

# Report on some deep-sea echiurans (Echiura) of the North-East Atlantic

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## ABSTRACT

Seven species of deep-sea echiurans (phylum Echiura) are described in this work, of which *Achaetobonellia ricei* n. sp. is new to science. The main diagnostic characters of the new species include the presence of a thick integument covered with microscopic papillae aligned roughly in transverse rows at the anterior end of the trunk; a bilobed proboscis with the lateral margins uniting proximally to form a funnel around the mouth; a single gonoduct on the right side of the nerve cord with the gonostome located sub-basally on a short stalk and sac-like or tubular anal vesicles into which open numerous excretory tubules. All the specimens in the collection belong to the family Bonelliidae. *Sluiterina sibogae* (Sluiter, 1902) and *Pseudoikedella achaeta* Zenkevitch, 1958 are new records for the Atlantic Ocean. The specimens were collected during the BENGAL cruises that were undertaken between September 1996 and October 1998 in the Porcupine Abyssal Plain in the North-East Atlantic.

## KEY WORDS

Echiura,  
deep-sea,  
North-East Atlantic,  
new species.

## RÉSUMÉ

*Rapport sur des Echiura d'eaux profondes de l'Atlantique nord-est.*

Sept espèces d'échiures d'eaux profondes (phylum Echiura) sont décrites dans cet article, dont une nouvelle : *Achaetobonellia ricei* n. sp. Les principaux caractères diagnostiques de la nouvelle espèce incluent la présence d'un tégument épais couvert par des papilles microscopiques grossièrement alignées en rangs transversaux à l'extrémité antérieure du tronc ; un proboscis bilobé dont les marges latérales s'unissent pour former un entonnoir autour de la bouche ; un seul gonoducte sur le côté droit de la corde nerveuse avec le gonostome sous-basal sur une courte tige et des vésicules anales tubulaires ou en forme de sac dans lesquelles débouchent de nombreux tubules excréteurs. Tous les spécimens de cette récolte appartiennent à la famille des Bonelliidae. *Sluiterina sibogae* (Sluiter, 1902) et *Pseudoikedella achaeta* Zenkevitch, 1958 sont nouvellement mentionnés pour l'Océan atlantique. Les spécimens ont été récoltés durant les campagnes BENGAL entre septembre 1996 et octobre 1998 dans la plaine abyssale Porcupine (Atlantique nord-est).

## MOTS CLÉS

Echiura,  
eaux profondes,  
Atlantique nord-est,  
nouvelle espèce.

## INTRODUCTION

The author received two lots of deep-sea echiurans (phylum Echiura) through the courtesy of J. Galeron of the Centre national de Tri d'Océanographie biologique (CENTOB, IFREMER, Brest), France, for the purpose of identification. The specimens were collected during several cruises that were undertaken between September 1996 and October 1998 in the North-East Atlantic.

The project BENGAL (study of the Benthic biology and geochemistry of a north-eastern Atlantic abyssal locality) of the EU MAST 3 programme was coordinated by S.O.C. (coordinators: A. Rice and D. Billett). IFREMER, DRO/Environnement Profond was one of the 17 partners that participated in the study of the benthic fauna.

The overall objective of the project was to identify, quantify and model the principal processes within the abyssal benthic boundary layer which intercede between the incoming organic and inorganic flux and its incorporation into the permanent sedimentary record.

The principal aim was to understand how the physics, chemistry and biology of the abyssal boundary layer respond to and modify the incoming chemical signal from the overlying surface layers, and thus affect the palaeoceanographic record in the underlying sediments.

Concerning the ecology of the benthic community, the objective was to obtain a qualitative and quantitative analysis of the structure and activity of all the size classes of the benthic community in order to investigate the seasonal evolution.

The IFREMER team was interested mainly in two size classes of the benthic community, the megafauna collected by a beam trawl and the macrofauna sampled by an USNEL box corer.

The area chosen to conduct this programme was located in the Porcupine Abyssal Plain, centered at 48°50'N, 16°30'W, at a depth of 4850 m.

This report contains descriptions of seven species of deep-sea bonellids of which one is new to science. The nomenclature used here follows that of Stephen & Edmonds (1972) and DattaGupta (1976). In their monograph Stephen & Edmonds

(1972) have outlined some of the taxonomic problems encountered in the phylum. Some species description made by earlier authors, are rather brief and lack details on some important taxonomic characters. In the family Bonelliidae several species are based on single or incomplete specimens, which means that nothing is known about the variations that occur within a species. Some of these species need re-examination and re-description.

The reports by DattaGupta (1981) and Biseswar (1992) on deep-sea echiurans of the North Atlantic have revealed one new bonellid genus and several new species and new records. These reports and the present collection indicate that the echiuran fauna of the North Atlantic is significantly numerous.

All the specimens examined have been deposited in the Muséum national d'Histoire naturelle, Paris (MNHN).

## SYSTEMATICS

Family BONELLIIDAE Lacaze-Duthiers, 1858  
Genus *Torbenwolffia* Zenkevitch, 1966

*Torbenwolffia galathea* Zenkevitch, 1966  
(Fig. 1A-C)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 3, Discovery 229, stn 13200#94, 48°50.99'N, 16°26.03'W, 4847 m, 25.VII.1997, 1 ♀.

## DESCRIPTION

Colour of preserved specimen is light pink. Only basal stump of proboscis is attached to trunk, the rest is missing. Lateral margins of proboscis unite proximally to form a narrow lower lip ventral to mouth (Fig. 1A). Trunk is cylindrical, 53 mm long and 12 mm at broadest part. Body wall in anterior half of trunk is thick and opaque, in posterior half it is thinner and devoid of papillae. Papillae are microscopic, arranged in concentric rings around the trunk. Gonopore located on rounded elevation of body wall (Fig. 1A). Ventral setae absent.

Single, oval gonoduct is located on right side of nerve cord (Fig. 1B). Gonostome funnel-shaped,

opening into base of gonoduct. Only foregut is intact, rest of intestine is missing. Distinct constriction demarcates pharynx from oesophagus. Gut contents consist of fine sand not moulded into faecal pellets. Neurointestinal vessel is single, arising from wall of intestine. Anal vesicles consist of two main tubes with primary and secondary branches terminating in ciliated funnels (Fig. 1C).

#### REMARKS

The genus *Torbenwolffia* is distinguished by the presence of a large, bilobed proboscis; absence of ventral setae; single gonoduct and short unbranched anal vesicles.

*Torbenwolffia galathea* was originally described by Zenkevitch (1966) from specimens collected in the Kermadec Trench at great depths. DattaGupta (1981) ascribed two specimens from the North Atlantic to the species *T. galathea*. However, this identification is erroneous as his description mentions that the gonostome is located at the terminal end of the tubular gonoduct. The illustrations provided by Zenkevitch (1966) clearly show the gonostome is located close to the base of the gonoduct.

The specimen on hand closely approaches the description given by Zenkevitch (1966). One minor difference, however, lies in the structure of the anal vesicles, which in the present specimen are tubular with primary and secondary branches.

Genus *Alomasoma* Zenkevitch, 1958

*Alomasoma nordpacificum* Zenkevitch, 1958  
(Fig. 1D)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 5, Discovery 231, stn 13368#52, 48°48.30'N, 16°25.97'W, 4839 m, 19.III.1998, 1 ♀.

#### DESCRIPTION

Colour of trunk of preserved specimen is cream; proboscis is missing. Trunk is oval in outline, 46 mm long and 15 mm at broadest part. Integument is thick but moderately transparent. Trunk covered with minute, irregularly shaped

papillae, more conspicuous at anterior end. Single gonopore is located a few millimetres away from anterior end of trunk. Ventral setae absent. Except for gonoducts, nerve cord and rectum, rest of internal organs missing. Gonoducts one pair, sac-like, located close to each other (Fig. 1D). Gonoducts unite proximally beneath nerve cord and open to exterior by single genital aperture. Gonostome set on long stalk with frilly margins. Anal vesicles not seen, probably damaged due to poor preservation.

#### REMARKS

The genus *Alomasoma* is close to the genus *Amalosoma* Fisher, 1948 but differs from the latter in possessing two gonoducts which unite proximally and open to the exterior by a common gonopore. Also a genital slit is present in *Amalosoma* but absent in *Alomasoma*. In the genus *Amalosoma* the two gonoducts open to the exterior separately.

The presence of two gonoducts with a common gonopore and the absence of a specialized genital slit indicate that the specimen on hand belongs to the genus *Alomasoma*. *Alomasoma nordpacificum* is close to *A. rhynchollulus*, described by DattaGupta (1981) from a single specimen from the North Atlantic. According to DattaGupta (1981), *A. rhynchollulus* differs from all other species in the genus in possessing a minute triangular proboscis. The size of the proboscis, however, is not a reliable taxonomic character in separating species because its length is variable depending on its state of contraction. Therefore, the validity of the species described by DattaGupta (1981) is questionable.

This is a second report on the occurrence of *A. nordpacificum* from the North Atlantic.

Genus *Sluiterina* Monro, 1927

*Sluiterina sibogae* (Sluiter, 1902)  
(Fig. 1E-G)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 1, Discovery 222, stn 12930#73, 48°50'N, 16°30'W, 4839 m, 14.IX.1996, 1 ♀.

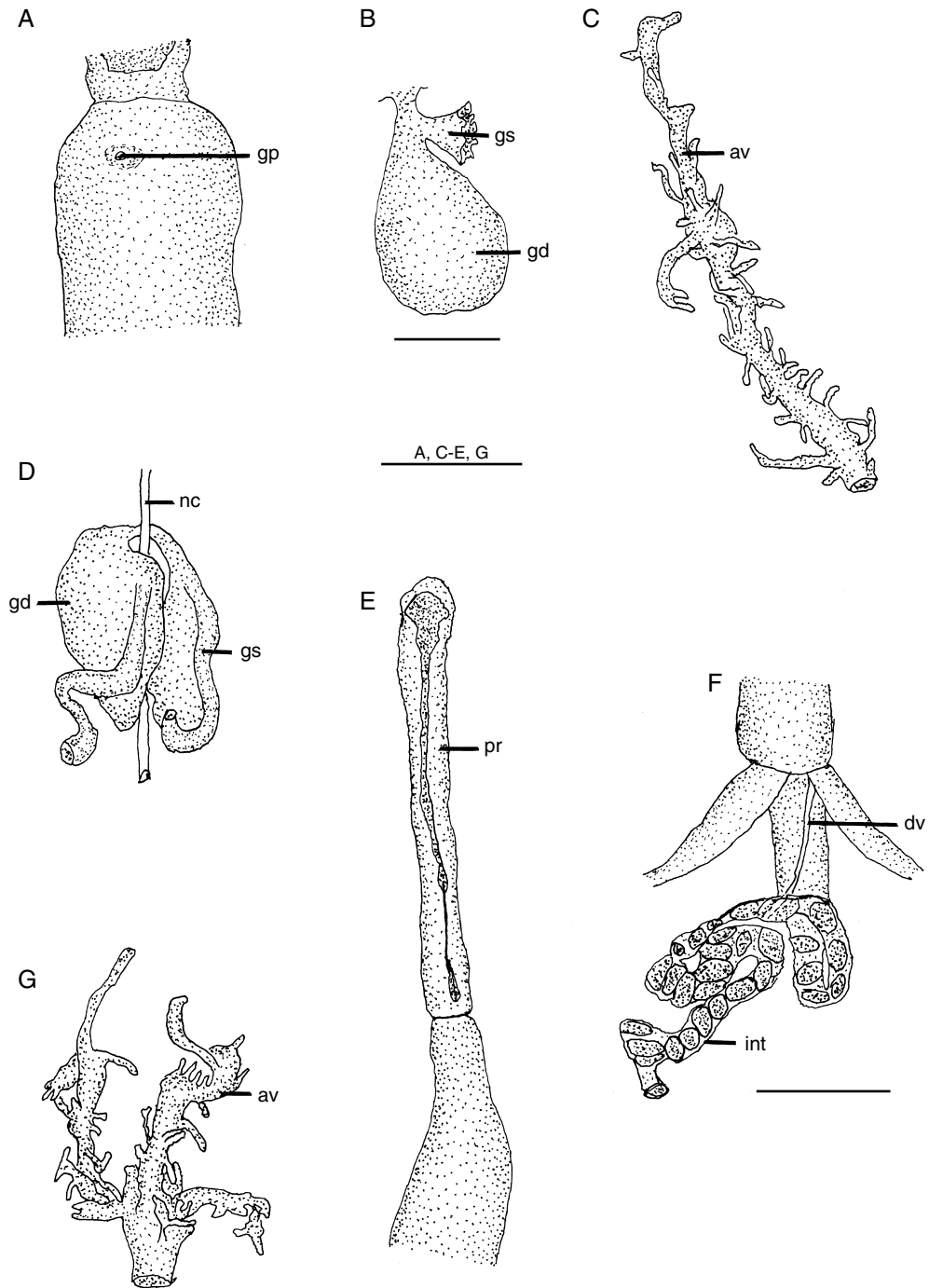


FIG. 1. — **A-C**, *Torbenwolfia galatheae* Zenkevitch, 1966; **A**, ventral view of anterior part of female; **B**, gonoduct; **C**, anal vesicle of one side; **D**, *Alomasoma nordpacificum* Zenkevitch, 1958, gonoducts; **E-G**, *Sluiterina sibogae* (Sluiter, 1902); **E**, ventral view of anterior part of female; **F**, anterior part of alimentary canal; **G**, anal vesicles. Abbreviations: **av**, anal vesicle; **dv**, dorsal vessel; **gd**, gonoduct; **gp**, gonopore; **gs**, gonostome; **int**, intestine; **nc**, nerve cord; **pr**, proboscis. Scale bars: A, E, 4 mm; B, C, F, 2 mm; D, 0.5 mm; G, 1 mm.

## DESCRIPTION

Colour of proboscis and trunk of preserved specimen is cream. Proboscis 21 mm long, truncate, rounded anteriorly; lateral margins curl inwards forming a tubular structure (Fig. 1E). At proximal end lateral margins of proboscis unite to form lower lip ventral to mouth. Trunk 25 mm long and 7 mm across broadest part. Integument thin and transparent. Intestine with pellet-like faeces visible through transparent body wall. Papillae microscopic at anterior and posterior ends of trunk; integument smooth and devoid of papillae in middle region. Ventral setae absent. Internally, only basal fragment of gonoduct present on left side of nerve cord. Pharynx is a thick tube, not clearly demarcated from oesophagus (Fig. 1F).

Intestine long and highly coiled, densely packed with oval faecal pellets (Fig. 1F).

Dorsal and neurointestinal vessels arise from wall of foregut. Neurointestinal vessel is single throughout. Anal vesicles arborescent, consisting of several branches opening into rectum (Fig. 1G).

## REMARKS

The species *Sluiterina sibogae* is known from a single female from Indonesia collected at a depth of 4391 m. Although the present specimen is much smaller in size, it approaches the description given by Sluiter (1902) especially in the structure of the proboscis. According to Sluiter (1902) the proboscis is *Thalassema*-like with the lateral edges close together giving it a tubular appearance. Similarities are also evident in the distribution of the dermal papillae. Unfortunately, the anal vesicles have not been described by the latter author. In the specimen from the North-East Atlantic there is a single gonoduct with a basally located gonostome. All the other species in the genus *Sluiterina* differ from the specimen on hand in possessing anal vesicles that are bushy, consisting of numerous, thin, unbranched excretory tubules resembling a string mop.

*Sluiterina sibogae* of the present collection is the first report since its discovery and the first record of its occurrence in the North Atlantic.

Genus *Pseudoikedella* Jonston & Tiegs, 1919

*Pseudoikedella achaeta* (Zenkevitch, 1958)  
(Fig. 2A, B)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 3, Discovery 229, stn 13200#94, 48°50.99'N, 16°26.03'W, 4847 m, 25.VII.1997, 2 ♀♀.

## DESCRIPTION

Colour of proboscis and trunk is light pink in preserved state. Trunk of larger specimen is 50 mm long and 10 mm across broadest part. Corresponding measurements of smaller specimens are 28 mm and 13 mm. Proboscis is truncate, 4 mm in length, rounded at distal end; lateral margins curl inwards and unite proximally to form funnel around mouth (Fig. 2A). Junction of proboscis and trunk is stout. Anterior end of trunk covered with small rounded papillae, rest of integument is smooth. Single genital pore located few millimetres away from anterior end of trunk (Fig. 2A). Ventral setae absent.

Single gonoduct located on right side of nerve cord (Fig. 2B). Gonostome lateral near terminal extremity, located on a small stalk. Dorsal vessel prominent, passes anteriorly and enters proboscis. Neurointestinal vessel missing probably damaged. Intestine filled with soft mud. Anal vesicles are two slender tubes with sparsely distributed ciliated funnels.

## REMARKS

*Pseudoikedella achaeta* was originally described by Zenkevitch (1958) from specimens collected at great depths from the southern part of the Sea of Okhotsk. This species has also been reported from several other localities in the North Pacific and Tasman Sea (Zenkevitch 1958, 1966; Zenkevitch & Murina 1976). Recently, *P. achaeta* was recorded and described from Antarctica waters by Saiz-Salinas *et al.* (2000).

The discovery of this species is a first report of its occurrence in the Atlantic and extends its range of distribution considerably.

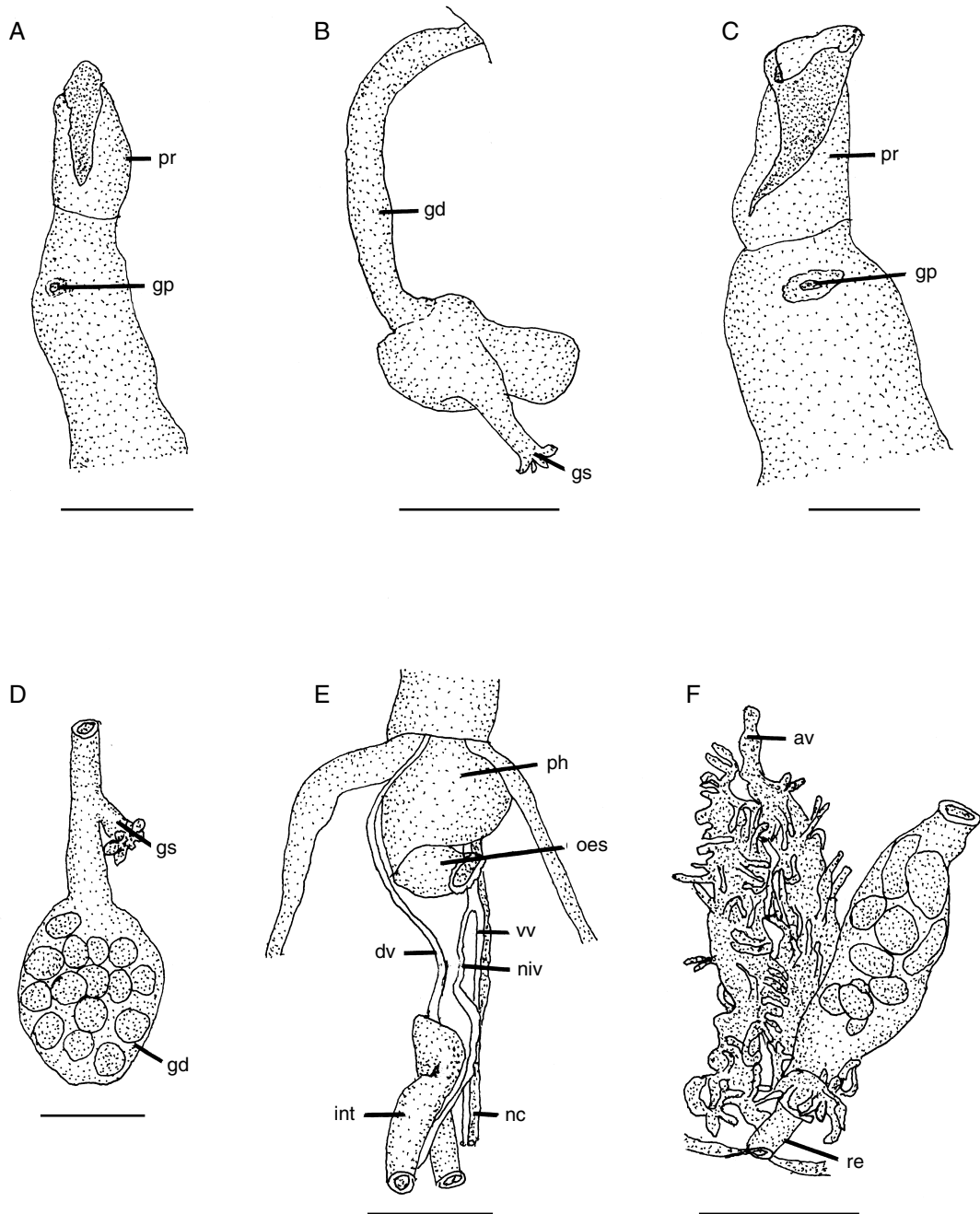


FIG. 2. — **A, B,** *Pseudoikedella achaeta* (Zenkevitch, 1958); **A,** ventral view of anterior part of female; **B,** gonoduct; **C-F,** *Achaetobonellia ricei* n. sp.; **C,** ventral view of anterior part of female; **D,** gonoduct; **E,** internal morphology; **F,** anal vesicles. Abbreviations: **av,** anal vesicle; **dv,** dorsal vessel; **gd,** gonoduct; **gp,** gonopore; **gs,** gonostome; **int,** intestine; **nc,** nerve cord; **niv,** neurointestinal vessel; **oes,** oesophagus; **ph,** pharynx; **pr,** proboscis; **re,** rectum; **vv,** ventral vessel. Scale bars: A, C, E, 3 mm; B, D, F, 2 mm.

Genus *Achaetobonellia* Fisher, 1953

TYPE SPECIES. — *Achaetobonellia maculata* Fisher, 1953.

*Achaetobonellia ricei* n. sp.

(Fig. 2C-F)

MATERIAL EXAMINED. — Holotype: Porcupine Abyssal Plain, BENGAL 2, Discovery 226, stn 13078#27, 48°47.26'N, 16°34.01'W, 4844 m, 3.IV.1997, ♀. Paratypes: BENGAL 3, Discovery 229, stn 13200#940, 48°50.99'N, 16°26.03'W, 4847 m, 25.VII.1997, 3 specimens.

ETYMOLOGY. — The species is named after Dr A. L. Rice who was one of the coordinators and Principal Scientist of the BENGAL Project of the EU MAST 3 programme.

## DESCRIPTION

Trunk of preserved specimens is light pink, proboscis is off-white. Proboscis of holotype is 15 mm long, bilobed distally; lateral margins curl inwards and unite at base forming funnel around mouth (Fig. 2C). Trunk of holotype is 49 mm long and 13 mm across broadest part. In paratypes only basal stump of proboscis is attached to trunk, rest is missing. Trunk length of paratypes ranges from 43 to 61 mm and approximately 14 mm across broadest part. Integument is thick and opaque. Papillae microscopic, aligned roughly in transverse rows at anterior end of trunk. Single gonopore is located on conspicuous, rounded elevation of body wall, about 3 mm away from anterior end of trunk (Fig. 2C). Ventral setae absent. Internally a single gonoduct is located on right side of nerve cord (Fig. 2D). Proximal half of gonoduct is tubular but distally it is distended and globular in outline, containing large round eggs (Fig. 2D). Gonostome is situated sub-basally on a short stalk, gonostomal lip is petaloid. Pharynx is bulbous, separated from oesophagus by constriction (Fig. 2E). Intestine is long and complexly coiled. Gut contents moulded into oval faecal pellets. Neurointestinal vessel is comparatively long, single throughout, arising from wall of intestine, continuing anteriorly and opening into ventral vessel (Fig. 2E). Dorsal vessel arises separately, passes anteriorly and enters proboscis.

In holotype, anal vesicles are two elongated sac-like structures, close to each other, into which open numerous branched tubules (Fig. 2F). In one paratype, anal vesicles are tubular into which open many excretory tubules.

## REMARKS

Diagnostic characters of the genus *Achaetobonellia* include bifid proboscis; absence of ventral setae; single gonoduct with a gonostome placed sub-basally; anal vesicles numerous arborescent structures. The genus *Achaetobonellia* contains a single species, *A. maculata* described by Fisher (1953) from a single specimen collected from Gilbert Islands. Significant differences exist between *A. maculata* and the new species, *A. ricei* n. sp., from the North Atlantic. According to the description provided by Fisher (1953) the body wall is thin and generally smooth and the lateral margins of the proboscis do not fuse at the base to form a tube. Another difference lies in the anal vesicles which in *A. maculata* appear as numerous arborescent structures. Furthermore, the proximal part of the gonoduct of *A. maculata* is modified into a thick-walled chamber which serves as an androecium. In view of the structure of the anal vesicles in the new species, the diagnosis of the genus needs modification.

This is a first report on the occurrence of the genus *Achaetobonellia* in the North Atlantic.

Genus *Eubonellia* Fisher, 1946*Eubonellia longistomum* DattaGupta, 1981

(Fig. 3A-C)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 2, Discovery 226, stn 13078#27, 48°47.26'N, 16°34.01'W, 4844 m, 3.IV.1997, 1 ♀. — BENGAL 5, Discovery 231, stn 13368#53, 48°49.98'N, 16°33.53'W, 4842 m, 19.III.1998, 1 ♀.

## DESCRIPTION

Colour of proboscis of preserved specimens is off-white; trunk is light pink. Proboscis of smaller specimen is bilobed, 9 mm long with small

projections at distal ends of lobes (Fig. 3A). Lateral margins curl inwards at proximal end but do not unite at base. Junction of proboscis and trunk is stout. Mouth located on round, muscular projection. Trunk of smaller specimen is 35 mm long and 11 mm across broadest part. Corresponding measurements of larger female are 72 mm and 10 mm. Only basal stump of proboscis still attached to trunk, rest is missing. Single genital pore is located a few millimetres away from anterior tip of trunk (Fig. 3A). Integument is thick and opaque. Papillae small, spherical, confined to posterior end of trunk, rest of integument is smooth. Longitudinal muscles aggregated into bands. Ventral setae absent.

Internally, single gonoduct is located on right side of nerve cord (Fig. 3B). Gonoduct tubular at proximal end but dilated distally. Gonostome distal in position with conspicuous lobes around margin. Neurointestinal vessel arises from wall of foregut, single throughout (Fig. 3C). Dorsal vessel prominent, passing anteriorly and entering proboscis (Fig. 3C). Anal vesicles two slender tubes with sparsely distributed ciliated funnels opening on either side of cloacal bulb.

#### REMARKS

Diagnostic features of the genus *Eubonellia* include a well developed bifurcate proboscis; absence of ventral setae; single gonoduct on right side of nerve cord with terminal gonostome; anal vesicles dendritic or tubular.

The species *E. longistomum* was erected by DattaGupta (1981) based on specimens in which the distal ends of the probosces were missing. The specimens on hand conform with the description provided by DattaGupta (1981) except for minor differences in the structure of the proboscis. According to the description given by the latter author, the proximal part of the proboscis adhering to the trunk is broad and flat and covers the mouth dorsally. The species *E. longistomum* differs from *E. valida* Fisher, 1946 and *E. noratlanticum* DattaGupta, 1981 in possessing tubular anal vesicles. Fisher (1946) states that the anal vesicles in *E. valida* are long and dendritic with a voluminous axial bladder which bears a few prox-

imal branches. In *E. noratlanticum* the anal vesicles are also dendritic bearing short stalked funnels (DattaGupta 1981).

Genus *Charcotus* DattaGupta, 1981

*Charcotus clavatum* DattaGupta, 1981  
(Fig. 3D, E)

MATERIAL EXAMINED. — Porcupine Abyssal Plain, BENGAL 5, Discovery 231, stn 13368#52, 48°48.30'N, 16°25.97'W, 4839 m, 19.III.1998, 2 ♀♀.

#### DESCRIPTION

Colour of proboscis of preserved specimens is creamy white. Trunk grey in distended regions but light pink in contracted portions. Proboscis of larger specimen is 7 mm and rounded distally; lateral margins unite proximally forming funnel around mouth (Fig. 3D). Trunk is 66 mm in length and 12 mm across broadest part. Corresponding measurements of smaller specimens are 63 mm and 15 mm. Distal end of proboscis damaged in smaller specimen. Single gonopore located a few millimetres away from anterior end of trunk (Fig. 3D). Ventral setae absent. Papillae microscopic, more clearly discernible in contracted regions of body.

Internally, single gonoduct located on right side of nerve cord (Fig. 3E). Gonoduct distended at proximal and distal ends but constricted and tubular in middle region. Gonostome is terminal, gonostomal lip simple and round (Fig. 3E). Gut long and coiled, attached to body wall by thin mesenteric strands. Gut contents consist of fine sand not moulded into faecal pellets. Dorsal and neurointestinal vessels are long; neurointestinal vessel is single throughout. Anal vessels are two elongated tubes opening into cloacal bulb.

#### REMARKS

The genus *Charcotus* is distinguished by a well developed and truncate proboscis; mouth in an oral cup; no ventral hooks; single gonoduct with terminal gonostome and long and tubular anal vesicles.



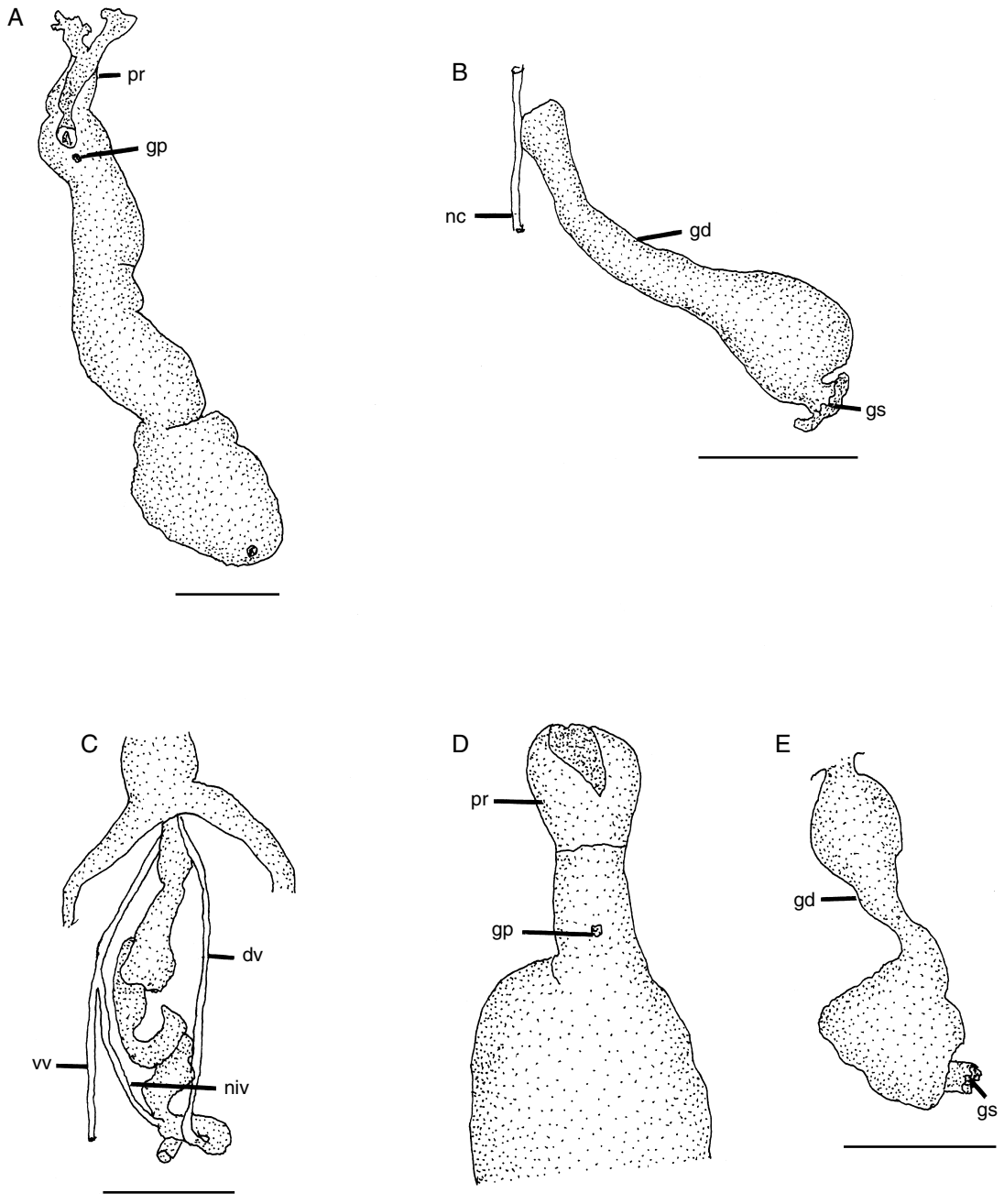


FIG. 3. — **A-C**, *Eubonellia longistomum* DattaGupta, 1981; **A**, ventral view of female; **B**, gonoduct; **C**, anterior end of trunk cavity showing the blood system; **D, E**, *Charcotus clavatum* DattaGupta, 1981; **D**, ventral view of anterior part of female; **E**, gonoduct. Abbreviations: **dv**, dorsal vessel; **gd**, gonoduct; **gp**, gonopore; **gs**, gonostome; **nc**, nerve cord; **niv**, neurointestinal vessel; **pr**, prosciscus; **vv**, ventral vessel. Scale bars: A, D, 4 mm; B, E, 2 mm; C, 3 mm.

This genus is nearest to the genus *Eubonellia* however, the proboscis is bifurcate and the anal vesicles are tube-like with numerous branches.

The species *C. clavatum* was erected by DattaGupta (1981) based on specimens from the North Atlantic at a depth of 4829 m. The specimen on hand closely approaches the description given by DattaGupta (1981) except for some minor differences in the dimensions of the proboscis and trunk and the dermal papillae.

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