

**NERILLA INOPINATA, A NEW SPECIES
OF ARCHIANNELID,
FROM THE WEST COAST OF NORTH AMERICA.**

by

John S. Gray

Friday Harbor Laboratories, University of Washington
and Wellcome Marine Laboratory, University of Leeds, Robin Hood's Bay.

Résumé

Certains Nerillidae récoltés sur l'île San Juan (Washington, U.S.A.) présentent des caractères intermédiaires entre *N. antennata* O. Schmidt et *N. mediterranea* (Schlieper). Les spécimens recueillis peuvent être considérés comme une espèce nouvelle avec leurs cirres péristomiaux dépassant plus de deux fois la longueur des cirres suivants (caractère distinctif avec *N. mediterranea*), les soies de leur premier segment de même longueur à peu près que leurs cirres (caractères distinctifs avec *N. antennata*) et l'existence de quatre touffes de cils latéraux entre chaque parapode (caractère distinctif avec *N. mediterranea*). *N. inopinata* diffère à la fois des deux autres espèces par ses anneaux ciliés dorsaux très réduits sur les segments du corps et ses six soies seulement par faisceau. Nous avons été amené ainsi à donner à cette espèce nouvelle, intermédiaire entre *N. antennata* et *N. mediterranea*, le nom de *N. inopinata*.

INTRODUCTION

In his study of the archiannelids of Puget Sound, Washington, U.S.A., Wieser (1957) described the occurrence of two species of *Nerilla*, namely *N. antennata* O. Schmidt and *N. digitata* Wieser. Whilst searching for archiannelids on San Juan Island, Washington, many nerillids turned up at different collecting sites around the island. Marcus (1947) critically examined the characters of the group and concluded that the two subspecies *N. antennata antennata* O. Schmidt and *N. antennata mediterranea* Schlieper described by Remane (1932), were in fact distinct species.

Examination of specimens from San Juan showed that they had characters intermediate between the two species *N. antennata* and *N. mediterranea*. The characters examined were found to be stable for specimens collected from a wide variety of habitats and seem therefore to justify the description of a new species. Remane (1932) indicated that a form intermediate between *N. antennata* and *N. mediterranea* occurs on the European Atlantic coast, but gave no descriptive details.

Specimens conforming to the characters of *N. antennata* were found in fine sand in front of the Friday Harbor Laboratory (Fig. 1, A). Figure 1 shows the collecting sites around San Juan Island where the

new species was present. At each station broken barnacle and mussel shells were collected and transported to the laboratory in glass containers. The shells were allowed to stand for 12 hours and the surface layers were removed and added to a beaker containing magnesium chloride (70 g.p.l.). After 10 minutes, the shell gravel was stirred vigorously and the liquid poured through a fine mesh plankton net.

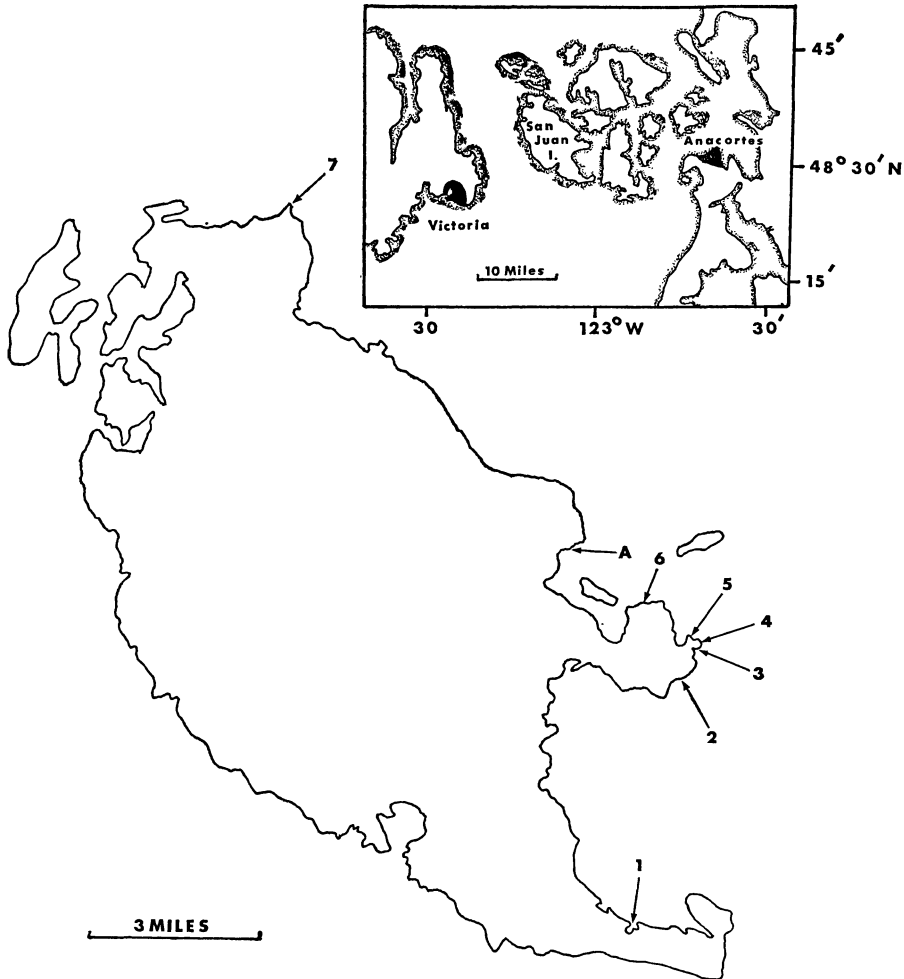


FIG. 1

Map of San Juan Island showing stations where nerillids were collected.
1-7: *Nerilla inopinata*; A: *N. antennata*.

The gravel was washed 2-3 times with sea water. The plankton net was then inverted in a petri dish and the animals were washed off with sea water. They survived well in glass bowls kept at 15°C with a little shell gravel, changing the sea water weekly.

Living animals were examined, when anaesthetized with magnesium chloride (70 g.p.l.), under a high power microscope. Photographs were taken of living animals and drawings made from the photographs.

N. inopinata n. sp.

The following description was derived from examination of over two hundred specimens.

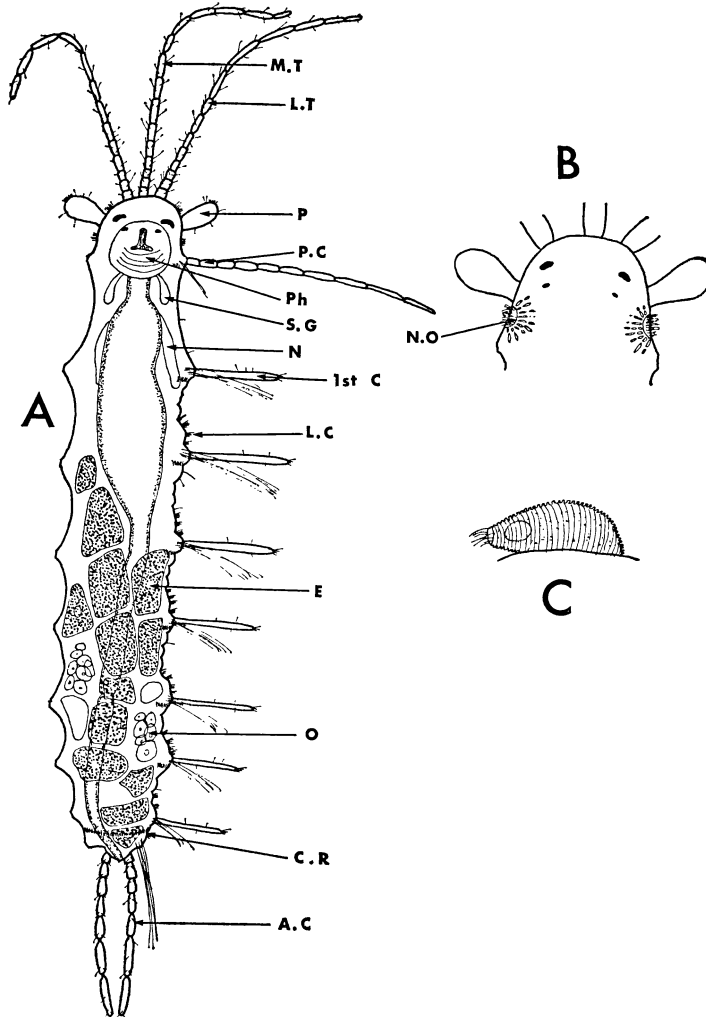


FIG. 2

A: female *N. inopinata*.

A.C.: anal cirri; C.R.: ciliated ring; E.: eggs; L.T.: lateral tentacle; M.T.: median tentacle; L.C.: lateral cilia tufts; N.: first nephridium; O.: ovary; P.: palps; P.C.: peristomial cirri; Ph: pharynx; S.G.: salivary gland.

B: dorsal surface of head of *N. inopinata* showing the ciliated nuchal organ and refringent granules.

C: epizoic protozoan commonly present on *N. inopinata*.

The overall length of the adults was 1.5-2.0 mm. On average the body width was 250 μ in the head region, 270 μ in the mid-body region and 340 μ from parapodium base to parapodium base. The

median head tentacle measured 470 μ and the lateral head tentacles 430 μ . The palps were 70 μ long.

The peristomial cirri were 390 μ long and each peristomial cirrus had 9-10 joints. The following cirrus, that of the first body segment, is only 140 μ long with setae 150 μ long. Thus, the peristomial cirrus is over twice as long as the following cirrus. The remaining unjointed lateral cirri are 170 μ long with setae of 200 μ length. The setae are arranged in two bundles of 6 setae, arising one dorsal and one ventral to each cirrus. Normally these are backwardly directed and appear to be one bundle of 12 setae (as in Fig. 2). Occa-

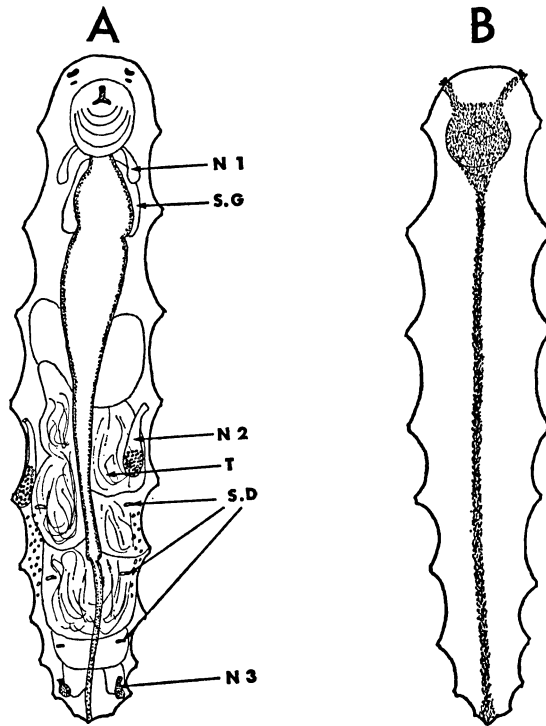


FIG. 3

A: male *N. inopinata*.
N.: nephridia 1, 2, 3; S.D.: internal sperm duct opening; S.G.: salivary gland;
T.: testis.

B: ventral surface showing ciliation patterns.

sionally however, the bundles are separated one before and one after the lateral cirrus. From the base of the peristomial cirrus, four small setae up to 60 μ long arise. The anal cirri are 7 jointed (in whole specimens) and measure 330 μ with the anal setae of 230 μ .

Between each parapodium there are groups of 3 or 4 ciliary tufts which are usually in the posterior half of each segment. Cilia also occur just in front of the base of the lateral palps and on the leading edge of the palps. Posterior to each parapodium on the dorsal surface, there is a small incomplete 'ring' of cilia which, on the pygidial segment, forms a complete ring.

The head is rounded and bears one pair of large eyes and one smaller pair. Behind the eyes (Fig. 2, B) is a cup-shaped well ciliated nuchal organ. This nuchal organ is surrounded by a series of refringent greenish granules. (These occur in both sexes and are not confined to the male as in *N. digitata* Wieser, 1959).

The internal organization shows the usual nerillid pattern. The female (Fig. 2, A) has a large number of large pale pink eggs with asymmetrical ovaries. The gut is divided into two regions by a distinct groove. Salivary glands occur in segment 2. The nephridia occur in segments 2, 5, 6 and 8 with an oviduct in segment 7.

The males (Fig. 3) differ from the females in having nephridia in segments 2, 5 and 9. In segments 6, 7 and 8 the paired internal openings of the sperm ducts can be seen, with live sperm in the testis (see Jouin, 1968 for a comparative account of reproduction in the Nerillidae).

On the ventral surface of both sexes, there is a well developed ciliation (Fig. 3, B). This is very similar to that of other nerillid species.

Between the lateral peristomial cirri often 4 or 5 epizoic protozoans were attached (Fig. 2, C). These protozoans were 38 μ long by 25 μ broad with a sculptured margin and large contractile vacuole. They have a ciliated anterior end and use the lateral ciliation of their hosts as additional feeding currents.

Validity of speciation in *Nerilla*

Marcus (1947) distinguished *N. antennata* from *N. mediterranea* on the grounds that in the former species the peristomial cirrus was more than twice as long as the following cirrus. Secondly, the cirrus of the first segment was much shorter than the setae of this segment in *N. antennata* and as long or longer in *N. mediterranea*. To these characters, Wieser (1959) added the lateral cilia between parapodia consisting of up to four tufts on either side in *N. antennata* and consisting of one tuft on either side in *N. mediterranea*.

N. inopinata has the peristomial cirri more than twice as long as the succeeding ones (as *N. antennata*); cirri of the first body segment approximately the same length as the setae of this segment (as *N. mediterranea*), and four tufts of cilia between each parapodium (as *N. antennata*). Schlieper (1925) records that in *N. antennata* the anal setae are approximately as long as the anal cirri whereas in *N. mediterranea* the anal setae are distinctly shorter than the cirri. However, Marcus (1947) regarded this as a poor character as Quatre-fage's and Beauchamp's figures of *N. antennata* showed shorter setae than cirri. The cirri are very fragile and care must be taken to ensure complete specimens are examined. In *N. inopinata*, the anal cirri are much longer than the setae.

In *N. inopinata*, there are usually only 6 setae per bundle giving a total of 12 setae per parapodium. On the 9th segment, both bundles appear to be fused giving a total of 12 setae on this segment. Goodrich (1912) states that 10 to 16 setae occur in each bundle, in what is now

regarded as *N. mediterranea*. Marcus (1947) reports 6 to 12 setae per bundle in *N. mediterranea* from Brazil. *N. antennata* has 8 to 10 setae per bundle (De Beauchamp 1910).

Jouin (personal communication) has confirmed that in *N. antennata* the peristomial cirri are always twice as long as the cirri of the following segment and that the cirri of this second segment are always shorter than the setae of this segment. Furthermore, she agrees that *N. antennata* has 6 to 9 setae per parapodium on the peristomial segment and from 9 to 16 setae per bundle on the following segments. She records that *N. mediterranea* has fewer setae per bundle. Thus, the number of setae per bundle could be an additional character for separating *N. antennata* from *N. mediterranea* and from *N. inopinata*. *N. inopinata* having 6 setae per bundle, *N. mediterranea* 6 to 12 typically and *N. antennata* 9 to 16.

Remane (1925) stated that the dorsal ciliary ring on the pharyngeal segment was reduced in *N. mediterranea*. An incomplete ring is present in *N. inopinata*. De Beauchamp's (1910) description of *N. antennata* and Goodrich's (1912) and Marcus' (1947) descriptions of *N. mediterranea* indicate that both species possess well developed dorsal ciliary rings in each segment (except in the peristomial segment in *N. mediterranea*). *N. inopinata* can therefore be distinguished from both the above two species as it has much reduced dorsal ciliary rings (Fig. 2, A).

Thus *N. inopinata* has some characters similar to those of *N. antennata* and some similar to those of *N. mediterranea*. If *N. antennata* and *N. mediterranea* can be regarded as distinct species on the taxonomic characters mentioned by Marcus (1947) and Wieser (1957) then the consistent differences from these species recorded in the San Juan Island animals must be regarded as evidence of a new species. Re-examination of the intermediate form reported by Remane (1932) might show that it too is similar to *N. inopinata*.

Diagnosis of *N. inopinata*

Peristomial cirri more than twice as long as succeeding cirri; cirri of first body segment approximately the same length as the setae of this segment; lateral cilia between each parapodium consisting of up to four tufts on each side; on the dorsal surface of each segment just posterior to each parapodium is an incomplete ciliated ring; two bundles containing usually six setae each, occur dorsally, and ventrally to each parapodium.

Differences from *N. antennata*

Setae of first body segment approximately the same length as the cirri of this segment; reduced ciliated 'rings' present on the dorsal surface posterior to each parapodium; usually six setae per bundle.

Differences from *N. mediterranea*

First pair of cirri more than twice as long as succeeding one; lateral cilia between parapodia consisting of up to 4 tufts on each side; usually only 6 setae per bundle; an incomplete ciliary ring is present on the peristomial segment.

Type specimens of *N. inopinata*

Holotype male U.S. National Museum Cat. No. 36067, Allotype female Cat. No. 36068, 10 Paratypes Cat. No. 36069.

Acknowledgements

I am extremely grateful to Professor R.J. Fernald and the staff of the Friday Harbor Laboratories for the excellent facilities and hospitality offered me. Dr. C. Jouin kindly provided valuable information on *N. antennata* and *N. mediterranea* from her own observations. The National Science Foundation generously supported this work. Mr. V. Theokritoff kindly translated the Summary in to German.

Summary

Nerillids collected from San Juan Island, Washington, U.S.A. showed characters intermediate between *Nerilla antennata* O. Schmidt and *N. mediterranea* (Schlieper). The specimens were held to be a new species on the grounds that the peristomial cirri were more than twice as long as succeeding cirri (different from *N. mediterranea*), the setae of the first segment were approximately the same length as the cirri of this segment (different from *N. antennata*) and between each parapodium were four tufts of lateral cilia (different from *N. mediterranea*). *N. inopinata* differs from both *N. antennata* and *N. mediterranea* in having much reduced dorsal ciliary rings on the body segments and only 6 setae per bundle. Thus the new species has distinct characters intermediate between *N. antennata* and *N. mediterranea*.

Zusammenfassung

Archanneliden der Gattung *Nerilla* von der San Juan Insel, Washington, U.S.A. zeigten Charakteristiken zwischen den beiden *N. antennata* O. Schmidt und *N. mediterranea* (Schlieper). Die Exemplare waren beide für neue Spezies gehalten für die folgende Gründe dass die Cirren von den Peristomium zweimal so lang als die folgenden Cirren waren (anders als vom *N. mediterranea*), die Borsten von dem ersten Segment waren ungefähr die selbe Länge als die Cirren dieses Segments (anders als vom *N. antennata*) und zwischen jeden Parapodien waren vier Schöpfe vom lateral Wimpern (anders als vom *N. mediterranea*). *N. inopinata* ist anders als beide *N. antennata* und *N. mediterranea* wegen viel kleineren dorsal Wimpernringe an den Körpersegmenten und nur sechs Borsten per Bündel. Deshalb hat die neue Spezies bestimmte Charakteristiken zwischen *N. antennata* und *N. mediterranea*.

REFERENCES

- DE BEAUCHAMP, P., 1910. — Sur l'organisation de *Nerilla*. *Bull. Sc. France-Belgique*, 44, pp. 11-22.
 GOODRICH, E.S., 1912. — *Nerilla* an Archannelid. *Quart. J. micr. Sci.*, 57, pp. 397-433.
 JOUIN, C., 1968. — Sexualité et biologie de la reproduction chez *Mesonerilla* Remane et *Meganerilla* Boaden (Archannelides Nerillidae). *Cah. Biol. Mar.*, 9, pp. 31-52.

- MARCUS, E. et DU BOIS-REYMOND, E., 1947. — *Nerilla mediterranea* from Brazil. *Com. Zool. Mus. Montevideo*, 45, pp. 1-8.
- REMANE, A., 1932. — Archiannelida (in Grimpe and Wegler). *Tierw. Nord- und Ostsee*, 6, pp. 1-36. Leipzig.
- SCHLIEFER, C., 1925. — Zur Systematik der Gattung *Nerilla*. *Zool. Anz.* 62, pp. 229-234.
- WIESER, W., 1957. — Archiannelids from Puget Sound. *Trans. Amer. micr. Soc.* 76, pp. 275-285.