

NIPHARGUS PHILIPPENSIS, A NEW SPECIES OF AMPHIPOD FROM THE UNDERGROUND WATERS OF THE PHILIPPINE ISLANDS

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THREE PLATES

For the opportunity of examining the interesting amphipod described in this paper I am indebted to Prof. C. F. Baker, of the College of Agriculture, Los Baños, Philippine Islands. By a fortunate coincidence the specimens forwarded by Professor Baker arrived just at the time when I was examining a new species of *Niphargus* from Chilka Lake, India; for, though different in several characters, the Philippine species is evidently closely related to the one from Chilka Lake. Professor Baker says that there are many subterranean drainage streams in the Philippine Islands, and wells frequently tap such streams; but near Los Baños the geological formation is all volcanic, and the waters usually emerge hot. He had examined several wells for amphipods without success, but recently Mr. S. Lantican, one of the students in zoölogy, found a well with moving cool water in the bottom and from this obtained the amphipods that were submitted to me. So far as is known, this is the first discovery of underground Crustacea in the Philippine Archipelago. From the statements made below it will be seen that the species differs from the description of the genus *Niphargus* given by Stebbing(4) in one or two points, in which, however, it agrees with the Chilka Lake species. The majority of the other characters are, nevertheless, so close to those of European species of *Niphargus* that I prefer to leave the species in the meantime under that genus.

**NIPHARGUS PHILIPPENSIS** sp. nov.

*Specific diagnosis.*—Body long and narrow, side plates 1 to 4 shallower than their respective segments. Pleon segments 1 to 3 with the posterolateral corners rounded and bearing short setules in slight indentations. Eyes wanting. First antenna nearly as long as the body; second joint about as long as the

first, third about one-third as long as the second; flagellum of about thirty joints, rather stout; secondary appendage very small, of two minute joints, shorter than the first joint of the primary flagellum. Second antenna about as long as the peduncle of the upper; flagellum of about six joints, the first being much longer than the others. First gnathopod with basal joint broad, ischium rounded on posterior side and covered with minute setæ; carpus slightly longer and broader than the propod; palm transverse, slightly convex. Second gnathopod with carpus subtriangular, propod narrow, oval, palm very oblique, occupying more than half the posterior margin of the propod, nearly straight, defined by one or two stout setules. First and second peræopods with the basal joint broadened, oval, greatest breadth about half the length. Fifth peræopod with basal joint of moderate size, remaining joints slightly broadened. Third uropods, when fully developed, about three-fourths the length of body, peduncle elongated, outer branch elongated, of two very long joints, first somewhat longer than the second, inner branch very small. Telson cleft to the base, each lobe bearing a stout seta at about the middle of the lateral margin and another near the extremity, with a minute setule placed at the extremity nearer the median line. Length of body, about 8 millimeters. Color, whitish.

*Locality.*—"From a well at Los Baños, Luzon. Collected by S. Lantican."

In addition to the specific diagnosis given above, the following further details may be useful. In general shape of the body the species resembles *Niphargus chilkensis* and most of the other species of the genus, the body being long, slender, and with the side plates much shallower than their respective segments. The head is produced laterally between the bases of the upper and lower antennæ into a distinct, rounded lobe. The pleon segments are not much produced downward, the first less so than the second and third; their lower margins are convex, the postero-inferior angle being broadly rounded and provided with minute setules arising from small indentations or serrations. The dorsal surface of the body is free from hairs or setæ.

The branchiæ are regularly oval, thus differing in shape from those of *N. chilkensis*, which are broad at the base. The anterior pairs are apparently smaller than the posterior. The length of the body of one specimen mounted on a micro-slide is about 8 millimeters, that of the upper antennæ being about

the same, and the third uropod when fully developed about 5.5 millimeters.

In the upper antennæ the first and second joints of the peduncle are of about equal length, the first pair bearing at the end a distinct setule on the lower margin, and a few finer setules at the end of the second joint. The third joint is about one-third the length of the first. The flagellum is greatly elongated, sometimes containing as many as thirty-six joints, as shown in Plate 1, fig. 1; in this specimen the antenna on the other side was shorter and contained only twenty-eight joints. The accessory appendage is minute, consisting of two very small joints, and is easily overlooked. It will be seen from this description that the first antenna differs considerably from that of *N. chilkinsis* in which the second joint of the peduncle is greatly elongated and bears distinct tufts of setæ on the upper margin toward its extremity. In the second antenna the gland cone is distinct, the last two joints of the peduncle subequal in length, the flagellum consisting of six distinct joints, the first much longer than any of the others, being nearly as long as the rest of the flagellum. In *N. chilkinsis* the joints of the flagellum are fused together.

fused

The upper lip is regularly rounded and slightly more convex near the median line where it is covered in the usual manner by a fur of minute setæ.

In the mandible the first joint of the palp is rather elongated, about one-third that of the second which is somewhat curved and slightly broadened, the third joint is about as long as the second and bears toward the extremity a number of setæ fully as long as the joint itself and extending almost at right angles to it. The cutting edges are normal and do not call for special description; the spine row contains numerous plumose spines. There seems to be little difference between the right and left mandibles.

The lower lip is of the usual shape, the mandibular process on each side being well marked and with the extremity rounded; the inner lobes are distinct, but rather small.

The first maxilla has the inner lobe well developed, broad, its oblique apical margin bearing twelve or more plumose setules; the outer lobe is of the usual shape, bearing about nine denticulate setules; the palp appears to be the same on both sides and bears at the apex some stout setules and a few slender hairs.

The second maxilla has the two lobes of about equal size, the outer with apical setæ only, the inner bearing an oblique row of long setæ near the inner margin in addition to those along the margin itself which merge into the usual apical setæ.

The maxillipeds have the inner lobe reaching about halfway along the outer, its truncate extremity with three stout setules and many smaller setules and hairs. The outer lobe is short, not reaching so far as the end of the carpus, its inner margin bearing stout setules, none of which are developed into spine teeth. The propod is much narrowed at the base, the dactyl is long and slender, nearly as long as the propod. In addition to the ordinary long setæ numerous fine short setules are present on the dactyl and on the distal portion of the propod.

The first gnathopod has the side plate produced a little anteriorly, the angle being rounded, the basal joint is broad with tufts of setæ on the posterior margin. The ischium is produced on the inner side into a rounded lobe, the whole of which is covered by minute setæ. Probably this joint meets the corresponding one on the other side when the limbs are being used and forms a grasping or triturating organ accessory to the appendages of the mouth. The carpus is considerably longer than the propod, its inner surface being thickly covered with tufts of long setæ as shown in Plate ■ fig. ■; the propod has the palm transverse and slightly convex.

2. 11.

The second gnathopod is considerably larger than the first, and differs to a rather marked degree in the shape of the carpus and propod; the carpus is triangular, with the tufts of setæ on its posterior margin compressed closely together; the propod is much longer than the carpus, oval, narrowing distally, the palm is slightly sinuous or nearly straight and much longer than the remaining portion of the posterior margin; the finger is strong and somewhat broad toward the base, but in the specimens examined does not show the bulging on the inner margin that is found in *N. chilkenensis*.

The first and second peræopods are subequal and similar in structure. The basal joint has the anterior margin produced and strongly convex so that the whole joint forms an oval, the greatest breadth being rather more than half the length; the posterior margin is somewhat serrate with long hairs arising from the shallow serrations; the merus, carpus, and propod are of about the same length and bear only a few setules, two on the posterior margin of the propod being stouter than the others; the finger is rather short, acutely pointed.

The third peræopod is about the same length as the first and second, the basal joint is oval but the posterior margin is not greatly produced; it bears a number of fine setæ in small indentations; the carpus and propod are subequal and shorter than the merus.

The fourth peræopod is similar in shape and structure to the third but is longer, being intermediate in length between the third and fifth peræopods.

The fifth peræopod is much longer than the third and fourth but similar as regards the shape of the basal joint; the carpus and propod, however, are considerably longer in proportion to the merus, all three joints being slightly widened, their margins bearing stout setules arising from slight serrations; the finger is small and acute.

The pleopods are all well developed, the branches in each being equal in length and many-jointed.

The first and second uropods extend backward to about the same point; in the first uropod the peduncle is much longer than the branches, and the outer branch is slightly shorter than the inner. The second uropod is similar but has the peduncle much shorter, and the difference in length between the two branches is slightly greater. The third uropod is greatly elongated appearing, however, to differ in length according to the development of the animal. In some specimens examined it is more than half the length of the body. The peduncle is long, being nearly three times as long as the telson; the outer branch consists of two greatly elongated joints which appear somewhat narrow in the side view of the animal but are flattened, the first joint being broader than the second and bearing stout setules in slight serrations along one margin, the other margin being almost free from setæ; the second joint has few setæ on its margins but a distinct tuft of long hairs at the extremity. The inner branch is very small, slightly broadened, and bears a few setules at the extremity.

The telson is cleft to the base, each half oval with a distinct spinule at about the middle of the outer margin, another of about the same size at the outer portion of the extremity with a minute setule nearer the median line.

The two species *Niphargus philippensis* and *N. chilkinsis* agree in two points in which they differ somewhat markedly from the generic diagnosis of *Niphargus* as given by Stebbing, namely:

1. The inner lobe of the first maxilla is large and broad and bears many plumose setæ.

2. The second gnathopod is larger than the first, and differs considerably from it in shape.

In his generic diagnosis Stebbing(4) (p. 405) says: "Maxilla 1, inner plate with few (2 or 3) setæ" and "Gnathopods 1 and 2 similar." In *N. pulchellus* [Sayce(3) (p. 152)] from Australia the inner plate of the first maxilla is broad and with numerous setæ, but in that species the first and second gnathopods are similar and subequal. The gnathopods in *N. chilkenensis* and *N. philippensis* present a rather striking resemblance to those of *Phreatogammarus propinquus* Chilton from New Zealand(2) (p. 84), and also resemble those of *Metacrangonyx longipes* Chevreux(1) (p. 27), found in the Balearic Isles, more than they do those of typical species of *Niphargus*. In *Phreatogammarus* and in *Metacrangonyx* the third uropods are, however, very different from those of *Niphargus*, being elongated with equal branches in *Phreatogammarus*, and very short with inner branch vestigial in *Metacrangonyx*. The third uropods are, however, subject to much modification in all subterranean species, and possibly the gnathopods are more trustworthy as evidence of relationship than the variable terminal uropods.

*Niphargus philippensis*, although resembling *N. chilkenensis* in the first maxilla, the shape of the gnathopods and particularly in the setose character of the ischium of the first gnathopod, differs in the following points, most of which have already been mentioned, namely:

1. In the absence of eyes.
2. In the different shape and size of the branchiæ.
3. In the shape of the first antenna, especially in the second joint of the peduncle and the long thickened flagellum.
4. In antenna 2, the joints of the flagellum being distinct and not fused as in *N. chilkenensis*.
5. In the broadened basal joints of peræopods 1 and 2.
6. In the basal joint of the fifth peræopod, which is normal and not greatly enlarged, while in *N. chilkenensis* the basal joint may be very large and longer than all the succeeding ones. In *N. chilkenensis*, too, the joints of the three posterior pairs of peræopods show a greater tendency to be broadened, the merus especially so.
7. In the third uropods, which are more elongated in *N. philippensis* and not quite so broad in proportion as *N. chilkenensis*.

An examination of the different specimens of *Niphargus philippensis* shows that there is considerable variation in the length

and thickness of the flagellum of the first antenna, the length and thickening of the joints of the fifth peræopod, and in the length of the third uropods. The special characters of these appendages appear to be attained only in adult specimens and possibly they are more marked in the males than in the females.

In *Niphargus chilkinsis* the parts that are similarly subject to special development seem to be the peduncle of the first antenna, the propod and dactyl of the second gnathopod, and the fifth peræopod.

#### REFERENCES

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2. CHILTON, C. Some New Zealand Amphipoda belonging to the genus *Phreatogammarus*. Journ. Zool. Research 3 (1918) 81-86, with text figures.
3. SAYCE, O. A. *Niphargus pulchellus*, a new Victorian blind amphipod. Proc. Roy. Soc. Victoria 12 (1900) 152-159, pl. 15.
4. STEBBING, T. R. R. Amphipoda, 1 Gammaridea. Das Tierreich, Lieferung 21 (1906).

## ILLUSTRATIONS

(All the figures refer to *Niphargus philippensis* sp. nov.)

### PLATE 1

- FIG. 1. Side view of whole animal.  
2. Peduncle of first antenna.  
3. Second antenna.  
4. Upper lip.  
5. Mandible, showing palp, etc.  
6. Mandible, showing cutting edge, molar tubercle, etc.  
7. Lower lip.  
8. First maxilla.  
9. Second maxilla.

### PLATE 2

- FIG. 10. Maxilliped; 10a, terminal joints of same.  
11. First gnathopod.  
12. Second gnathopod.  
13. First peræopod.  
14. Third peræopod.

### PLATE 3

- FIG. 15. Fifth peræopod.  
16. First uropod.  
17. Second uropod.  
18. Third uropod.  
19. Third uropod, basal joint and inner branch.  
20. Telson.  
21. Pleon and uropoda, side view.



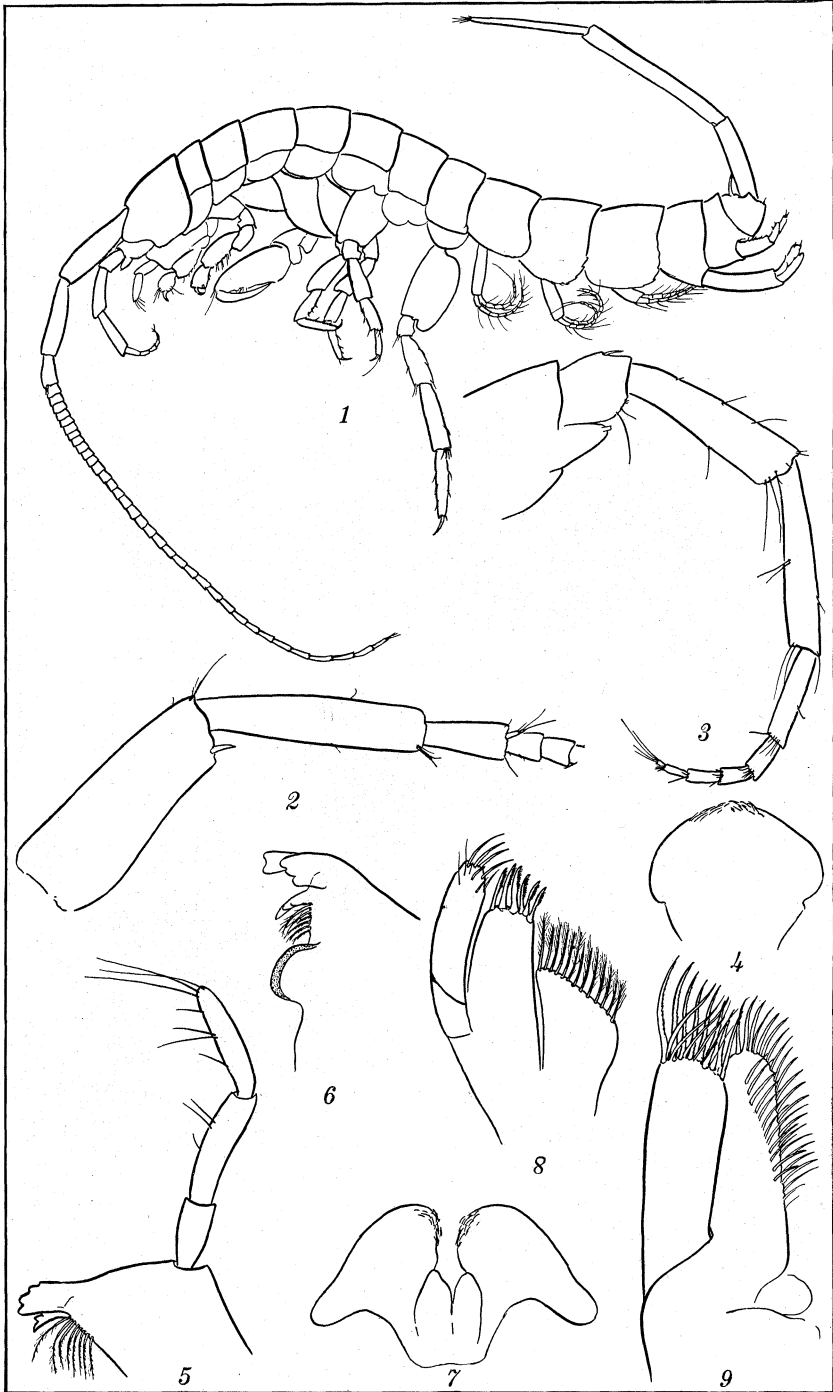


PLATE 1. NIPHARGUS PHILIPPENSIS SP. NOV.

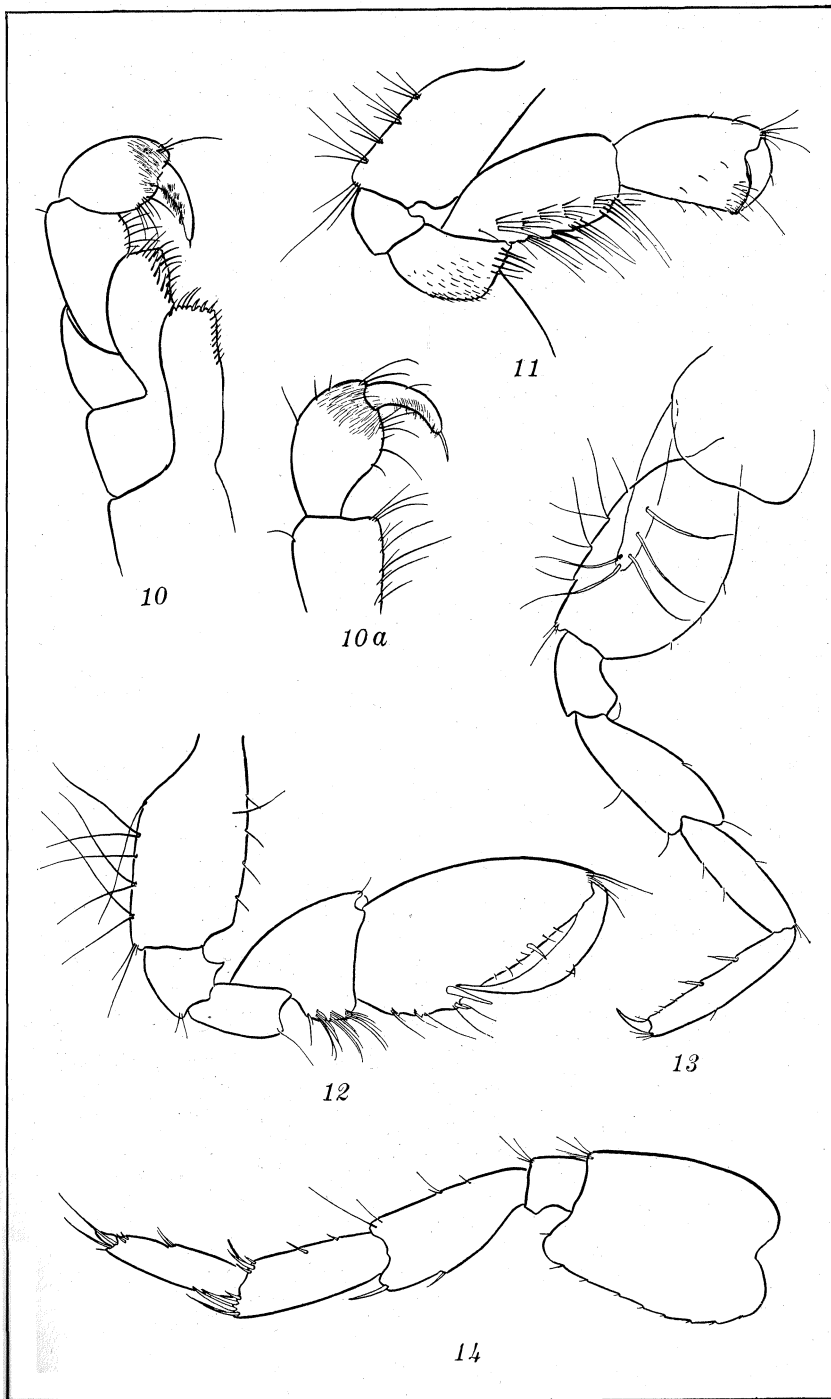


PLATE 2. NIPHARGUS PHILIPPENSIS SP. NOV.

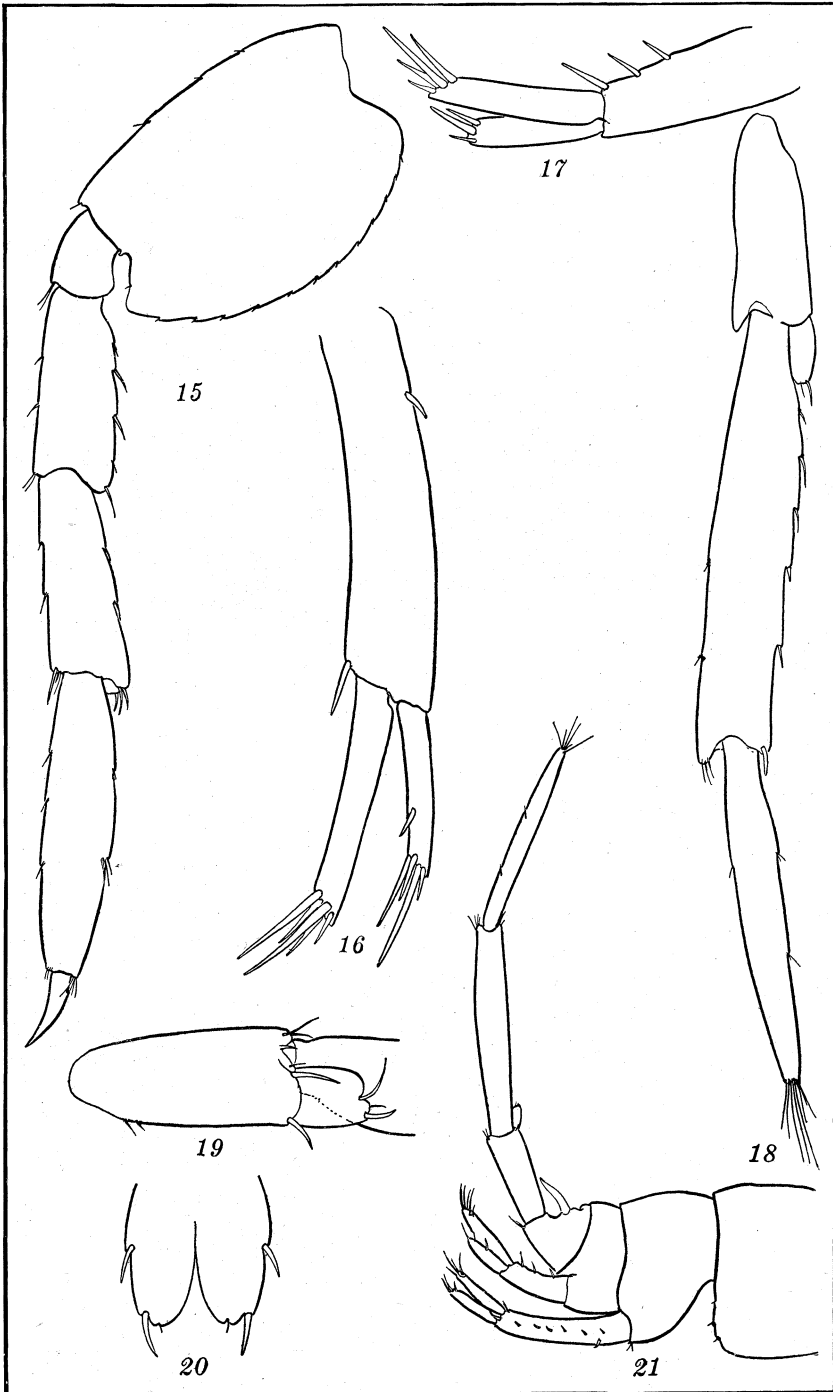


PLATE 3. NIPHARGUS PHILIPPENSIS SP. NOV.