detonella papillicornis* is found on the beach in the extreme northern portion of the Pacific Ocean, and Chilton says about the genus *Deto* (1914, p. 453): "All the species are strictly seashore inhabitants, probably not extending much above high-water mark or beyond the reach of the spray from the sea. In this respect as well as in many points of structure, they agree with the genera *Scyphax* and *Scyphoniscus*, and it is probable that their nearest affinities will be found to be with these two genera. *Scyphax* differs from *Deto* in the very large and well-developed eye with its rows of numerous ocelli, and *Scyphoniscus* in the peculiar structure of the end of the outer lobe of the first maxilla." In regard to these characteristics the genera in question differ also from *Detonella*.

The differences between *Deto* and *Detonella* will be best illustrated by the following comparison:

DETO²

Length of adult specimens 11–24 mm. Eyes of moderate size, with numerous ocelli. Antennulae with the third joint large, extended, bearing sensory filaments in two rows distant one from the other, the second joint with only one biarticulate plumose seta. The outer lobe of the first maxilla with single-tipped teeth. The masticatory lobe of the maxillipeds with a very small rudimentary plumose seta; spines seem to be lacking. The exopodites of the pleopoda (2–5) in both sexes with well developed setae at the postero-lateral margins.

DETONELLA

Length of adult specimens 3–4 mm. Eyes small, with few ocelli (about 6.) Antennulae with the third joint very small, rounded, the apex carrying three sensory filaments, the second joint with two articulate setae, at least one of which has a pencil bristle. About half of the teeth of the outer lobe of the first maxilla bifid. The masticatory lobe of the maxillipeds with a well-developed plumose seta, and some strong spines. The exopodites of the pleopoda (2–5) only in the male with plumose setae most of which are attached to the inner dorsal face near the median margin.

In her monograph Richardson admits only one representative of the family Scyphacidae from North America—that is, *Scyphacella arenicola* Smith. (Richardson, 1905, p. 672.) With *Scyphacella*, however, of which only the aforesaid species is known, *Detonella*

² Compare Chilton (1914, p. 348); and Wahrberg (1922, p. 80).

has but little in common. Aside from their widely separated ranges *Scyphacella* has large eyes with numerous ocelli, small lateral lobes and slender antennae. The mouth parts also seem to present a series of differences, but unfortunately they are so schematically reproduced by Richardson that no detailed conclusions can be drawn.

It thus appears that no near relative of *Detonella papillicornis* is known from the northern hemisphere. It seems, however, to be probable that upon closer investigation, other species of *Detonella* or related genera will eventually be found on the northern shores of the Pacific.

DETONELLA PAPILLICORNIS (Richardson)

1904 *Trichoniscus papillicornis* RICHARDSON, Proc. U. S. Nat. Mus., vol. 27, p. 670, figs. 18-22.

1905 *Trichoniscus papillicornis* RICHARDSON, Bull. No. 54, U. S. Nat. Mus., p. 695, figs. 734-738.

Localities.—Seldovia, Cook Inlet, Alaska (Harriman Alaska Expedition), a single specimen found on the beach, type, United States National Museum, Catalogue No. 28772 (Richardson, 1905, p. 698); Bering Island, 1897, 2 males, 2 females (G. S. Barrett-Hamilton, collector), United States National Museum, Catalogue No. 43645.

Description.—Length of male, 3 mm.; of female, 3.8 mm.

Body narrow, oblong, nearly three times as long as broad, dorsal surface rather strongly convex, covered with transverse rows of rounded tubercles.

Head with triangularly produced, broadly rounded median lobe. Lateral lobes large, directed somewhat downwards, roundish, rectangular. From near the center of the dorsal surface of the head at each side a row of large tubercles runs outwards and backwards to the posterior margin; in the center between these rows there are three smaller tubercles, and a row of small tubercles follows the posterior border. The front margin of the median lobe is well marked by two slightly S-shaped ridges meeting at the apex of the lobe. Laterally from these ridges at each side a strong elongated tubercle is to be found, forming a transition from the median lobe to the lateral one.

Eyes small but distinct and prominent, black, composed of about six ocelli, oblong, and situated on the lateral margins at the base of the lateral lobes.

Antennulae (fig. 3 *a-b*) with the basal joint large and broad, second joint as long as the first but much slenderer and gradually tapering, terminal joint very small, rounded, carrying three sensory filaments (*Leydig'sche Organe*), the longest of which are more than twice as long as the terminal joint. At the extremity of the second joint are two long biarticulate setae, the basal joint of which is very short and at least one of which ends in four extremely delicate hairs.

Antennae (fig. 3 *c-d*) rather short. The basal joint is narrow, transverse, the second and third joints are subequal in length and twice as long as the first, the fourth is one and a half, and the fifth twice as long as the third. The last three joints have the inner margins beset with numerous strong tuberculiform papillae, each surmounted with a tuft of very short bristles. The fifth joint is produced at the outer distal angle into an acute process and carries at the inner angle a curved seta. Flagellum scarcely as long as the fifth joint of the peduncle (scapus), composed of four joints, the first of which is shortest, and the third longest. The last joint is tipped with a bunch of hairs. At the middle of the third joint there is a group of about four olfactory setae (*Leydig'sche Borsten*).

In the female the antennae are relatively longer and much more slender than in the male but show otherwise about the same proportions.

Left mandible (fig. 6*j*) with the outer cutting edge formed of three very long, strongly chitinous teeth, one of which is bifid at the end. The inner cutting edge (*lacinia mobilis*) also ends in three large teeth near the base of which arise two curved plumose setae; next follows a single one, and then from a marked prominence a brushlike tuft of long plumose setae, the inner one of which is shortest, the others gradually increasing in length, the outermost one being very long (*seta inferior*).

Right mandible (fig. 6*k*) similar to left but the teeth of the outer cutting edge are much shorter and the inner cutting edge (*lacinia mobilis*) ends in a crown of numerous small pointed teeth of irregular size. Inner cutting edge attended by a bunch of stiff bristles, between which and the dense tuft of long plumose bristles are two large plumose setae.

Lower lip (fig. 3*e*) formed of two rounded lobes which have the extremities thickly covered with short fine setae and have on their dorsal side a small number of short spines. Between these lobes is a narrow tonguelike central lobe, hairy at the end.

First maxillae (fig. 3 *f-g*), outer lobe narrow lanceolate, inner margin fringed with few, outer margin with a great many fine, delicate setae which are arranged in short transverse rows (*Kamm-schuppen*; comb lamellae). The extremity of the lobe bears about 10 stoutly chitinous spines of different sizes, five of which are bifid. Inner lobe narrow and provided with two subequal brushlike setae.

Second maxillae (fig. 3*h*) distinctly bilobed at the apex, outer lobe shorter and very much more slender than the inner, both rounded and bearing delicate setae and a number of short stout blunt setae, three at the apex of the outer lobe and about a dozen in a single row at the extremity of the inner.

Maxillipeds (fig. 3*i*); epipodite narrow, oblong, with the end rounded. Outer margin of the basis moderately expanded and toward the distal end bearing a fringe of fine setae. Masticatory



FIG. 3.—*DETONELLA PAPILLICORNIS* (RICHARDSON). *a*. ANTENNULA; *b*. ANTENNULA, THIRD JOINT AND EXTREMITY OF SECOND JOINT; *c*. ANTENNA OF MALE; *d*. ANTENNA OF FEMALE; *e*. LOWER LIP; *f*. FIRST MAXILLA, OUTER LOBE; *g*. FIRST MAXILLA, INNER LOBE; *h*. SECOND MAXILLA; *i*. MAXILLIPED

lobe (endite) large, more than half the length of the palp (endopodite), end roundly truncate and covered with fine setae, bearing also a number of spines and at the inner distal angle a rather large

plumose seta. Ischium joint of the palp distinct, short, and on the ventral side armed with a few short spines. Terminal part of the palp formed of a single piece, which is lobed on the inner side,

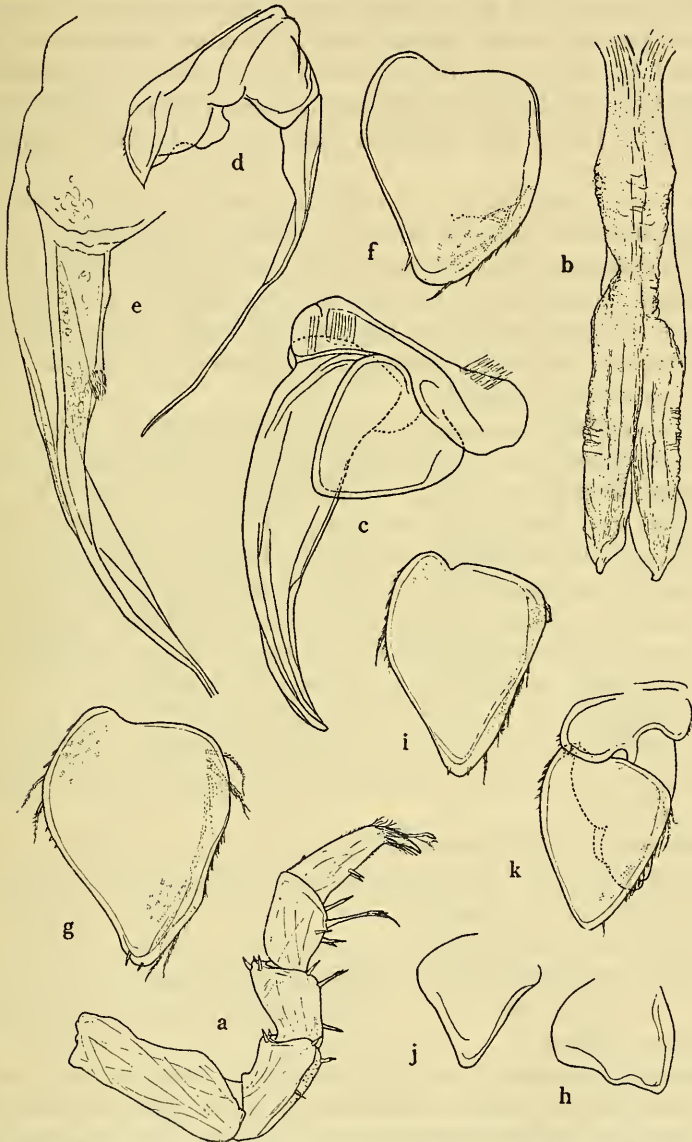


FIG. 4.—*DETONELLA PAPILLICORNIS* (RICHARDSON). MALE. *a.* SEVENTH LEG; *b.* PENIS; *c.* FIRST PLEPOD; *d-f.* SECOND PLEPOD; *g.* THIRD EXOPODITE; *h.* THIRD ENDOPODITE; *i.* FOURTH EXOPODITE; *j.* FOURTH ENDOPODITE; *k.* FIFTH PLEPOD

indicating that it is composed of four joints each bearing many stout, short, and long setae. The outer and the inner margins of the palp fringed with fine setae, the outer margin bearing also one or two stout setae.

Peraeon, first segment slightly longer than the others which are subequal. Epimera rather undeveloped. The posterior margin of the first segment straight, the margins of the second and third slightly concave and those of the fourth to the seventh increasingly concave; postero-lateral angles broadly rounded in the first, slightly produced in the second to the fourth, and more and more acutely produced in the following segments, those of the seventh segment reaching as far as the posterior margin of the third segment of pleon.

The central parts of all the segments bear two transverse rows of rounded tubercles, one of which is close to the posterior margin. In the first segment the two rows are somewhat irregularly arranged, indicating a third row. On the epimera there is a single row of tubercles or, particularly on the last segments, rather an irregular ridge running obliquely outwards and backwards in the direction of the postero-lateral angle.

Legs somewhat increasing in length backwards, though all rather short. Basis nearly twice the length of the ischium, which is slightly expanded distally and one and a half times the length of the merus. The merus and the carpus are about subequal in length. The propodus is a little longer than either of the two preceding joints but considerably narrower. The dactylus is moderately stout and has the basal portion thickly covered with setae which are longer in the male than in the female and one of which is always much longer than the others. The terminal portion of the dactylus forms a rather slender claw, on the outside of the base of which in the male arises a long well developed seta having a slight club-like swelling toward its extremity, and arising from its side a delicate furcate feathery hair. (Fig. 5*d*.)

The inner side of the propodus, carpus, merus, and ischium, and the outer distal margin of the merus and ischium bear a number of rather short, stout, spiniform setae split toward the end. The carpus has also a single very long seta split and curved toward the end. The arrangement of the setae and the general shape of the joints of the legs can best be shown by the accompanying figures. (Figs. 4*a* and 6*a*.)

The inner margin of the propodus of the first pair of legs bears a row of very short spines and is also covered with very thin imbricated lamellae. (*Strukturschuppen*: Fig. 5*e*.) On the first pair of legs in the male I find a special sort of lamellae scattered upon the inner side of the carpus and merus, and the ischium distally; on the seventh pair they are present only upon the ischium and the adjoining part of the merus. (Figs. 5*c* and 4*a*.) These lamellae have the free edge serrated.

Penis bilobed at the end, as is shown in the figure. (Fig. 4*b*.)

Pleon not abruptly narrower than peraeon; the first two segments covered laterally by the last peraeon segment, lateral angles of the third, fourth, and fifth segments well developed, terminal segment short, with the apex broadly rounded. The first and second segments bear a single row of rounded tubercles.

Pleopoda: In the male the first pleopod (fig. 4 *c*) has the basal portion short and broad, the outer margin rounded. The exopodite comparatively very small and triangularly heart-shaped. The endopodite is long, gradually tapering, slightly and evenly curved, with the end pointing outwards.

The second pleopod (fig. 4 *d-f*) has the basal portion similar to that of the first, the outer postero-lateral angle being produced slightly triangularly, pointed at the end and bearing a few short setae. Its exopodite is considerably larger than that of the first pleopod and more irregular in shape, its inner margin being fringed with fine setae and bearing on its inner dorsal surface a number of long plumose setae, as well as two short spiniform setae at the end, all of which are lacking in the first exopodite. The endopodite is two-jointed, the first joint being short and broadly rectangular, the second very long with the basal half curved and gradually tapering, the distal half forming a fine styli-form process.

The exopodites of the following pleopoda (fig. 4 *g-i-k*) are similar to those of the second but somewhat more elongated, the fourth and fifth becoming by degrees smaller and smaller. In the third exopodite the plumose setae are particularly well developed (fig. 5 *b*); besides those in an oblique row on the inner dorsal surface there are two setae at the outer margin (fig. 4 *g*). The proximal part of the outer margin is beset with short transverse rows of fine setae like the inner margin, those on the latter, however, being much longer. On the outer proximal and inner distal part of the dorsal surface there are a number of small transverse rows of fine setae (comb lamellae).

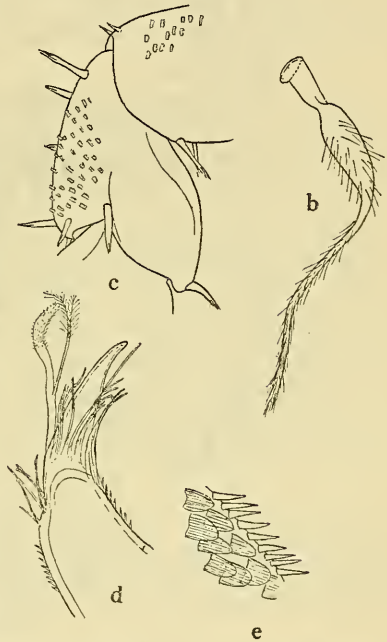


FIG 5.—*DETONELLA PAPILLICORNIS* (RICHARDSON). *b*. PLUMOSE SETA FROM THE INNER DORSAL SURFACE OF THE THIRD EXOPODITE OF MALE; *c*. MERUS AND ADJOINING PARTS OF THE FIRST LEG OF MALE, WITH LAMELLAE; *d*. DACTYLUS OF THE SEVENTH LEG OF MALE; *e*. INNER MARGIN OF THE PROPODUS OF THE FIRST LEG

The endopodites of the third, fourth, and fifth pleopoda are roundly triangular, with the inner portion thickened, smaller than the exopodites, the fifth endopodite being the largest.

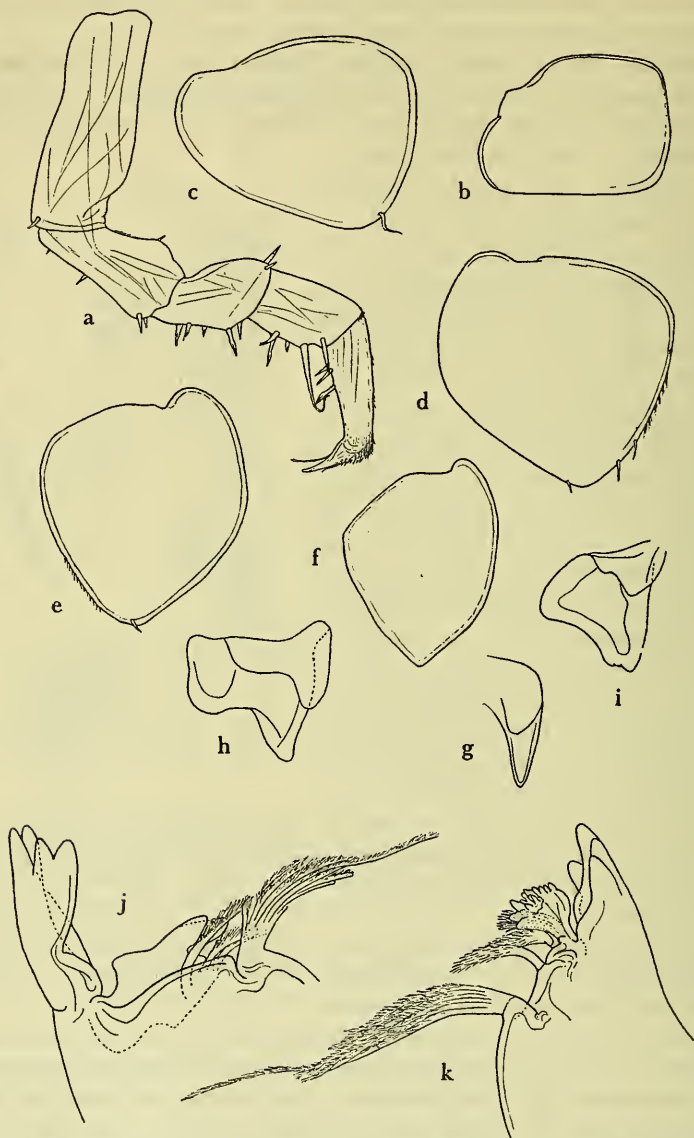


FIG. 6.—*DETONELLA PAPILLICORNIS* (RICHARDSON). FEMALE. *a*. SEVENTH LEG; *b*. FIRST EXOPODITE; *c*. SECOND EXOPODITE; *d*. THIRD EXOPODITE; *e*. FOURTH EXOPODITE; *f*. FIFTH EXOPODITE; *g*. SECOND ENDOPODITE; *h*. THIRD OR FOURTH ENDOPODITE; *i*. FIFTH ENDOPODITE; *j*. LEFT MANDIBLE; *k*. RIGHT MANDIBLE

The pleopoda of the female differ considerably from those of the male. The first exopodite is almost transversely rectangular, the following exopodites gradually changing from a rectangular to a

triangular shape. (Fig. 6 *b-f*.) The inner margins of the third and fourth exopodites are sparsely fringed with fine setae. The second and fourth exopodites each bear a short spiniform seta at the apex and the third exopodite bears three. Plumose setae are completely lacking. The first endopodite appears to be lacking, the second is small and narrow and the third to fifth are larger and subtriangular. (Fig. 6 *g-h-i*.)

Uropoda with bases large, and extending a little beyond the extremity of the terminal segment. Rami conical, the inner being nearly as long as the outer but much narrower throughout and both tipped with a few setae.

Remarks.—I have had no opportunity to examine the type specimen of *Trichoniscus papillicornis* from Cook Inlet. In fact, neither the description nor the reproductions of Richardson admit of any certain conclusion that the individuals from Bering Island and the single specimen from Cook Inlet belong to the same species. However, as the Bering Island individuals were determined by Richardson, the identity may be regarded as settled. On this presumption, Richardson's description of the antennae of *papillicornis* appears not to be quite correct, as she characterizes the flagellum as "composed of about seven articles" (1905, p. 696), while it is only four-jointed.³ Otherwise I agree with Richardson's description of the species. Her reproductions are characteristic though somewhat schematic.

³Mr. C. R. Shoemaker, of the United States National Museum, has examined the antennae of the type *Trichoniscus papillicornis* Richardson and finds that, owing to the fact that the type is a small, immature specimen, the exact number of articles in the flagella is rather obscure. As well as he is able to determine, there are four or possibly five articles, but the fifth is very obscure and uncertain.

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