

# Integrative taxonomy of West African *Magelona* (Annelida: Magelonidae): species with thoracic pigmentation

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Benthic samples collected during several cruises from shelf areas along the West African coast from Morocco to Angola, have highlighted a huge diversity of magelonid species (over 20 species), many of which are undescribed. The majority of samples were taken as part of two large-scale projects in the region: the Canary Current Large Marine Ecosystem project (CCLME) and the Guinea Current Large Marine Ecosystem project (GCLME). Six magelonid species bearing posterior thoracic pigmentation have been highlighted, *Magelona alleni* and five species new to science: *Magelona fasciata* sp. nov., *Magelona guineensis* sp. nov., *Magelona mackiei* sp. nov., *Magelona nansenii* sp. nov. and *Magelona picta* sp. nov. West African magelonids and comparative material from the UK and Norway have been investigated using COI, 16S and 28S markers. An integrated taxonomic approach is used to delineate species of *Magelona* carrying posterior thoracic pigmentation. These species from West African waters constitute a well-supported monophyletic group, with the species *M. alleni* being sister to the new species herein described. Our 41 COI DNA-barcode-sequences had between species distances from 9.3 to 26.8% and were allocated to ten different BINs in Boldsystems.org.

ADDITIONAL KEYWORDS: *Magelona alleni* – molecular phylogeny – new records – new species – tubes.

## INTRODUCTION

The Magelonidae is a small family of annelid worms containing 72 extant species and the fossil, *Dannychaeta tucolus* Chen *et al.*, 2020. The family is characterized by the presence of distinct spade-like prostomia, giving the group the common name shovelhead worms, and paired ventrally inserted papillated palps, unique to the group.

Within the extant members of the family, all but one species occur in the genus *Magelona* F.Müller, 1858, characterized by possessing a thoracic region with nine chaetigers. The second, monotypic genus *Octomagelona* Aguirrezabalaga *et al.*, 2001 is characterized by possessing only eight thoracic chaetigers. Whilst

only one species is formally described for the genus, several undescribed *Octomagelona* are known to exist, including one off West Africa (see: Capa *et al.*, 2019). Other previously introduced generic names, viz. *Maea* Johnston, 1865, *Meredithia* Hernández-Alcántara & Solís-Weiss, 2000 and *Rhynophylla* Carrington, 1865, have since been synonymized with *Magelona*.

Magelonids are generally considered to be shallow-water species, at depths of less than 100 m (Rouse, 2001), although several species have been recorded from deeper waters (1000 to over 4000 m; see: Hartman, 1971; Fiege *et al.*, 2000; Aguirrezabalaga *et al.*, 2001; Mills & Mortimer, 2018).

Five magelonid species have been described as possessing a distinct, deep-brown to reddish pigment band in the posterior thorax: *Magelona cincta* Ehlers, 1908, *Magelona japonica* Okuda, 1937, *Magelona alleni* Wilson, 1958, *Magelona equilamellae* Harmelin, 1964 and *Magelona variolamellata* Bolívar & Lana, 1986. These species are characteristically stout, possessing a fewer number of chaetigers, prostomia that are wider

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than long and have short palps carrying numerous long papillae (appearing almost ‘frilly’). They are amongst the few magelonids reported to construct distinct tubes (Mortimer & Mackie, 2014; Shakouri *et al.*, 2017; Capa *et al.*, 2019; Mortimer *et al.*, 2020) and may differ in the morphology of the pygidium in comparison to other magelonid species (Mills & Mortimer, 2019; Mortimer *et al.*, 2020). Two further magelonids have been recorded to possess pigmentation of the thoracic region, although not forming a distinct band, as in the aforementioned species, namely, *Magelona symmetrica* Mortimer & Mackie, 2006 (Mortimer *et al.*, 2012) and *Magelona polydentata* Jones, 1963.

Despite magelonid species having been recorded from all around the world, large gaps in our current taxonomic knowledge exist. This is particularly true for African waters, where only a handful of species have been described, and the diversity of magelonids is virtually unknown. Only nine magelonid species in total have been recorded from West African waters: *M. alleni*, *M. capensis* Day, 1961, *M. cincta*, *M. cornuta* Wesenberg-Lund, 1949, *M. filiformis* Wilson, 1959, *M. pacifica* Monro, 1933, *M. papillicornis* Müller, 1858, *M. rosea* Moore, 1907 and *M. wilsoni* Glémarec, 1967 (Ehlers, 1908; Fauvel, 1936; Day, 1955, 1961, 1967; Kirkegaard, 1959, 1996; Rullier, 1965; Amoureux, 1973, 1976; Intès & Le Loeuff, 1977; Bayed & Glémarec, 1987a, b). Of these species, only *M. cincta* and *M. alleni* are known to possess reddish pigmentation of the posterior thorax, as described above.

Day (1961) recorded three magelonid species occurring along the coast of South Africa: *Magelona capensis* Day, 1961, *M. cincta* and *M. papillicornis*. The South African specimens, erroneously identified as *M. papillicornis*, were later referred to *Magelona debeerei* Clarke *et al.*, 2010 (also recorded off Namibia) and *M. cincta* was redescribed by Mortimer & Mackie (2009). A key for magelonid species of South Africa was additionally provided by Clarke *et al.* (2010).

The present study aims to review the magelonids from shelf areas along the west coast of Africa from Morocco to Angola, based on a large number of benthic samples obtained during numerous cruises with the R/V *Dr Fridtjof Nansen* between 1997 and 2012. Collections from these cruises have been sorted and stored by the University Museum of Bergen under the project acronym MIWA (Marine Invertebrates of Western Africa) and specimens have been subject to DNA barcoding and systematic investigation by local staff and a number of visiting scientists (e.g. Malaquias *et al.* 2016; Gil & Ramil, 2021). Preliminary results suggest that in excess of 20 magelonid species occur off Western Africa, many of which are undescribed. Investigations have highlighted six of these magelonid species to possess posterior thoracic pigmentation: *M. alleni* originally described from Plymouth, England, and five species

new to science, described below: *Magelona fasciata*, *M. guineensis*, *M. mackiei*, *M. nansenii* and *M. picta*.

## MATERIAL AND METHODS

### SPECIMEN COLLECTION

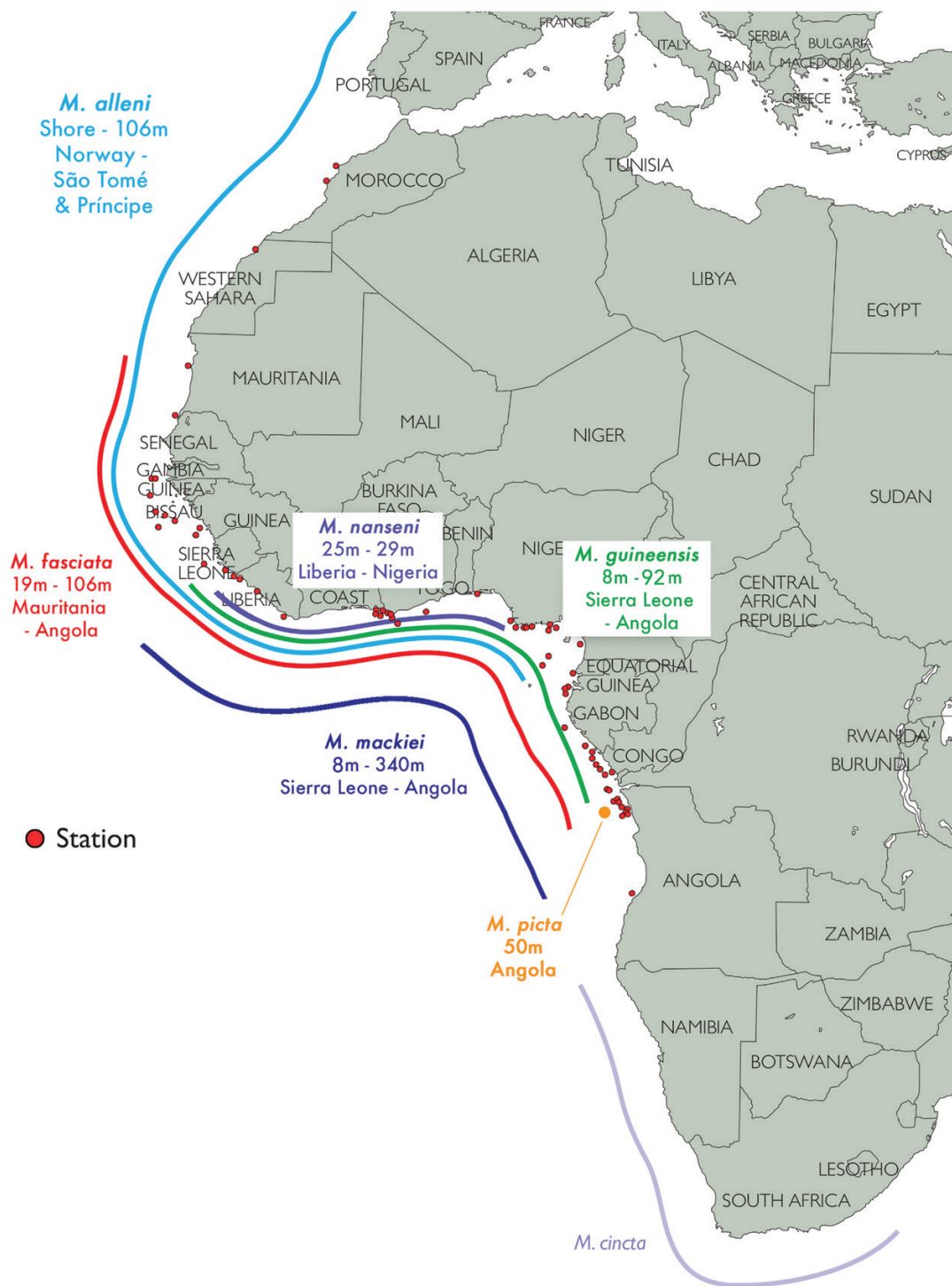
The majority of specimens were collected during two major projects commissioned by the Food and Agriculture Organization of the United Nations and conducted by the Norwegian Institute of Marine Research between 2005 and 2012: The Canary Current Large Marine Ecosystem (CCLME) project and the Guinea Current Large Marine Ecosystem (GCLME) project. Sampling was undertaken along the coast of West Africa from Morocco to Angola (Fig. 1) from research vessel *Dr Fridtjof Nansen* using a grab or an epibenthic-sledge, between the depths of 8 and 877 m. Specimens examined herein were found down to 340 m (see Table 1). Samples were either fixed in 4% formalin and subsequently transferred into 75% ethanol (75% Etoh) or preserved directly in 96% ethanol (96% Etoh). Additional specimens included in this study were collected from shelf areas off Angola during a cruise with RV *Dr Fridtjof Nansen* in 1997 (Table 1). Specimens have been deposited in the collections of the University Museum of Bergen (ZMBN), Norway and Amgueddfa Cymru – National Museum Wales (NMW), UK.

Type material of *M. alleni* was borrowed from the Natural History Museum, London (BMNH) and additional specimens of the species were collected near to the type locality (Jennycliffe Bay, Plymouth from RV *Sepia* using a short-armed, chain-rigged Van Veen grab) for molecular characterization.

Comparative material of four species of *Magelona* collected during a series of sampling expeditions both on and off shore in UK waters (Devon, southern England; Berwick-upon-Tweed, Northumberland; Cardigan Bay, Wales; and Isles of Scilly, Cornwall) from Amgueddfa Cymru – National Museum Wales collections were used for morphological and molecular analyses. Additional Norwegian material from ZMBN collections was also studied.

### MORPHOLOGICAL OBSERVATIONS AND ILLUSTRATIONS

All drawings were made using a camera lucida attachment on a Leica MZ9.5 zoom microscope or a Leica DM2000 compound microscope. Images were acquired with a Canon EOS 80D 24 MP DSLR camera attached to a Leica Z6 Macroscope with trinocular head. All images were then stacked using HeliconFocus v.6.22 (HeliconSoft Ltd) extended depth of field software, with calibrated scale bars added using



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**Figure 1.** Map showing the MIWA sampling area between Morocco in the north and Angola in the south, indicating the position of all sampling stations and current known distributions and depths for all magelonid species carrying posterior thoracic pigmentation off the western and southern coasts of Africa.

Adobe Photoshop v.20.0.5. To maintain consistency, specimen descriptions are in the same format as those used, for example, in [Mortimer & Mackie \(2003, 2006,](#)

[2009\)](#) and [Mills & Mortimer \(2018\)](#). Specimens are herein recorded as complete (c), anterior fragments (af), posterior fragments (pf) or fragments (f). Left- and

**Table 1.** Information for all sampling stations off Western Africa where *Magelona* specimens carrying pigmentation of the posterior thorax were collected

Country	Station code	Sampling date	Latitude	Longitude	Depth (m)	Gear
Angola	7AN-01	11.07.2007	6.6002S	12.2122E	50	Grab
Angola	7AN-02	11.07.2007	6.7076S	11.9659E	106	Grab
Angola	7AN-03	11.07.2007	6.8526S	12.2831E	50	Grab
Angola	7AN-04	12.07.2007	7.1452S	12.4721E	65	Grab
Angola	7AN-05	12.07.2007	7.2229S	12.7655E	25	Grab
Angola	7AN-08	13.07.2007	7.4915S	12.8025E	51	Grab
Angola	1997-13	23.05.1997	12.3467S	13.5001E	70	Grab
Angola	1997-15	23.05.1997	12.3367S	13.3667E	244	Grab
Angola	1997-20	27.05.1997	7.5901S	12.8101E	61	Grab
Angola	1997-23	28.05.1997	7.6033S	12.4951E	340	Grab
Angola	1997-28	02.06.1997	6.0917S	11.4683E	261	Grab
Angola	1997-29	02.06.1997	6.1011S	11.5833E	151	Grab
Cameroon	5C-10	23.06.2005	3.4498N	9.5415E	24	Grab
Cameroon	6C-21	01.07.2006	2.6335N	9.7721E	25	Grab
Gabon	5G-01	30.06.2005	0.8625N	9.2285E	19	Grab
Gabon	5G-03	01.07.2005	0.0868N	9.0350E	60	Grab
Gabon	5G-15	10.07.2005	3.4470S	10.2557E	64	Grab
Gabon	5G-13	09.07.2005	3.1717S	9.8193E	92	Grab
Gabon	5G-16	11.07.2005	3.8108S	10.6133E	69	Grab
Gabon	7GA-07	27.06.2007	0.2612S	8.9671E	65	Grab
Gabon	7GA-26	05.07.2007	4.1061S	10.7379E	105	Grab
Gabon	8G-01	04.05.2008	0.0570N	8.8661E	197	Grab
Ghana	7GH-01	06.06.2007	4.9613N	3.0146W	52	Grab
Ghana	7GH-02	06.06.2007	4.9169N	2.6495W	40	Grab
Ghana	7GH-05	07.06.2007	4.6394N	2.7359W	204	Grab
Ghana	7GH-06	07.06.2007	4.8122N	2.3915W	47	Grab
Ghana	7GH-07	07.06.2007	4.5382N	2.0449W	76	Grab
Ghana	7GH-08	08.06.2007	4.2286N	1.7297W	193	Grab
Ghana	2009105-GE1/28	04.05.2009	4.7647N	2.1327W	28	Grab
Ghana	2009105-GW2/52	06.05.2009	4.9642N	3.0227W	52	Grab
Ghana	2009105-GW4/252	06.05.2009	4.7440N	3.0647W	252	Grab
Ghana	2009105-GP1/28	07.05.2009	4.9280N	2.5759W	28	Grab
Ghana	2009105-GP2/51	07.05.2009	4.8543N	2.6188W	51	Grab
Ghana	2011404-GE1/249	21.04.2011	5.0530N	0.3428W	249	Grab
Guinea Bissau	6GB-07	03.05.2006	10.4467N	16.0761W	27	Grab
Guinea Bissau	7GB-06	08.05.2007	10.5575	16.8016W	153	Grab
Guinea Bissau	7GB-08	09.05.2007	10.4473N	16.0757W	28	Grab
Guinea Bissau	2011410-SL09	30.10.2011	11.5879N	17.2640W	101	D-sledge
Guinea Bissau	2012404-SL06	20.05.2012	11.5711N	17.2551W	99	D-sledge
Guinea Conakry	7GU-01	10.05.2007	10.1174N	15.6441W	25	Grab
Guinea Conakry	7GU-05	14.05.2007	9.7173N	14.2127W	27	Grab
Guinea Conakry	2011410-GR01	21.10.2011	9.2601N	14.3221W	45	Grab
Guinea Conakry	2012404-GR02	15.05.2012	9.7640N	16.4901W	101	Grab
Liberia	7LI-01	23.05.2007	6.7984N	11.4092W	29	Grab
Liberia	7LI-04	25.05.2007	6.0001N	10.2667W	26	Grab
Liberia	7LI-07	28.05.2007	4.6231N	8.4953W	54	Grab
Mauritania	2011410-SL20	08.11.2011	16.3577N	16.7520W	103	D-sledge
Mauritania	2012404-SL20	08.06.2012	19.3063N	16.7474W	30	D-sledge
Morocco	2011410-GR45	11.12.2011	31.6147N	9.7558W	36	Grab
Morocco	2011410-GR50	13.12.2011	32.4725N	9.2744W	40	Grab
Nigeria	5N-11	12.06.2005	4.1482N	5.7688E	25	Grab
Nigeria	5N-12	13.06.2005	3.9751N	6.2965E	45	Grab

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**Table 1.** Continued

Country	Station code	Sampling date	Latitude	Longitude	Depth (m)	Gear
Nigeria	5N-14	15.06.2005	3.8015N	7.6477E	217	Grab
Nigeria	6N-01	10.06.2006	6.3152N	3.0978E	25	Grab
Nigeria	6N-11	16.06.2006	4.5212N	5.4367E	26	Grab
Nigeria	6N-14	18.06.2006	3.9828N	6.2157E	41	Grab
Nigeria	6N-15	19.06.2006	4.0718N	6.6437E	40	Grab
Nigeria	6N-20	21.06.2006	4.2212N	7.6942E	24	Grab
Nigeria	6N-23	22.06.2006	3.9223N	8.1641E	84	Grab
Republic of Congo	7CR-02	08.07.2007	4.7651S	11.2267E	248	Grab
Republic of Congo	7CR-04	08.07.2007	4.9478S	11.8043E	51	Grab
Republic of Congo	7CR-05	09.07.2007	5.1283S	11.4873E	202	Grab
Republic of Congo	8CR-01	12.05.2008	4.4936S	10.9313E	202	Grab
São Tomé and Príncipe	5SP-05	27.06.2005	1.5345N	7.4225E	38	Grab
São Tomé and Príncipe	2009-T2	01.06.2009	0.4132N	6.6703E	8	Grab
São Tomé and Príncipe	ES-77-SBE					
Senegal	2011410-SL11	31.10.2011	12.5648N	17.3551W	29	D-sledge
Senegal	2011410-SL12	31.10.2011	12.5564N	17.5701W	106	D-sledge
Sierra Leone	7SL-04	19.05.2007	7.6772N	13.5651W	34	Grab
Sierra Leone	7SL-06	21.05.2007	7.2743N	12.2949W	19	Grab
Sierra Leone	7SL-08	22.05.2007	6.9237N	11.6979W	37	Grab
Sierra Leone	7SL-09	22.05.2007	6.8832N	11.7311W	49	Grab
Western Sahara	2011410-GR27	03.12.2011	27.0158N	13.5021W	32	Grab

right-hand, when referring to parapodia or palps are denoted by LH and RH, respectively. Measurements, such as, prostomial length and width, thoracic length (including prostomium) and width, abdominal width and total length were taken as detailed in Fiege *et al.* (2000, measurements excluding parapodia), and staining patterns were observed using methyl green as detailed by Mackie & Gobin (1993).

#### MOLECULAR WORK

Molecular work was performed both at the University of Bergen (UIB) and at the Canadian Centre for DNA Barcoding (CCDB), in Guelph. Tissue for DNA extraction was cut from posterior parts of selected specimens (avoiding thoracic region and other structures of possible taxonomic interest where possible). The Qiagen DNeasy Blood and Tissue Kit protocol was used for extraction within the lab at UIB. Three genetic markers were selected for the present study: partial sequences of mitochondrial markers cytochrome *c* oxidase subunit I (*COI* barcodes) and 16S ribosomal RNA (r16S) and nuclear ribosomal RNA (r28S). Polymerase chain reaction (PCR) and Sanger sequencing in both directions was performed with the primers listed in Table 2 (Palumbi *et al.*, 1991; Passamaneck *et al.*, 2004; Struck *et al.*, 2006; Carr *et al.*, 2011). The quality and quantity of PCR products were assessed by gel electrophoresis following standard methods, and successful PCR products were

purified with ExoSAP-IT (Thermo Fisher Scientific). Sequence reactions were run on an ABI 3730XL DNA Analyzer (Applied Biosystems).

For sequencing carried out at CCDB, tissue samples and data were submitted according to the routines in BOLD (<http://www.boldsystems.org>). CCDB used their own tissue lysis protocol and applied the forward primer polyLCO and the reverse primer polyHCO for PCR amplification and sequencing of *COI*.

DNA-sequences of three markers were recovered from 41 individuals and used in the species delimitation analyses (Table 3), including single specimens from four accepted species not belonging to the group of species characterized by posterior thoracic pigmentation. The following species, *M. filiformis* Wilson, 1959, *M. johnstoni* Fiege *et al.*, 2000, *M. minuta* Eliason, 1962 and *M. mirabilis* (Johnston, 1865) served as the outgroup. *COI* sequences from all 41 individuals were used in the computation of intra- and interspecific distances after the species had been defined. Sequences were edited in SEQUENCHER 5.0 (Gene Codes Corporation, 1991–2011) and aligned with the MAFFT plugin in GENEIOUS 11 (Kearse *et al.*, 2012). GENEIOUS was additionally used to concatenate aligned sequences from the tree genes into one dataset.

The web version of Automatic Barcode Gap Discovery (ABGD; Puillandre *et al.*, 2012) with default settings (Pmin = 0.001, Pmax = 0.1, Steps = 10, X = 1.5, Nbins = 20) was used to assign sequences to groups

**Table 2.** PCR and sequencing primers used in this study

Marker	Primer name	Sequence 5'-3'	Direction	Source
<i>COI</i>	PolyLCO	GAYTATWTTCAACAAATCATAAAGATATTGG	Forward	Carr <i>et al.</i> (2011)
	PolyHCO	TAMACTTCWGGGTGACCAARAATCA	Reverse	–
16S	16Sar-L	CGCCTGTTTATCAAAAACAT	Forward	Palumbi <i>et al.</i> (1991)
	16Sbr-H	CCGGTCTGAACTCAGATCACGT	Reverse	–
28S	28F5	CAAGTACCGTGAGGGAAAGTTG	Forward	Passamaneck <i>et al.</i> (2004)
	P028R4	GTTCCACCATCTTTCGGGTCCCAAC	Reverse	Struck <i>et al.</i> (2006)

based on *COI* p-distances. Mega7 (Kumar *et al.*, 2016) was used to compute within/between distances from these groups, using 1000 bootstrap replicates to estimate standard errors. MrBayes 3.2.5 (Ronquist *et al.*, 2012) was used to estimate the phylogenetic relations from the concatenated sequence data. The assembled data was partitioned into four character sets: one comprised by the first- and second-codon positions of *COI*, one by the third-codon positions, one by 16S and the fourth by 28S. A priori model testing was not performed, but MrBayes' ability to search the complete parameter space with gamma and invariable sites for the best submodels of the general time reversible model, GTR, was taken advantage of, while simultaneously searching for the set of optimal trees (Ronquist *et al.*, 2012). Four Markov chains were used in two parallel runs for 2 million generations, sampling every 1000<sup>th</sup>. Diagnostic output from MrBayes was supplemented with the software TRACER (Rambaut *et al.*, 2018), and tree graphics were made with FigTree (Rambaut, 2006–2016). Statistics based on the method of Ross *et al.* (2008) were calculated with the Species Delimitation Plugin, SDP v.1.4.3, (Masters *et al.*, 2011) in GENEIOUS. SPD statistics were computed from Kimura two-parameter distances on the *COI* data, using the Bayesian tree obtained from the concatenated sequence data and the groups obtained with ABGD as predefined clades. IntraDist is the average pairwise patristic distance amongst members of a group; InterDist is the average pairwise patristic distance between members of the group and its sister taxa; Intra/Inter is the ratio of IntraDist to InterDist; PID(Liberal) is the mean probability with a 95% confidence interval for a prediction to result in a correct identification of an unknown specimen being sister to, or within the group of interest; PID(Strict) is the mean probability with a 95% confidence interval for a prediction of making a correct identification of an unknown specimen being found only in the group of interest; AvMA is the mean distance between the most recent common ancestor of the species and its members; Rosenberg's P(AB) is the probability that a species *A* represented by *n* sequences, in a clade of *n* + *m* sequences, will be reciprocally monophyletic

with the remaining *m* sequences under the null model of random coalescence (Rosenberg, 2007). The null hypothesis in this test is that lineages evolve according to a Yule model with random branching. If the null hypothesis is rejected it is assumed that the branching may be due to some barrier to gene flow (Rosenberg, 2007). Rosenberg's test was also performed with the R-package SPIDER (Brown *et al.*, 2012), also using the *COI* sequences and a Bayesian tree obtained from the concatenated sequence data.

Rodrigo's (RD) (Rodrigo *et al.*, 2008) parameter was not included in the SPD-results because it is not a relevant measure of the degree of distinctness when the underlying tree is not estimated under a strict molecular clock (Masters *et al.*, 2011; Boykin *et al.*, 2012).

Unlike ABGD, which is based on sequence input and a similarity threshold as input, the Generalized Mixed Yule Coalescent (GMYC) model (Fujisawa & Barraclough, 2013) takes reconstructed gene trees as an input and uses a likelihood method to fit within- and between-species branching models from a given topology and branch lengths. However, GMYC assumes that the tree is isometric and evolved with equal rates in all branches. Due to the fact that our data did not meet these criteria, the related Poisson Tree Processes (PTP) model was used (Zhang *et al.*, 2013) in its Bayesian version on the bPTP Species Delimitation server at <https://species.h-its.org>. Computation of bPTPs returns the probabilities that all descendants from each node in the tree are likely to be from one species. Altogether 500 000 MCMC generations were run with sample thinning every 500 and using default settings for burn-in. Both the Bayesian consensus tree (Fig. 2) and a ML *COI* (Supporting Information, Fig. S1) gene tree were used as an input for bPTP. The ML *COI* gene tree was computed with PhyML (Guindon *et al.*, 2010) implemented in SeaView (Gouy *et al.*, 2010) using the GTR+G model.

## RESULTS

### MOLECULAR ANALYSES

The Bayesian runs on concatenated data were approaching equilibrium with average standard

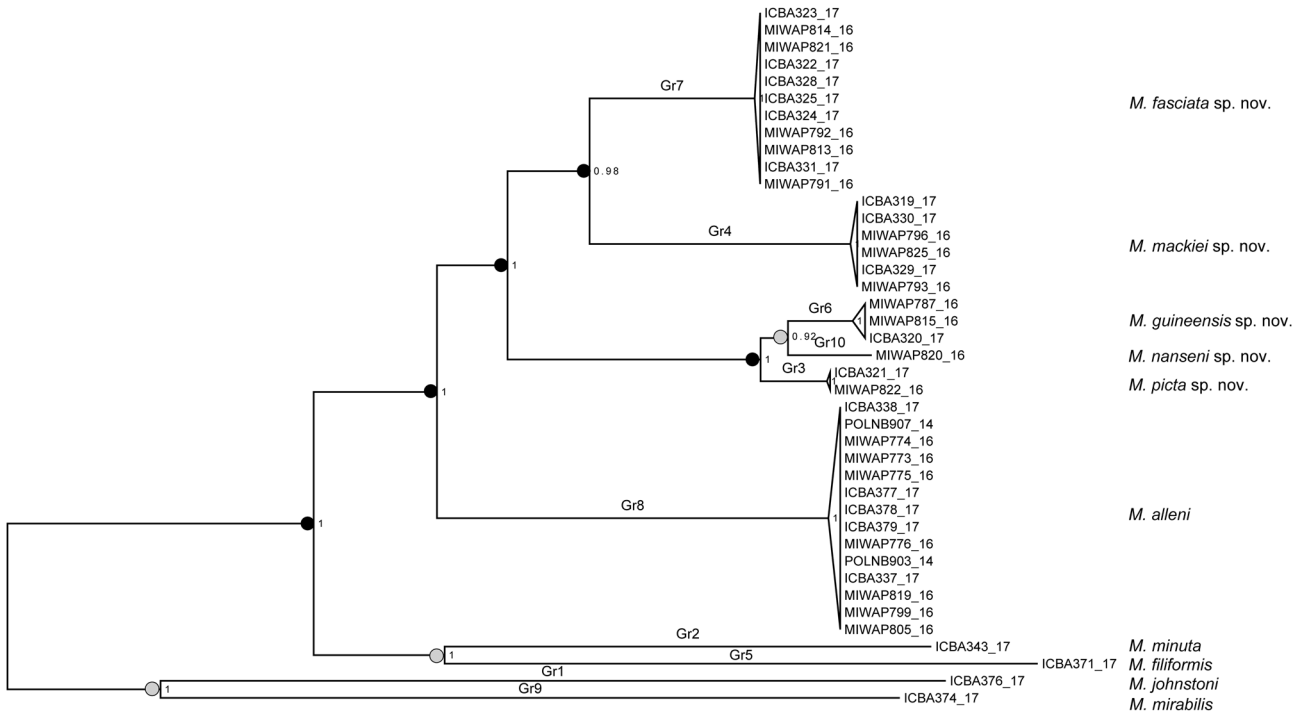
**Table 3.** DNA-voucher specimens, with museum catalogue number, sampling location, BOLD process ID and GenBank accession IDs of sequences included in present study. Abbreviations: MIWA, Marine Invertebrates of Western Africa; NMW, Amgueddfa Cymru – National Museum Wales; ZMBN, Department of Natural History, University Museum of Bergen, Norway

Species	Museum Voucher ID	Sampling location and depth	Process ID (BOLD)	GenBank accession number		
				COI	16S	28S
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2009.027.0523	UK, Isles of Scilly, 49.9210N 6.3352W, 15 m	MIWAP773-16	MZ334703		
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2003.035.0018	UK, Mill Bay, Devon 50.2304N 3.7679W, low shore	MIWAP774-16	MZ334671		
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2010.039.0001	UK, Cardigan Bay, Wales, 52.3626N 4.1776W, 26 m	MIWAP775-16	MZ334687		
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2006.019.0799	UK, Tresco, Isles of Scilly 49.9600N 6.3300W, low tide	MIWAP776-16	MZ334673		
<i>Magelona alleni</i> Wilson, 1958	ZMBN195087	Norway, 58.3880N 8.7490E, 66 m	POLNB903-14	MZ334684		
<i>Magelona alleni</i> Wilson, 1958	ZMBN195091	Norway, 58.3880N 8.7490E, 66 m	POLNB907-14	MZ334674		
<i>Magelona alleni</i> Wilson, 1958	ZMBN107315	Western Sahara, 27.0158N 13.5021W, 32 m	MIWAP799-16	MZ334702	MZ334751	
<i>Magelona alleni</i> Wilson, 1958	ZMBN107321	Senegal, 12.5564N 17.5701W, 106 m	MIWAP805-16	MZ334709		
<i>Magelona alleni</i> Wilson, 1958	ZMBN107335	Guinea Conakry, 9.7640N 16.4901W, 101 m	MIWAP819-16	MZ334697		
<i>Magelona alleni</i> Wilson, 1958	ZMBN115753	Senegal, 12.5564N 17.5701W, 106 m	ICBA337-17	MZ334695	MZ334746	MZ334769
<i>Magelona alleni</i> Wilson, 1958	ZMBN115754	Western Sahara, 27.0158N 13.5021W, 32 m	ICBA338-17	MZ334712	MZ334758	MZ334777
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2018.007.0001	UK, Jernycliff Bay, Plymouth, 50.3483N 4.1288W, 8 m	ICBA378-17	MZ334672	MZ334733	MZ334759
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2018.007.0002	UK, Jernycliff Bay, Plymouth, 50.3483N 4.1288W, 8 m	ICBA377-17	MZ334692	MZ334744	MZ334767
<i>Magelona alleni</i> Wilson, 1958	NMW.Z.2018.007.0003	UK, Jernycliff Bay, Plymouth, 50.3483N 4.1288W, 8 m	ICBA379-17	MZ334705	MZ334753	MZ334775
<i>Magelona fasciata</i> sp. nov.	ZMBN107307, Paratype	Gabon, 4.1061S 10.7379E, 105 m	MIWAP791-16	MZ334691	MZ334743	MZ334766
<i>Magelona fasciata</i>	ZMBN107308, Paratype	Gabon, 0.0868N 9.0350E, 60 m	MIWAP792-16	MZ334670		
<i>Magelona fasciata</i>	ZMBN107329, Paratype	Sierra Leone, 6.9237N 11.6979W, 37 m	MIWAP813-16	MZ334698	MZ334747	MZ334770
<i>Magelona fasciata</i>	ZMBN107330, Paratype	Ghana, 4.9169N 2.6495W, 40 m	MIWAP814-16	MZ334681	MZ334737	MZ334761
<i>Magelona fasciata</i>	ZMBN107337, Paratype	Mauritania, 16.3577N 16.7520W, 103 m	MIWAP821-16	MZ334711	MZ334757	
<i>Magelona fasciata</i>	ZMBN115738, Paratype	Senegal, 12.5648N 17.3551W, 29 m	ICBA322-17	MZ334686	MZ334741	MZ334764
<i>Magelona fasciata</i>	ZMBN115739, Paratype	Senegal, 12.5648N 17.3551W, 29 m	ICBA323-17	MZ334694	MZ334745	MZ334768
<i>Magelona fasciata</i>	ZMBN115740, Paratype	Angola, 7.1452S 12.4721E, 65 m	ICBA324-17	MZ334707	MZ334754	MZ334776
<i>Magelona fasciata</i>	ZMBN115741, Paratype	Mauritania, 19.3063N 16.7474W, 30 m	ICBA325-17	MZ334676	MZ334734	MZ334760
<i>Magelona fasciata</i>	ZMBN115744, Paratype	Angola, 6.7076S 11.9659E, 106 m	ICBA328-17	MZ334688	MZ334742	MZ334765
<i>Magelona fasciata</i>	ZMBN 115747, Paratype	Republic of Congo, 4.9478S 11.8043E, 51 m	ICBA331-17	MZ334680	MZ334736	
<i>Magelona guineensis</i> sp. nov.	ZMBN107303, Paratype	São Tomé and Príncipe, 1.5345N 7.4225E, 38 m	MIWAP787-16	MZ334713		
<i>Magelona guineensis</i>	ZMBN107331, Paratype	Nigeria, 4.2212N 7.6942E, 24 m	MIWAP815-16	MZ334679		
<i>Magelona guineensis</i>	ZMBN115736, Paratype	Nigeria, 6.3152N 3.0978E, 25 m	ICBA320-17	MZ334682	MZ334738	MZ334762
<i>Magelona mackiei</i> sp. nov.	ZMBN107309, Holotype	Nigeria, 3.8015N 7.6477E, 217 m	MIWAP793-16	MZ334706		

Table 3. Continued

Species	Museum Voucher ID	Sampling location and depth	Process ID (BOLD)	GenBank accession number		
				COI	16S	28S
<i>Magelona mackiei</i>	ZMBN107312, Paratype	Republic of Congo, 4.7651S 11.2267E, 248 m	MIWAP796-16	MZ334675		
<i>Magelona mackiei</i>	ZMBN107341, Paratype	Ghana, 5.0530N 0.3428W, 249 m	MIWAP825-16	MZ334693		
<i>Magelona mackiei</i>	ZMBN115735, Paratype	Ghana, 4.2286N 1.7297W, 193 m	ICBA319-17	MZ334708	MZ334755	
<i>Magelona mackiei</i>	ZMBN115745, Paratype	Republic of Congo, 4.4936S 10.9313E, 202 m	ICBA329-17	MZ334710	MZ334756	
<i>Magelona mackiei</i>	ZMBN115746, Paratype	Nigeria, 3.8015N 7.6477E, 217 m	ICBA330-17	MZ334685	MZ334740	
<i>Magelona nanseni</i> sp. nov.	ZMBN107336, Paratype	Nigeria, 4.1482N 5.7688E, 25 m	MIWAP820-16	MZ334677	MZ334735	
<i>Magelona picta</i> sp. nov.	ZMBN107338, Holotype	Angola, 6.8526S 12.2831E, 50 m	MIWAP822-16	MZ334690		
<i>Magelona picta</i>	ZMBN115737, Paratype	Angola, 6.8526S 12.2831E, 50 m	ICBA321-17	MZ334704	MZ334752	MZ334774
Outgroup taxa:						
<i>Magelona filiformis</i> Wilson, 1959	NMW.Z.2018.006.0001	UK, Berwick-upon-Tweed, 55.7658N 1.9855W, low shore	ICBA371-17	MZ334683	MZ334739	MZ334763
<i>Magelona johnstoni</i> Fiege, Licher & Mackie, 2000	ZMBN132129	UK, Berwick-upon-Tweed, 55.7658N 1.9855W, low shore	ICBA376-17	MZ334701	MZ334750	MZ334773
<i>Magelona minuta</i> Eliason, 1962	ZMBN115759	Morocco, 30.5646N 9.8007W, 46 m	ICBA343-17	MZ334699	MZ334748	MZ334771
<i>Magelona mirabilis</i> (Johnston, 1865)	ZMBN132131	UK, Berwick-upon-Tweed, 55.7658N 1.9855W, low shore	ICBA374-17	MZ334700	MZ334749	MZ334772





**Figure 2.** Bayesian 50% consensus tree from concatenated data of partial mitochondrial cytochrome *c* oxidase subunit I and large mitochondrial (16S) and nuclear ribosomal genes (28S). Annotated sequence groups were obtained with ABGD. Numbers on nodes correspond to posterior probabilities. Black dots mark significant and grey dots non-significant reciprocally monophyletic clades according to Rosenberg's (2007) test.

deviation of split frequencies down to 0.01 already after 220 000 generations. A burn-in of 25% was used and it was observed that all model parameters had been effectively sampled, showing ESS values well above the recommended 200. The consensus tree with node support is shown in Figure 2. The six species carrying posterior thoracic pigmentation were recovered as monophyletic with Bayesian analysis (PP = 1). Within this group, the species *M. alleni* (which is distributed from Norway to São Tomé and Príncipe) is sister to the group of five new species from West African waters. ABGD resulted in ten groups of species (Fig. 2; Table 4) and bPTP estimated between ten and 14 species with a mean of 10.18.

All species generally had high support from bPTP. All groups comprised of more than one specimen were found reciprocally monophyletic with their sister-groups according to Rosenberg's test (Fig. 2; Table 4). The species delimited by ABGD and bPTP fully corresponded with the BIN assignments computed by the BOLD algorithm (Table 5) (Ratnasingham & Hebert, 2013). The uncorrected *p*-distances between pairs of groups varied from 9.3 to 26.9% (Table 5). The shortest distances were calculated among sequences comprised by a clade including the three new species *M. guineensis*, *M. nanseni* and *M. picta* described below.

## SYSTEMATICS

### MAGELONIDAE CUNNINGHAM & RAMAGE, 1888

*MAGELONA* F. MÜLLER, 1858; EMENDED FIEGE ET AL., 2000

#### *MAGELONA ALLENI* WILSON, 1958

(FIGS 3–6)

*Magelona alleni* Wilson (1958), Mackie *et al.* (1995, 2006), Fiege *et al.* (2000), Meißner & Darr (2009), Robinson *et al.* (2009), Mills & Mortimer (2019), Mortimer *et al.* (2020).

*Magelona cincta* Fauvel (1936), Mare (1942), Clarke & Milne (1955) (see: Wilson, 1958).

*Type locality:* **UK:** Plymouth, Rame Mud (a deposit of black sandy mud, close to station 93 of Ford (1923), viz. Rame Head, E. ½ N. Tregantle, N. ½ E., see Mare (1942), approximately 50.302°N, 4.244°W and 60 m.

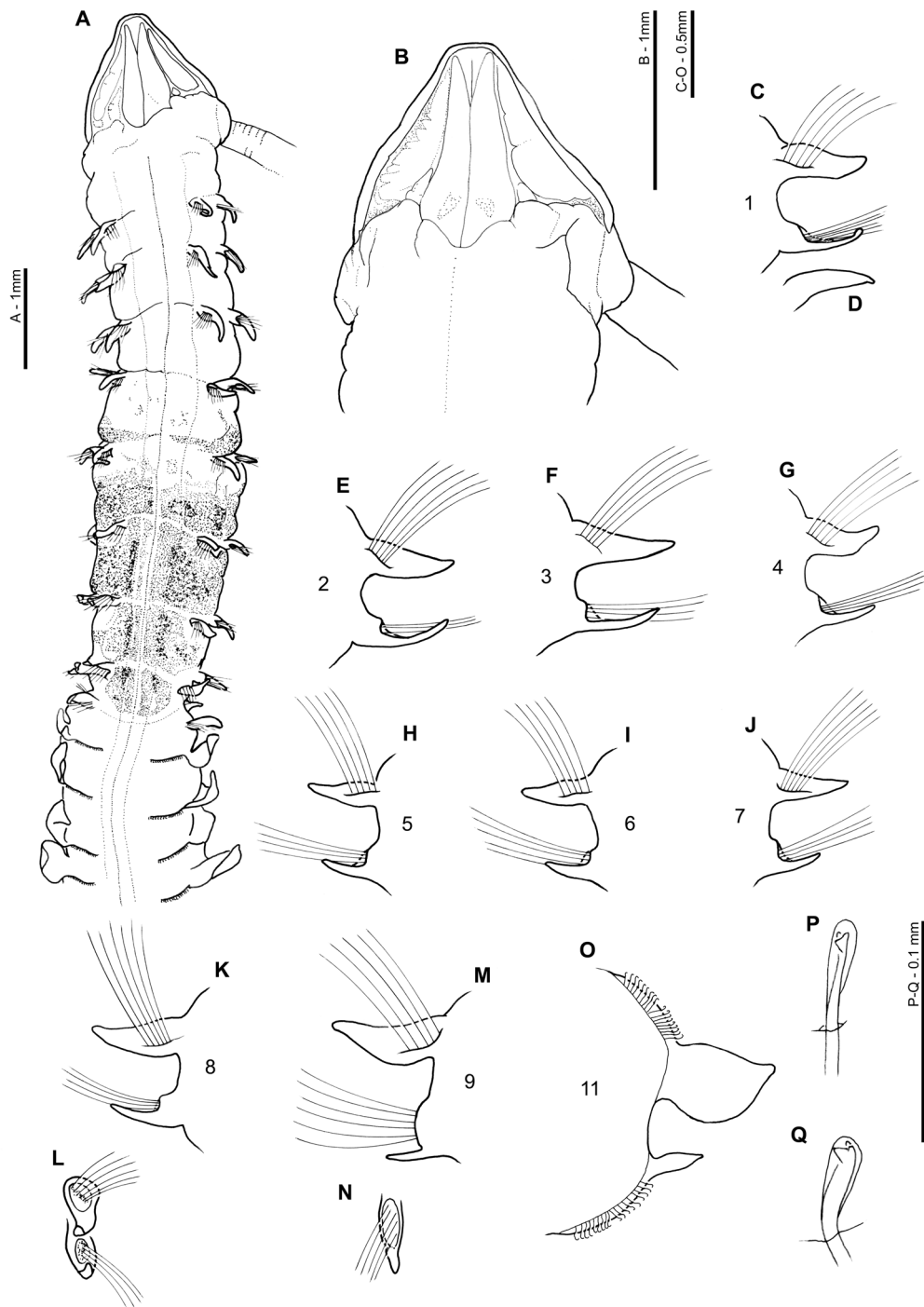
*Type material examined:* Holotype, af (BMNH 1958.5.2.1), mud, Coll. D.P. Wilson, 1958; Paratypes: Rame Head, 1c (BMNH 1958.5.2.2); 1af (BMNH 1958.5.2.3); 15af, 3f, 3 palps (BMNH 1958.5.2.4–10), Coll. E. Ford/M.F. Mare, 1939.

**Table 4.** Statistics from Species Delimitation with Rosenberg's Test (Masters *et al.*, 2011) and bPTP support (Zhang *et al.*, 2013) computed from the species tree and from the *COI* gene tree. See text for explanation. NA: not computed

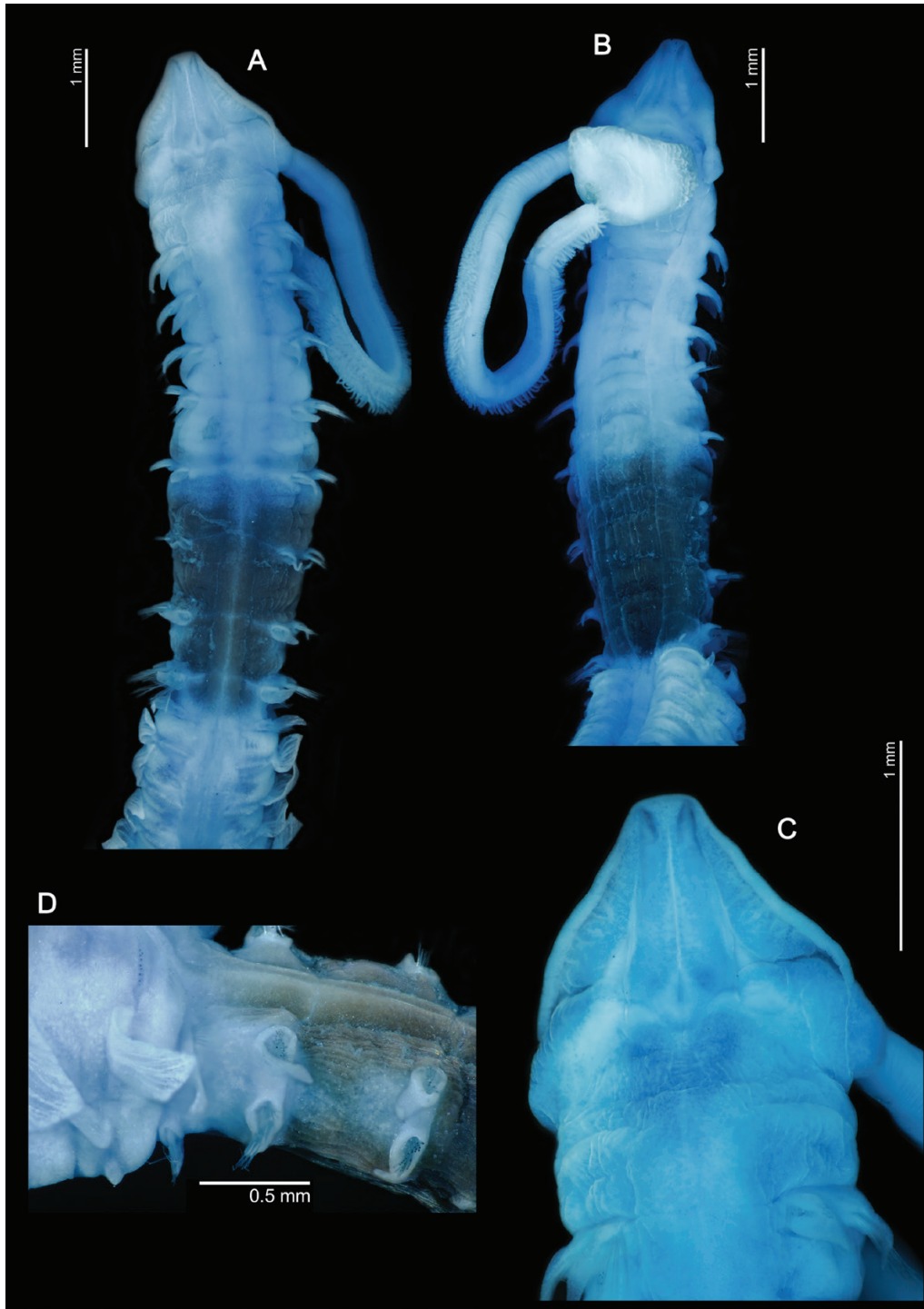
Species	n	Closest Species	Monophyletic?	Intra Dist	Inter Dist	Intra - Closest Dist	Intra/ Inter	P ID (Strict)	P ID (Liberal)	Av(MRCA-tips)	P (Randomly Distinct)	Rosenberg's P(AB)	bPTP	bPTP <i>COI</i>
<i>M. johnstoni</i>	1	<i>M. mirabilis</i>	yes	0.000	0.656	0.000	0.000	0.000	0.96 (0.83, 1.0)	0.0000	NA	1.22E-03	1.00	1.00
<i>M. minuta</i>	1	<b><i>M. fasciata</i></b>	yes	0.000	0.457	0.000	0.000	0.000	0.96 (0.83, 1.0)	0.0000	NA	1	1.00	1.00
<b><i>M. picta</i></b>	2	<i>M. guineensis</i>	yes	0.002	0.073	0.030	0.58 (0.43, 0.73)	0.97 (0.81, 1.0)	0.0010	0.0015	0.05	0.03	1.00	0.99
<b><i>M. mackiei</i></b>	6	<b><i>M. fasciata</i></b>	yes	0.003	0.186	0.020	0.92 (0.80, 1.0)	0.98 (0.88, 1.0)	0.0015	0.0015	0.05	1.00E-05	0.96	0.97
<i>M. filiformis</i>	1	<i>M. minuta</i>	yes	0.000	0.465	0.000	0.000	0.000	0.96 (0.83, 1.0)	0.0000	NA	1	1.00	1.00
<b><i>M. guineensis</i></b>	3	<b><i>M. nanseni</i></b>	yes	0.006	0.067	0.080	0.74 (0.56, 0.91)	0.96 (0.82, 1.0)	0.0035	0.0035	0.05	0.17	1.00	0.99
<b><i>M. fasciata</i></b>	11	<b><i>M. mackiei</i></b>	yes	0.002	0.186	0.010	0.98 (0.89, 1.0)	1.00 (0.95, 1.0)	0.0012	0.0012	0.05	1.00E-05	0.98	0.95
<i>M. alleni</i>	14	<b><i>M. fasciata</i></b>	yes	0.004	0.31	0.010	0.98 (0.92, 1.0)	1.00 (0.96, 1.0)	0.0036	0.0036	0.05	9.00E-12	0.95	0.98
<i>M. mirabilis</i>	1	<b><i>M. fasciata</i></b>	yes	0.000	0.641	0.000	0.000	0.000	0.96 (0.83, 1.0)	0.0000	NA	1.22E-03	1.00	1.00
<b><i>M. nanseni</i></b>	1	<b><i>M. guineensis</i></b>	yes	0.000	0.067	0.000	0.000	0.000	0.96 (0.83, 1.0)	0.0000	NA	0.17	1.00	1.00

**Table 5.** Mean *p*-distance (below diagonal) with standard errors (above diagonal) between and within species of *Magelona*, with standard error (SE). n/c, not calculated. For all species, BIN assignments in BOLD with numbers (N) of *COI* sequences assigned to each BIN

Species	1	2	3	4	5	6	7	8	9	10	Within	Within SE	BOLD BIN	N
1 <i>M. alleni</i>		0,017	0,017	0,017	0,018	0,016	0,017	0,018	0,018	0,016	0,006	0,002	ADA7054	14
2 <b><i>M. mackiei</i></b>	0,207		0,016	0,016	0,017	0,017	0,017	0,015	0,013	0,016	0,004	0,001	ADA5678	6
3 <b><i>M. picta</i></b>	0,226	0,189		0,016	0,011	0,012	0,016	0,016	0,017	0,018	0,002	0,001	ADA5677	2
4 <b><i>M. fasciata</i></b>	0,207	0,177	0,189		0,016	0,016	0,015	0,016	0,016	0,016	0,004	0,001	ADA6415	11
5 <b><i>M. nanseni</i></b>	0,225	0,193	0,104	0,192		0,011	0,016	0,018	0,018	0,016	n/c	n/c	ADB4817	1
6 <b><i>M. guineensis</i></b>	0,223	0,199	0,100	0,203	0,093		0,015	0,017	0,019	0,016	0,007	0,003	ADA6414	3
7 <i>M. johnstoni</i>	0,239	0,198	0,218	0,231	0,226	0,211		0,016	0,018	0,014	n/c	n/c	ABU8508	1
8 <i>M. mirabilis</i>	0,241	0,194	0,203	0,207	0,215	0,198	0,231		0,017	0,016	n/c	n/c	ADA7606	1
9 <i>M. filiformis</i>	0,227	0,243	0,255	0,241	0,269	0,264	0,257	0,242		0,018	n/c	n/c	ADA6413	1
10 <i>M. minuta</i>	0,224	0,218	0,210	0,226	0,199	0,208	0,226	0,208	0,254		n/c	n/c	ACJ4785	1



**Figure 3.** *Magelona alleni* (Morocco St. 2011410–GR45, NMW.Z.2021.001.0001): A, anterior region (dorsal view showing pigment band); B, prostomium, dorsal view (base of RH palp visible); C, E–K, M, O, parapodia of chaetigers 1–9, 11, respectively (anterior views); D, neuropodial lamella of chaetiger 1 (ventral view); L, parapodium of chaetiger 8 (lateral view); N, neuropodium of chaetiger 9 (lateral view); P, Q, tridentate abdominal hooded hooks (oblique lateral and lateral views, respectively).

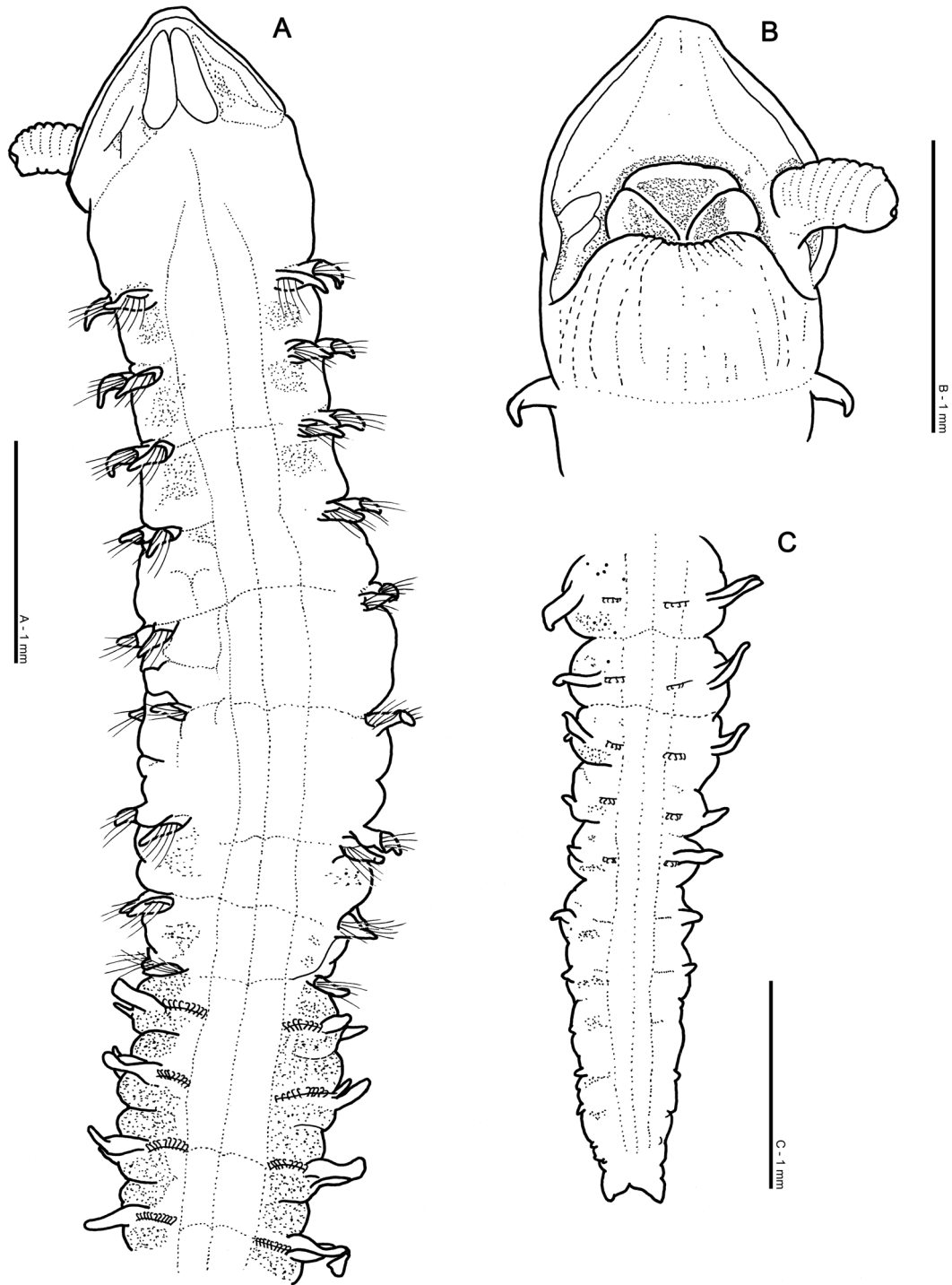


**Figure 4.** *Magelona alleni* (Morocco St. 2011410–GR45, NMW.Z.2021.001.0001), methyl green staining pattern: A, anterior region (dorsal view, showing pigment band. RH palp attached); B, anterior region (ventral view, showing partially everted burrowing organ); C, prostomium and first chaetiger (dorsal view); D, right-hand parapodia of chaetigers 7–10 (lateral view).

*West African material:* **Morocco:** St. 2011410–GR45, 1af in 75%Etoh (NMW.Z.2021.001.0001, figured); 8af, 2f, 2pf in 75%Etoh (NMW.Z.2021.001.0002); St. 2011410–GR50, 2af in 75%Etoh (ZMBN132134).

**Western Sahara:** St. 2011410–GR27: 2af in 75%Etoh (ZMBN132136); 1af in 96%Etoh (ZMBN132125); 1af in 96%Etoh (ZMBN107315, DNA-voucher); 1af in 96%Etoh (ZMBN115754, DNA-voucher). **Senegal:**

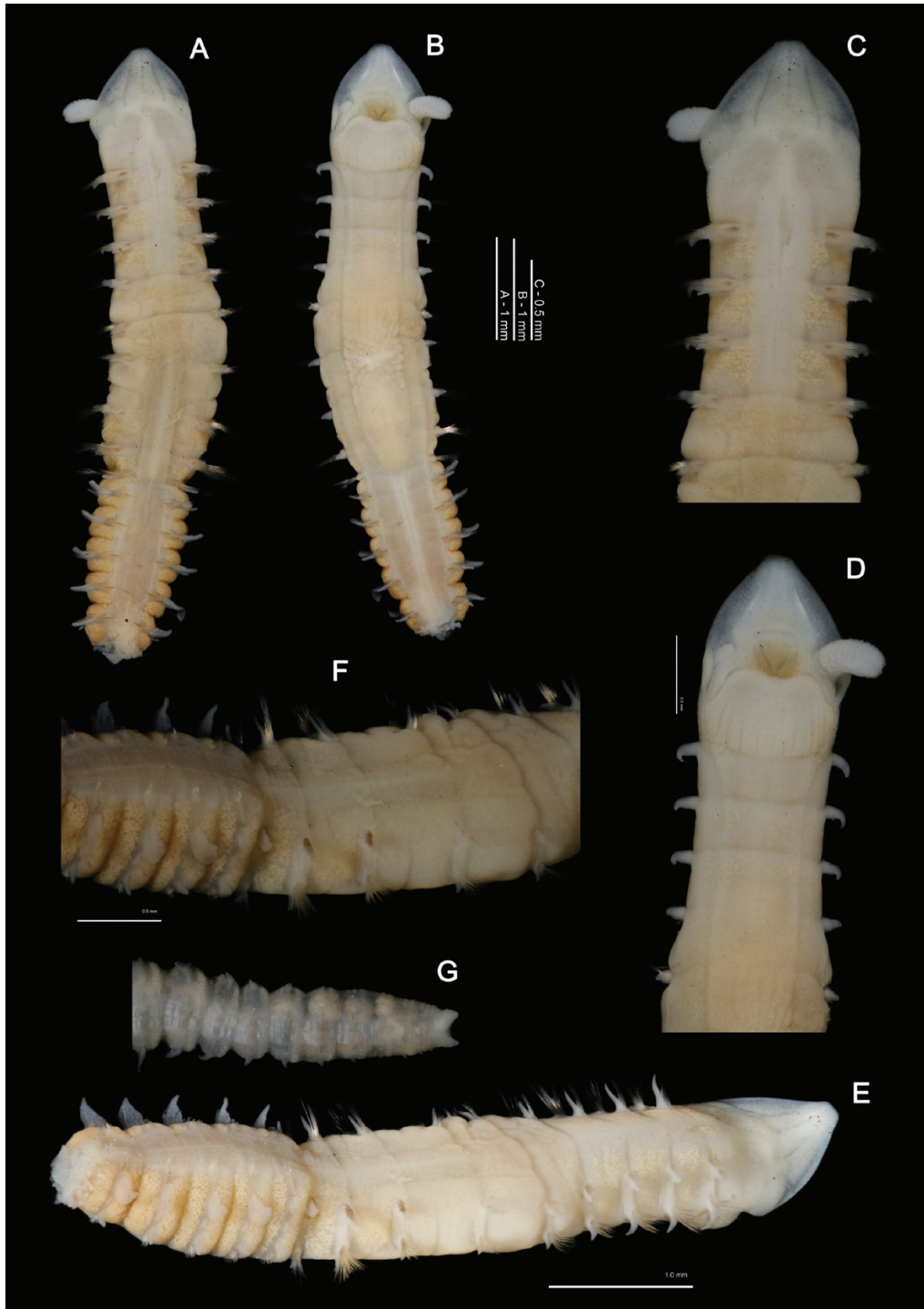




**Figure 5.** *Magelona alleni* (A, B, holotype BMNH 1958.5.2.1; C, paratype BMNH 1958.5.2.2): A, anterior region (dorsal view); B, prostomium and first chaetiger (ventral view, showing mouth and base of LH palp); C, posterior region (dorsal view).

St. 2011410–SL12: 18af in 96%Etoh (ZMBN132135); 22af in 96%Etoh (ZMBN132124); 1af in 96%Etoh (ZMBN107321, DNA-voucher); 1af in 96%Etoh

(ZMBN115753, DNA-voucher); 6af in 96%Etoh (NMW.Z.2020.000.0003). **Guinea (Conakry):** St. 2012404–GR02, 1af in 96%Etoh (ZMBN107335,



**Figure 6.** *Magelona alleni* (A–F, holotype BMNH 1958.5.2.1; G, paratype BMNH 1958.5.2.2): A, B, anterior region (dorsal and ventral views, respectively); C, D, prostomium and first five chaetigers (dorsal and ventral views, respectively); E, anterior region (laterodorsal view); F, thoracic/abdominal junction showing chaetigers 4(RH) to 13 (LH) (lateral view); G, posterior region (dorsal view).

DNA-voucher). **São Tomé and Príncipe:** St. ES-77—SBE: 3af in 75%EtoH (exact locality unknown).

**Additional European material:** **Norway:** Skagerrak coast, 58.388°N 8.749°E, 66 m, 28.06.2006, 1af in 96%EtoH (ZMBN95087, DNA-voucher); 1af in 96%EtoH (ZMBN95091, DNA-voucher). **UK:** Isles of Scilly, 49.9210°N 6.3352°W, 15 m, 25.06.2009, 1af in 96%EtoH (NMW.Z.2009.027.0523, DNA-voucher); Old Grimsby, Tresco, Isles of Scilly, 49.96°N 6.33°W, low tide, 10.09.2006, 1af in 96%EtoH (NMW.Z.2006.019.0799, DNA-voucher); Mill Bay near East Portlemouth, Devon, 50.2304°N 3.7679°W, low shore, 17.05.2003, 1af in 96%EtoH (NMW.Z.2003.035.0018, DNA-voucher); Jennycliff Bay, Plymouth, 50.3483°N 4.1288°W, 8 m, 27.03.2017, 1af in 96%EtoH (NMW.Z.2018.007.0001, DNA-voucher); 1af in 96%EtoH (NMW.Z.2018.007.0002, DNA-voucher); 1af in 96%EtoH (NMW.Z.2018.007.0003, DNA-voucher); Cardigan Bay, Wales, 52.3626°N 4.1776°W, 26 m, 31.11.2010, 1af in 96%EtoH (NMW.Z.2010.039.0001, DNA-voucher).

**Diagnosis:** Prostomium width similar to length, no prostomial horns. Chaetigers 1–9 with slender triangular lamellae, distinct pigment band of the posterior thorax. All thoracic chaetae capillary. Abdominal lateral lamellae subequal, those of the notopodia clearly larger. Abdominal hooks tridentate, in two groups, *vis-à-vis* (face to face). No pouches observed, pygidium with stout lateral projections.

**Description:** A large, stout species; with marked constriction between thorax and abdomen (Figs 3A, 4A, D), thorax dorsoventrally flattened, much thinner (when viewed laterally), but marginally wider (particularly in mid thorax) than the rounded abdomen. Holotype, anterior fragment: prostomium 0.75 mm long, 0.8 mm wide; thorax 4.25 mm long (including prostomium), 0.95 mm wide (between chaetigers 5 and 6); total length 6.1 mm for 14 chaetigers. Complete paratype: 3.5 cm long for 67 chaetigers. Figured MIWA specimen (NMW.Z.2021.001.0001), anterior fragment: prostomium 1.2 mm long, 1.4 mm wide; thorax 7.1 mm long (including prostomium), 1.55 mm wide; abdomen 1.4 mm wide; total length approximately 12.4 mm for 20 chaetigers (width measurements not including parapodia). Thoracic chaetigers characteristically bulbous (Figs 3A, 4A, 5A, 6A, B), width greatest around chaetigers 4–6, body tapering towards chaetiger 9. Other anterior fragments measuring: 7.6–22.5 mm long for 14–41 chaetigers.

Prostomium triangular (Figs 3B, 4C, 6C), length marginally shorter but similar to width (L : W ratio 0.79–0.96), distal portion clearly narrower than proximal. No prostomial horns, anterior margin

straight and square, lateral prostomial margins slightly rounded. Prostomium with one pair of prominent longitudinal dorsal muscular ridges, abutting for majority of length, diverging only at distal third. Light angular striations apparent on dorsal surface of ridges towards distal tips in certain lights. A second pair of minute triangular ridges abutting prominent pair at their base, approximately a fifth of their length. Two large, roughly triangular areas noticeable (semitransparent and wrinkled), either side of the ridges, although not marked as in other species. Burrowing organ [previously termed ‘proboscis’, see Mortimer *et al.* (2012) for discussion on terminology] everted in 17 specimens, heart-shaped when fully everted, oval when partially everted (Fig. 4B). Burrowing organ transversely ridged, although that of the superior surface much fainter, ridges of figured anterior region distinct, almost zigzagged, giving a somewhat ‘wrinkled’ appearance. Palps arising ventrolaterally from base of prostomium, short and thick (Figs 4A, B, 5B) (retained, at least partially, on 11 specimens) appearing ‘frilly’, with long papillae. Palps reaching approximately chaetigers 9–18 when folded backwards. Non-papillated proximal region of palps reaching chaetigers 2–3 (occasionally 4). Papillae short proximally, increasing gradually in size; papillae at distal tips long. Proximally 6–8 rows of papillae either side of an inconspicuous mid-palp line, devoid of papillae, medially 4–6, and distally 1–3 rows either side. Exact number of papillae, difficult to ascertain due to their size and abundance, and due to neighbouring rows of papillae being somewhat offset.

Achaetous region behind the prostomium, roughly twice the size of chaetiger 1 (Figs 3A, 5A). Chaetigers 1–8 similar (Figs 3C–L, 4D); parapodia biramous. Notopodia with low prechaetal lamellae confluent with slender smooth-edged triangular to sinuous postchaetal lamellae, decreasing in size to chaetiger 6, but then increasing to chaetiger 9. No prechaetal superior dorsal lobes present on thoracic chaetigers. Neuropodia with low pre- and postchaetal lamellae encircling the chaetae, cuff-like, confluent with long slender triangular lamellae with pointed tips (Fig. 3D). These lamellae, although beneath the chaetal bundle, are initially in a slightly prechaetal position, becoming completely ventral by chaetiger 7. Neuropodial lamellae initially similar in size to the notopodia, but decreasing in size along the thorax.

Chaetiger 9 (Figs 3A, 4A, D): shorter and narrower than preceding chaetigers. Notopodial prechaetal lamellae low, confluent with larger slender triangular postchaetal lamellae, slightly larger than those of the preceding chaetigers (Fig. 3M). No superior dorsal lobes observed. Neuropodia similar to preceding chaetigers (Fig. 3N), however, pre- and postchaetal lamellae roughly twice the height. Ventral lamellae shorter and more slender, directly underneath chaetal

bundle. Chaetae of chaetigers 1–9 simple bilimbate winged capillaries.

Parapodia of abdominal chaetigers (Figs 3O, 4D) with subequal lateral lamellae, much larger in the notopodia than neuropodia. Lamellae not basally constricted and with no obvious postchaetal expansion of lamellae behind chaetal rows. No dorsal (DML) or ventral (VML) processes observed at inner margins of chaetal rows. Abdominal chaetae tridentate hooded hooks (Fig. 3P, Q) of a similar size, superior two fangs parallel, above main fang. Hooks in two approximately equal groups for each ramus, main fangs *vis-à-vis* (Fig. 3O). Approximately 12–14 hooks per ramus in the anterior abdomen. No abdominal pouches observed. Pygidium with two stout triangular lateral projections (Figs 5C, 6G), anus large, terminal (see: Mills & Mortimer, 2019). One specimen (Morocco, St. 2011410–GR45) ovigerous, eggs measuring approximately 130 µm in diameter.

Brown, sediment-covered tube present on many specimens, inner surface consisting of layers of brown/purple papery material, as noted by Mills & Mortimer (2019). Tube tight-fitting and difficult to remove from preserved specimens without damaging parapodial lamellae.

**Colour:** No living material observed, although live photographs of the species are provided by Mortimer *et al.* (2018) and Mills & Mortimer (2019). Animals yellow to orange, often with distinct orange patches at the base of the prostomium and on achaetous first segment. Preserved specimens markedly white in colour with obvious dark brown pigment band present in the posterior thorax (now lost on type material, and faded in some MIWA specimens). Band strongest between chaetigers 5–9, an additional stripe is present between chaetigers 4–5, with speckled pigment in between (Figs 3A, 4A, B). Pigment band extends around the body from dorsal to ventral surface. However, some areas around the parapodia, particularly those of chaetigers 7–9, are devoid of pigmentation. Dorsal, white-speckled (glandular?) areas present between chaetigers 1–4, particularly noticeable on holotype (Figs 5A, 6E), but present on other specimens as well. Staining with methyl green (Fig. 4) indistinct, showing no clear pattern. Although, speckled areas in the thoracic region and abdominal interparapodial patches more distinct in stained specimens.

**Habitat:** Type specimens collected in muddy sediments from the shallow sublittoral. West African specimens collected at six stations from five countries, Morocco to São Tomé and Príncipe, at depths of 32–106 m. Other material collected from the intertidal zone to 66 m in fine muddy sands, fine sand and mud.

**Distribution:** Confirmed records suggest that *M. alleni* is a North-East Atlantic species occurring from Norwegian waters to São Tomé and Príncipe, in the Gulf of Guinea (Fig. 1).

**Remarks:** The West African *M. alleni* specimens agree well with the type material, first described off Plymouth, England. Whilst, the breadth of the thoracic neuropodial lobes vary depending on the size of the animal, with those of larger specimens (e.g. ZMBN107335) being comparatively wider, they are never broad and scoop-shaped, as seen in *M. fasciata* (described below) or *M. cincta*. The abdominal parapodium drawn by Wilson (1958: fig. 1g), shows a basically triangular abdominal neuropodial lamella, which appears different to that drawn from MIWA material (Fig. 3O). However, re-examination of the type material shows that the abdominal neuropodial lamellae are more slender and pointier than originally drawn by Wilson, and thus comparable to the West African material. *Magelona alleni* differs from all pigmented species in the MIWA region in the nature of the neuropodia of chaetiger 9, possessing slender, distinctly ventral lamellae, rather than postchaetal (those of *M. fasciata*, *M. guineensis* and *M. mackiei* possessing additional small triangular processes underneath the neurochaetal bundle, not present in *M. alleni*). It further differs from *M. guineensis*, *M. mackiei*, *M. nanseni* and *M. picta* in not possessing superior dorsal lobes in the thorax. Additionally, it differs from *M. guineensis*, *M. nanseni* and *M. picta* in the nature of the prostomia, showing less distinct patternation either side of the dorsal muscular ridges. *Magelona alleni* differs from *M. fasciata* and *M. mackiei*, in possessing tridentate not bidentate abdominal hooded hooks. Lastly, *M. alleni* differs from all above-mentioned species and all known species carrying posterior thoracic pigmentation, except *Magelona koreana* Okuda, 1937 [originally *M. japonica* var. *koreana*, see Jones (1971)] in possessing subequal lateral lamellae in the abdomen. *Magelona koreana* shares many similarities with *M. alleni*, but differs in having prostomial horns and in the lamellae of chaetiger 9, which have superior dorsal lobes and large postchaetal neuropodial lamellae.

Wilson (1958) stated that *M. alleni* is likely to be a temperate-water species of the north-eastern Atlantic, further noting its presence from Dogger Bank (North Sea), Quiberon Bay (north-western France) and possibly the Atlantic coast of Morocco. The latter locality was based on a fragment identified by Fauvel as *M. cincta*. Fauvel (1936) stated that ‘les pieds portent une grande lamellae dorsale et une plus petite ventral, et sont dépourvus de cirre’ and, as Wilson (1958) suggested, ‘This description almost perfectly describes the posterior parapodia of *alleni*’.



Kirkegaard (1959) agreed with Wilson and considered Fauvel's (1936) record of *M. cincta* off Morocco to represent *M. alleni*. He further reported one additional specimen of *M. alleni* off Western Sahara (*Galathea* St. 4). Amoureux (1976) additionally recorded *M. alleni* to be present from the Moroccan coast of the Straits of Gibraltar (at depths of 60 m) and Bayed & Glémarec (1987a) recorded its occurrence off Moulay Bouselham and Casablanca (35–47 m). The MIWA material confirms the presence of *M. alleni* off north-west Africa as noted by the above authors, and further extends its known distribution to São Tomé and Príncipe, in the Gulf of Guinea.

The species has additionally been recorded in the Mediterranean, co-occurring with the morphologically similar *M. equilamellae* (Mortimer *et al.*, 2020), a species with which it has been previously confused (Fiege *et al.*, 2000).

**MAGELONA GUINEENSIS SP. NOV.**

(FIGS 7, 8)

*Zoobank registration.* urn:lsid:zoobank.org:act:053593E9-5402-4D0F-9519-8CAC8C23788E.

*Type locality:* **São Tomé and Príncipe**, 1.5345°N 7.4225°E, 38 m depth.

*Type material:* Holotype, **São Tomé and Príncipe** St. 5SP–05, af in 75%Etoh (ZMBN132137). Paratypes: **Guinea (Conakry):** St. 7GU–01, 5af in 75%Etoh (ZMBN107270); 1af in 75%Etoh (ZMBN107271, imaged). **Sierra Leone:** St. 7SL–04, 1af in 75%Etoh (NMW.Z.2021.001.0004). **Nigeria:** St. 6N–01, 1af in 96%Etoh (ZMBN115736, DNA-voucher); St. 6N–20, 1af in 96%Etoh (ZMBN107331, DNA-voucher). **Cameroon:** St. 5C–10, 1af in 96%Etoh (ZMBN107269); St. 6C–21, 3af in 75%Etoh (ZMBN107268). **Gabon:** St. 5G–13, 1af in 75%Etoh (ZMBN132140). **São Tomé and Príncipe:** St. 5SP–05, 1af, 1f in 75%Etoh (NMW.Z.2021.001.0005); 1af in 96%Etoh (ZMBN107303, DNA-voucher). **Angola:** St. 7AN–05, 1af in 75%Etoh (ZMBN107267).

*Etymology:* The specific name refers to type locality in the Gulf of Guinea.

*Additional material:* **Guinea-Bissau:** St. 6GB–07, 17af in 75%Etoh (ZMBN107272); St. 7GB–08: 3af in 96%Etoh (ZMBN107273); 1af in 96%Etoh (ZMBN107274).

*Diagnosis:* Prostomium width similar to length, no prostomial horns. Chaetigers 1–8 with slender sinuous

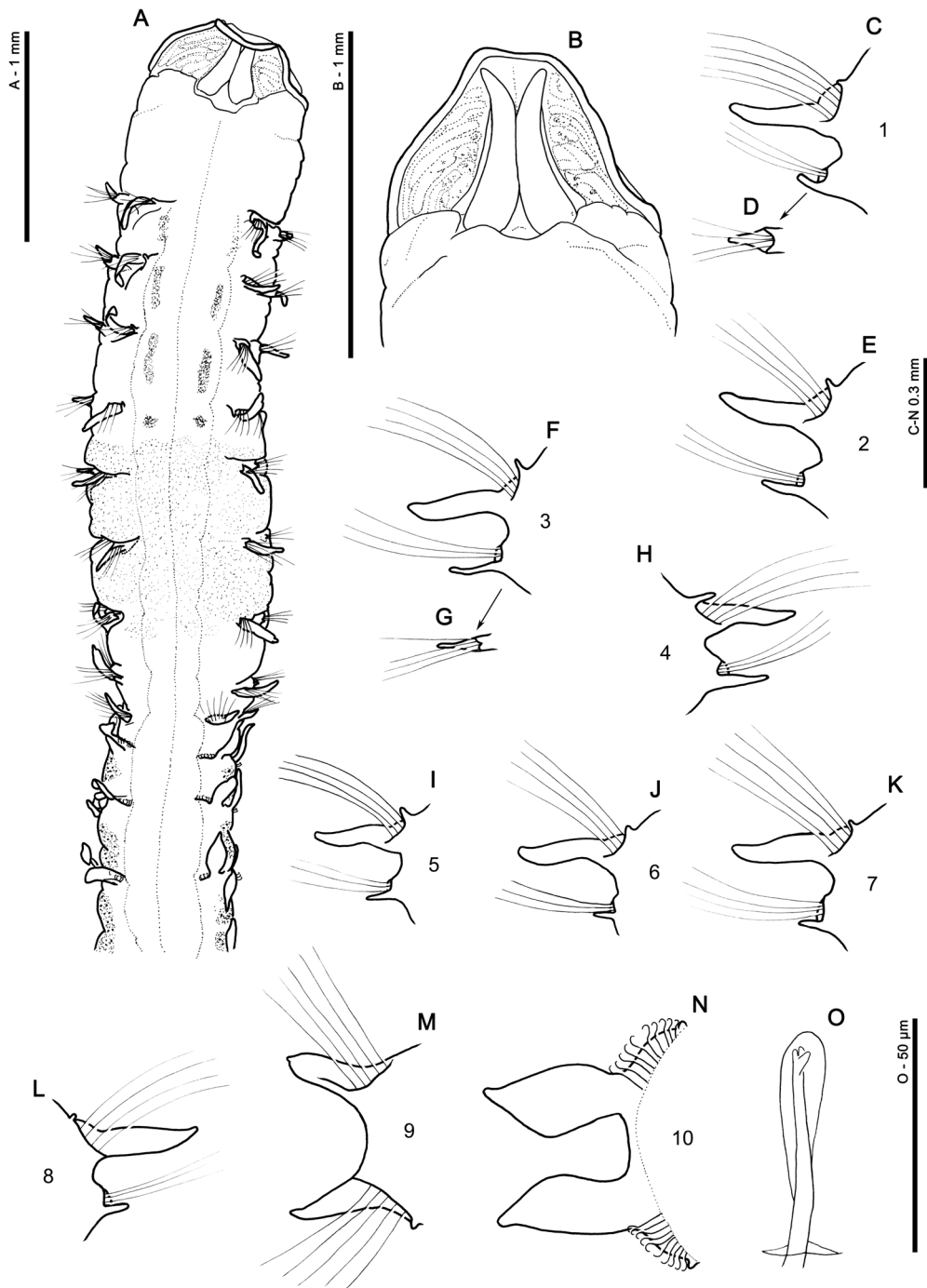
notopodial lamellae with small superior dorsal lobes and triangular ventral neuropodial lamellae. Lamellae of chaetiger 9 triangular and postchaetal, with additional small, ventral, neuropodial processes. All thoracic chaetae capillary. Abdominal lateral lamellae spatulate, with pointed tips. Abdominal hooks tridentate, in two groups, *vis-à-vis*. No pouches observed, pygidium unknown.

*Description:* A moderately sized species; junction between thorax and abdomen fairly marked (Figs 7A, 8A, B), abdomen more rounded than the dorsally flattened thorax. Holotype, anterior fragment: prostomium 0.7 mm wide, 0.7 mm long; thorax 3.5 mm long (including prostomium), 0.65 mm wide; abdomen, 0.45 mm wide; total length 9 mm for 21 chaetigers. Largest DNA-voucher specimen (ZMBN107331), anterior fragment: prostomium 0.6 mm long, 0.6 mm wide; thorax 5.0 mm long (including prostomium), 0.6 mm wide; abdomen 0.65 mm wide; total length approximately 7.8 mm for 17 chaetigers (width measurements not including parapodia). Other anterior fragments: 3–14 mm long for eight to 31 chaetigers.

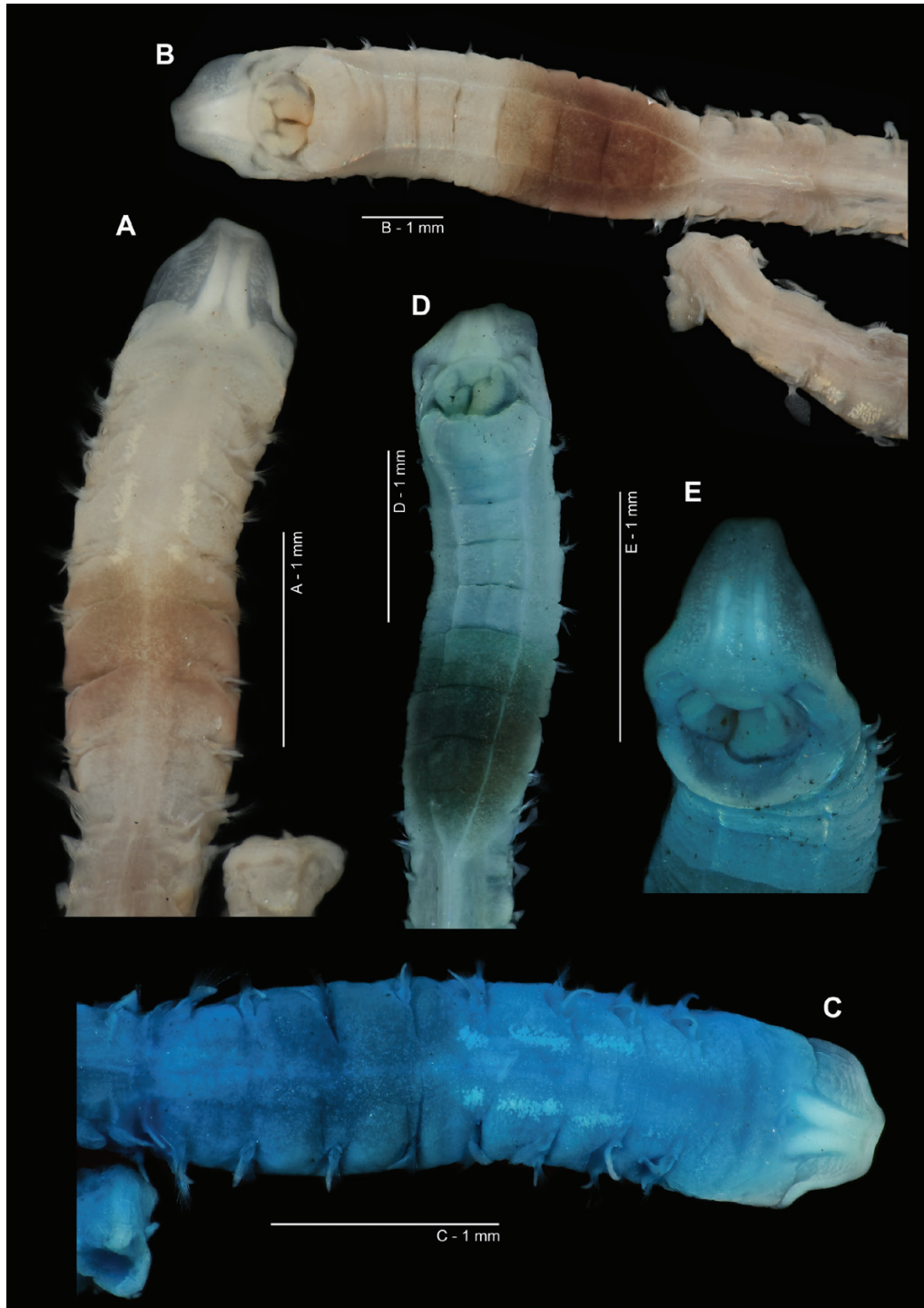
Prostomium (Figs 7B, 8A, C), approximately as wide as long (L : W ratio 1), anterior margin straight and square, rounded lateral margins. One pair of prominent longitudinal dorsal muscular prostomial ridges, abutting for majority of length, diverging at distal tips. Thin and marginally shorter outer pair of ridges abutting inner pair for entire length. Light, almost diagonal lines, either side of ridges, composed of small oblong to long rectangular patches, not as marked as seen in other species. Burrowing organ partially everted in one specimen (ZMBN107331), longitudinally ridged. No palps retained.

Achaetous region behind the prostomium, roughly twice the size of chaetiger 1 (Figs 7A, 8A, C). Chaetigers 1–8 similar; parapodia biramous (Fig 7C–L). Notopodia with low, triangular prechaetal lamellae confluent with slender, smooth-edged, sinuous postchaetal lamellae, decreasing slightly in size along thorax. Single, small digitiform, prechaetal superior dorsal lobe present on all thoracic chaetigers, except chaetiger 9, decreasing in size in posterior thorax. Neuropodia with low pre- and postchaetal lamellae, encircling chaetae cuff-like and confluent with slender triangular lamellae underneath the chaetal bundle, with rounded tips. Lamellae initially slightly prechaetal in position but becoming completely ventral by chaetiger 4, decreasing in size in posterior thorax.

Chaetiger 9: shorter and narrower than preceding chaetigers (Figs 7A, 8A, C). Notopodial prechaetal lamellae low, confluent with slender triangular postchaetal lamellae, shorter but wider than on preceding chaetiger (Fig. 7M). No superior dorsal lobes



**Figure 7.** *Magelona guineensis*. Holotype (São Tomé and Príncipe, St. 5SP-05, ZMBN132137): A, anterior region (dorsal view); B, prostomium (dorsal view); C, parapodium of chaetiger 1 (anterior view); D, ventral neuropodial lamella of chaetiger 1 (dorsal view); E, parapodium of chaetiger 2 (anterior view); F, parapodium of chaetiger 3 (anterior view); G, ventral neuropodial lamella of chaetiger 3 (dorsal view); H–N, parapodia of chaetigers 4–10, respectively (anterior views); O, abdominal tridentate hooded hook (oblique frontal view).



**Figure 8.** *Magelona guineensis*. Holotype (São Tomé and Príncipe, St. 5SP-05, ZMBN132137): A, B, anterior region (dorsal and ventral views respectively, showing pigment band); C, D, anterior region (dorsal and ventral views respectively); E, prostomium (ventral view, showing buccal region). C–E, stained with methyl green.

observed. Neuropodia similar to notopodia, with a low inferior ridge terminating in an additional small, triangular process on both sides of the chaetiger. Chaetae of chaetigers 1–9 simple bilimbate winged capillaries.

Parapodia of abdominal chaetigers (Fig. 7N) with spatulate to broad triangular lateral lamellae of similar size in both rami, showing a slight basal constriction, but with no obvious postchaetal expansion of lamellae

behind chaetal rows. Chaetae emerging from definite ridge. Small triangular dorsal (DML) and ventral (VML) processes observed at inner margins of chaetal rows. Abdominal chaetae tridentate hooded hooks (Fig. 7O) all of a similar size, superior two fangs parallel, above main fang. Hooks in two approximately equal groups in each ramus, main fangs *vis-à-vis* (Fig. 7N). Approximately eight to ten hooks per ramus in the anterior abdomen. No abdominal pouches observed, although no posterior fragments present within examined material. Pygidium unknown.

**Colour:** No living material observed. Preserved specimens cream in colour, faint reddish pigment present in the posterior thorax between chaetigers 5–8 (Figs 7A, 8A, B), particularly noticeable ventrally. Pigmentation of freshly preserved specimens unknown, pigment likely to have faded to some degree after more than 10 years of preservation. Yellow dorsal, linear speckled patches (glandular?) present between chaetigers 1–4, adjacent to parapodia, either side of the mid dorsal line. Staining with methyl green (Fig. 8C–E) shows no distinct pattern, just weak stain all over. However, dorsal speckles and abdominal interparapodial patches more apparent in stained specimens (e.g. Fig. 8C).

**Distribution:** Collected at 11 stations from eight countries during West African surveys at depths between 8 and 92 m. Distributed around the Gulf of Guinea, from Sierra Leone to Angola (Fig. 1).

**Remarks:** *Magelona guineensis* can be distinguished morphologically from all other magelonids in the MIWA region carrying posterior thoracic pigmentation using the following criteria. It differs from *M. fasciata* and *M. alleni* in possessing thoracic superior dorsal lobes, further differing from *M. fasciata* and, additionally, *M. mackiei* in possessing tridentate, instead of bidentate, abdominal hooded hooks. *Magelona guineensis* differs from *M. alleni*, *M. picta* and *M. nanseni* in the nature of the neuropodia of chaetiger 9; the neuropodial lamellae of *M. alleni* being ventral, as opposed to postchaetal, and in possessing additional small, triangular processes, which are not present in *M. picta* and *M. nanseni*.

The new species can also be distinguished from all other known pigmented magelonid species based on the following criteria. In stark contrast to *M. guineensis*, the outer pair of prostomial dorsal ridges of *M. cincta* are indistinct and no additional prostomial markings are present. Additionally, *M. cincta* does not have processes below the neurochaetae of chaetiger 9 (present in *M. guineensis*), and the ventral neuropodial lamellae of the anterior thorax in *M. cincta* are distinctly scoop-shaped (not slender triangular as in the new species).

*Magelona guineensis* can be distinguished from *M. cincta*, *M. equilamellae*, *M. japonica*, *M. symmetrica* and *M. variolamellata* by possessing thoracic superior dorsal lobes. *Magelona polydentata* differs in possessing polydentate abdominal hooded hooks (not tridentate). Lastly, *M. symmetrica* is recorded to have only light pigmentation in the posterior thorax, which does not form a distinct pigment band, as seen in *M. guineensis*.

The only remaining African species sharing affinities with *M. guineensis* is *Magelona cepiceps* Mortimer & Mackie, 2006 described from the Seychelles. However, *M. guineensis* differs in the prostomial shape (being somewhat onion-shaped in *M. cepiceps*), in possessing thoracic notopodial lamellae and superior dorsal lobes, which are both slender (much broader in *M. cepiceps*), and in the absence of superior dorsal lobes of chaetiger 9 (present in *M. cepiceps*). *Magelona hartmanae* Jones, 1978, originally described off California, shares some affinities with *M. guineensis* in terms of lamellar and prostomial shape. However, the species differ in the nature of the postchaetal neuropodial lamellae of chaetiger 9, which is low and broad in the former species, whilst in the latter it is elongate. Additionally, the length of the prechaetal processes of the same chaetiger is much greater in *M. hartmanae* than the new species.

#### **MAGELONA PICTA SP. NOV.**

(Figs 9, 10)

**Zoobank registration:** urn:lsid:zoobank.org:act:D51FC252-3FDE-4C25-AE0D-9FD07ACB0579.

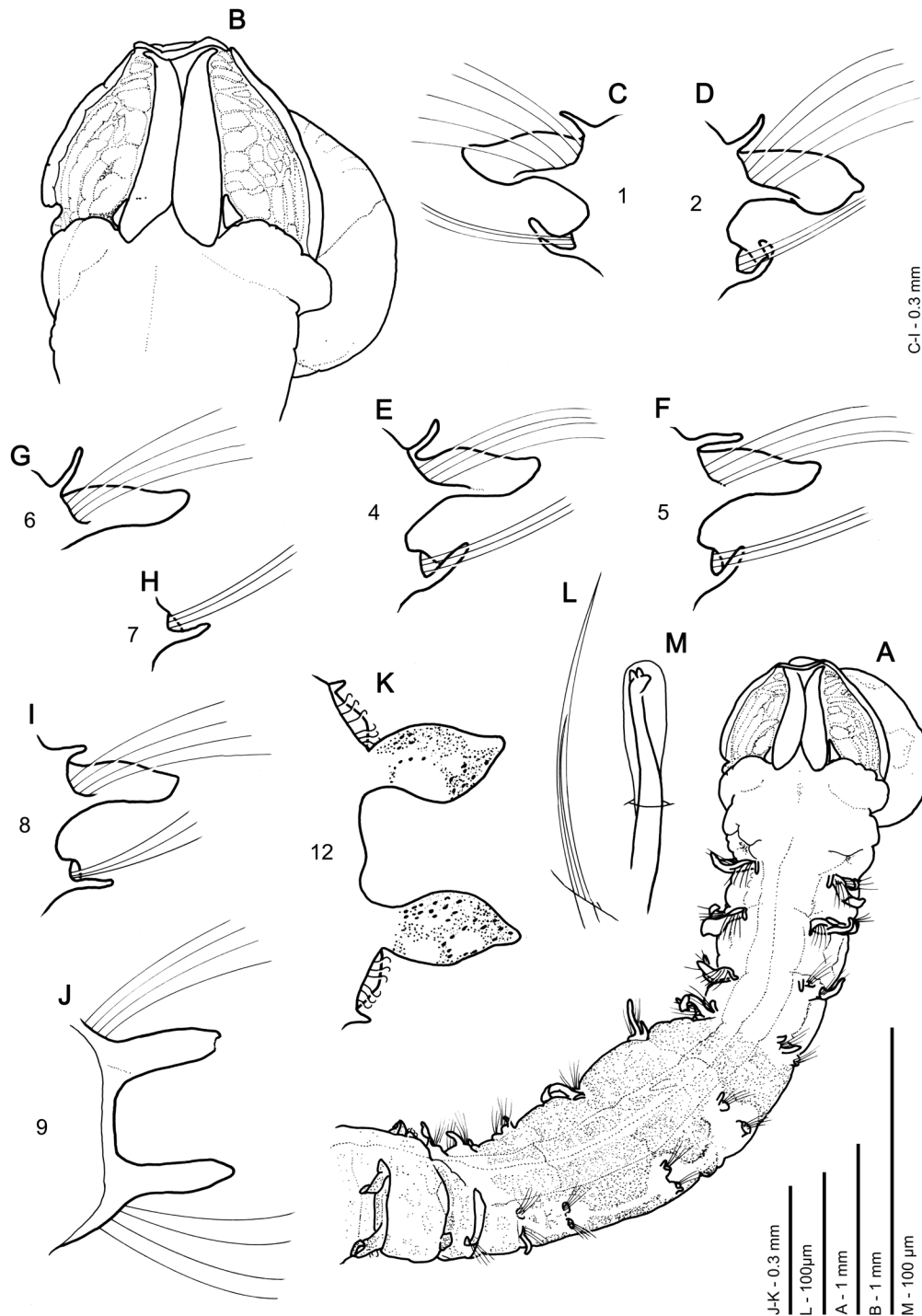
**Type locality:** **Angola:** 6.8526°S 12.2831°E, 50 m depth.

**Type material:** Holotype, **Angola:** St. 7AN–03, af in 96%EtoH (ZMBN107338, DNA-voucher). Paratype, same sample as holotype, 1af in 96%EtoH (ZMBN115737, DNA-voucher).

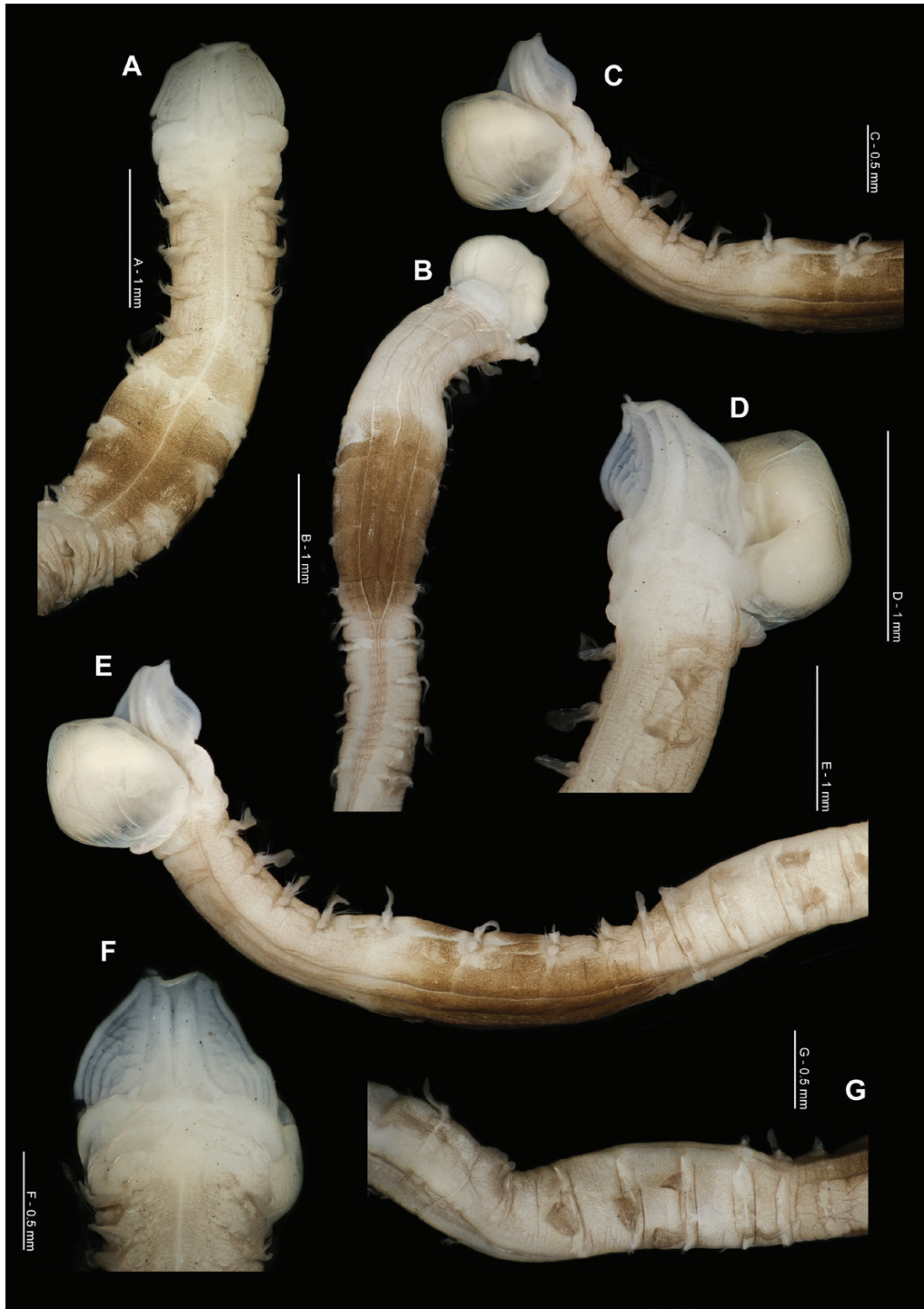
**Etymology:** The specific name is derived from the Latin word *pictus*, painted, referring to the pigmented body, in particular, the abdominal lateral lamellae.

**Diagnosis:** Prostomium marginally wider than long, no prostomial horns. Chaetigers 1–8 with slender foliaceous notopodial lamellae, long superior dorsal lobes and slender, triangular, ventral neuropodial lamellae. Lamellae of chaetiger 9 digitiform, postchaetal. All thoracic chaetae capillary. Abdominal lateral lamellae foliaceous and heavily pigmented. Abdominal hooded hooks tridentate, in two groups, *vis-à-vis*. No pouches observed, pygidium unknown.





**Figure 9.** *Magelona picta*. Holotype (Angola St. 7AN-03, ZMBN107338): A, anterior region (dorsal view); B, prostomium (dorsal view, partially everted burrowing organ on the right-hand side of prostomium); C–F, parapodia of chaetigers 1, 2, 4 and 5 (anterior views); G–H, notopodium and neuropodium of chaetigers 6 and 7, respectively (anterior views); I–K, parapodia of chaetigers 8, 9 and 12 (anterior views); L, thoracic capillary chaeta (lateral view); M, abdominal tridentate hooded hook (oblique frontal view).



**Figure 10.** *Magelona picta*. Holotype (Angola St. 7AN-03, ZMBN107338): A, anterior region (dorsal view); B, anterior region (ventral view, showing partially everted burrowing organ); C, anterior region (lateral view); D, prostomium and first three chaetigers (dorsolateral view); E, thorax and anterior abdomen, showing thoracic–abdominal junction at chaetiger 9 (lateral view); F, prostomium and first three chaetigers (dorsal view); G, right-hand chaetigers 7–17 (lateral view).

*Description:* A moderately stout species; junction between thorax and abdomen not hugely marked, but the dorsally flattened thorax is somewhat wider

and thinner than the rounded abdomen (Figs 9A, 10B, E). Holotype, anterior fragment: prostomium 0.95 mm long, 1.0 mm wide; thorax 4.6 mm long

(including prostomium), 1.0 mm wide (at widest point between chaetigers 5–6, only 0.75 mm in anterior thorax. NB specimen shows signs of being marginally dorsoventrally flattened); abdomen 0.6 mm wide; total length approximately 10.25 mm for 20 chaetigers (width measurements not including parapodia). Paratype, anterior fragment: 2.25 mm long for four chaetigers. Thoracic chaetigers of the mid-thorax bulbous and rounded when viewed dorsally (Figs 9A, 10A).

Prostomium rounded subtriangular (Figs 9B, 10F), marginally wider than long (L : W ratio 0.95). No prostomial horns, anterior margin straight, medially indented for holotype. Prostomium with one pair of thick longitudinal, dorsal muscular ridges, abutting for majority of length, diverging only at distal tips. Minute outer pair of ridges at their bases. Distinct prostomial markings either side of prostomial ridges, as arched lines and smaller more circular areas towards the centre. Burrowing organ of holotype almost fully everted, heart-shaped (Figs 9B, 10B, C, E), light longitudinal ridges inferiorly, appearing smooth superiorly. No palps retained, unknown.

Achaetous region behind the prostomium, approximately one and a half times the length of chaetiger 1 (Figs 9A, 10A). Chaetigers 1–8 similar (Fig. 9C–I); parapodia biramous. Notopodia with low triangular prechaetal lamellae confluent with slender foliaceous postchaetal lamellae, slightly broader in anterior thorax, the upper edges of which are smooth. Single, long prechaetal superior dorsal lobe present on all thoracic chaetigers, except chaetiger 9. Neuropodia with low prechaetal lamellae confluent with long, slender, triangular lamellae with rounded tips, directly under chaetal bundle. Postchaetal lamellae slightly larger than prechaetal, particularly in anterior thorax (Fig. 9C, D). Ventral lamellae decreasing greatly in size from chaetigers 1–4, and then of a similar size in the posterior thorax. Those of chaetigers 6–8 in a slightly postchaetal position.

Chaetiger 9: notopodial and neuropodial postchaetal lamellae similar in both rami, digitiform with rounded tips (Fig. 9J). Chaetae emerging above notopodial, and below neuropodial lamellae. Chaetae of chaetigers 1–9 simple bilimbate winged capillaries (Fig. 9L).

Parapodia of abdominal chaetigers (Fig. 9K) sinuous, foliaceous lateral lamellae with slight basal constrictions. Lamellae extend postchaetally behind chaetal rows in anterior abdomen, triangular. Small, triangular processes observed at inner margins of chaetal rows (DML, VML). Abdominal chaetae tridentate hooded hooks (Fig. 9M) all of a similar size, two superior fangs parallel, above main fang. Hooks in two approximately equal groups within each ramus, main fangs *vis-à-vis* (Fig. 9K). Approximately eight hooks per ramus in the anterior abdomen. No

abdominal pouches observed, but only 11 abdominal chaetigers examined. Pygidium unknown.

**Colour:** No living material observed. Preserved specimens cream with a distinct dark-brown pigment band present in the posterior thorax (chaetigers 5–8), comprising of many small dots (Figs 9A, 10). Pigment band extends around the body from dorsal to ventral surface. However, some areas around the parapodia, particularly those of chaetigers 6 and 7 and along the mid-dorsal and mid-ventral lines, are clear of pigmentation (Fig. 10A, E). Weaker pigmentation present over much of the body (except on prostomium and thoracic lamellae), similar in colour to pigment band, although much more diffuse. Pigmentation darker in furrows along the body. Abdominal lamellae heavily pigmented, comprising of dots over much of their surface. Staining with methyl green shows no distinct pattern, weakly stained over the entire body, except where heavily pigmented.

**Distribution:** Only collected from one station (off Angola) in the Gulf of Guinea Large Marine Ecosystem (LME), during West African surveys, 50 m (Fig. 1).

**Remarks:** This new species can be distinguished from other pigmented magelonid species within the MIWA region based on the following characters. In possessing a prostomium, which is wider than long with distinct prostomial markings either side of the prostomial ridges, *M. picta* differs from *M. alleni*, *M. fasciata* and *M. mackiei*. In addition to the distinct brown pigment band on chaetigers 5–8, *M. picta* possesses pigmentation over much of the body, including the abdominal lateral lamellae, not present in any of the other magelonid species in the MIWA region, apart from *M. fasciata*. However, in the latter species, this pigmentation occurs in a distinctly striped pattern, thus differing from *M. picta*. In possessing foliaceous thoracic notopodial lamellae, *M. picta* differs from *M. alleni*, *M. guineensis*, *M. fasciata* and *M. mackiei*. The presence of long thoracic superior dorsal lobes separates the new species from *M. alleni*, *M. guineensis*, *M. fasciata* and *M. mackiei* in which they are either short or absent. *Magelona picta* further differs from *M. fasciata* and *M. mackiei* in possessing tridentate hooded hooks in the abdomen, rather than bidentate. Of the MIWA magelonid species, *M. picta* shares the most similarities with *M. nanseni*, but differs in pigmentation patterns, with that of the latter species being restricted to the posterior thorax and light red in colour, whilst that of the former species is dark brown and over much of the body. Moreover, *Magelona picta* possesses foliaceous notopodial thoracic lamellae and abdominal lateral lamellae, which are not markedly constricted basally



but with distinct postchaetal expansions behind chaetal rows, whilst *M. nanseni* has more slender notopodial thoracic lamellae and abdominal lamellae, which are basally constricted but without postchaetal expansions behind chaetal rows.

Of the other magelonid species known to carry posterior thoracic pigmentation, *M. picta* differs from *M. cincta*, *M. equilamellae*, *M. japonica*, *M. variolamellata*, *M. symmetrica* and *M. polydentata* in possessing thoracic superior dorsal lobes. It can be further distinguished from *M. polydentata* in possessing tridentate abdominal hooded hooks, rather than polydentate. Additionally, *M. symmetrica* differs in possessing lamellae that are triangular, both in the thorax and abdomen, and pigmentation that is limited to the posterior thorax.

Of all the previously described African species, *M. picta* shares some affinities with *M. cepiceps* from the Seychelles, but differs in the nature of chaetiger 9, e.g. absence of super dorsal lobes (present in *M. cepiceps*) and in possessing elongate postchaetal neuropodial lamellae, without additional processes (broad, with additional prechaetal process in *M. cepiceps*).

#### *MAGELONA NANSENI* SP. NOV.

(Figs 11, 12)

*Zoobank registration:* urn:lsid:zoobank.org:act:6F8FA46E-BEBB-48E0-8758-26750FCDA54E.

*Type locality:* **Nigeria:** 4.1482°N 5.7688°E, 25 m depth.

*Type material:* Holotype, **Nigeria:** St. 5N–11, af in 75%EtoH (ZMBN132141). Paratypes: **Liberia:** St. 7LI–01, 1af in 75%EtoH (ZMBN132142); St. 7LI–04, 1af in 75%EtoH (NMW.Z.2021.001.0006); **Ghana:** St. 2009105–GP1/28, 1af in 75%EtoH (ZMBN107275); St. 2009105–GE1/28, 5af in 75%EtoH (ZMBN107276). **Nigeria:** St. 5N–11, 1af in 96%EtoH (ZMBN107336, DNA-voucher).

*Etymology:* The new species is named in honour of the zoologist and oceanographer Dr Fridtjof Nansen, whose name is also linked with the research vessel from which all samples from West Africa included in this paper were collected.

*Diagnosis:* Prostomium wider than long, with rudimentary prostomial horns. Chaetigers 1–8 with slender foliaceous notopodial lamellae, with long, superior dorsal lobes and slender, triangular neuropodial lamellae. Lamellae of chaetiger 9 triangular postchaetal in both rami. All thoracic

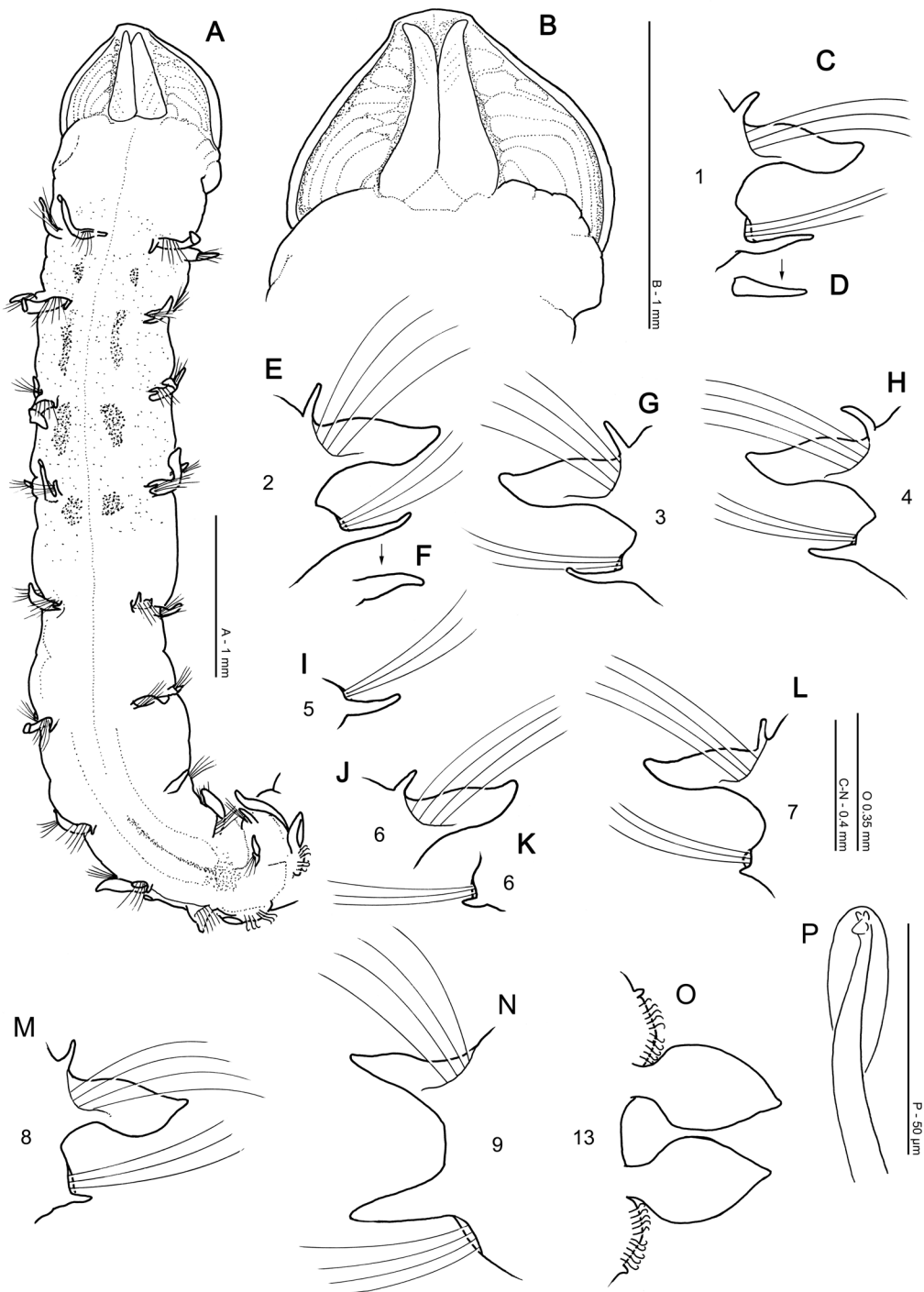
chaetae capillary. Abdominal lateral lamellae basally constricted and spatulate, with pointed tips. Abdominal hooded hooks tridentate, in two groups, *vis-à-vis*. No pouches observed, pygidium unknown.

*Description:* A stout species; junction between thorax and abdomen noticeable, although not distinctly marked (Figs 11A, 12B), abdomen more rounded than thorax. Holotype, anterior fragment: prostomium 1.0 mm wide, 0.85 mm long; thorax 5.75 mm long (including prostomium), 1.1 mm wide (at its widest point, approximately chaetiger 6); abdomen 0.9 mm wide; total length approximately 13.25 mm for 26 chaetigers. (NB last chaetiger of holotype dissected and slide-mounted. Width measurements not including parapodia.) Thorax tapering towards abdomen from approximately chaetiger 7. Additional anterior fragment (ZMBN107336) 4.8 mm long for 11 chaetigers, approximately 0.8 mm wide. Other anterior fragments 5.5–11.5 mm for 14–20 chaetigers.

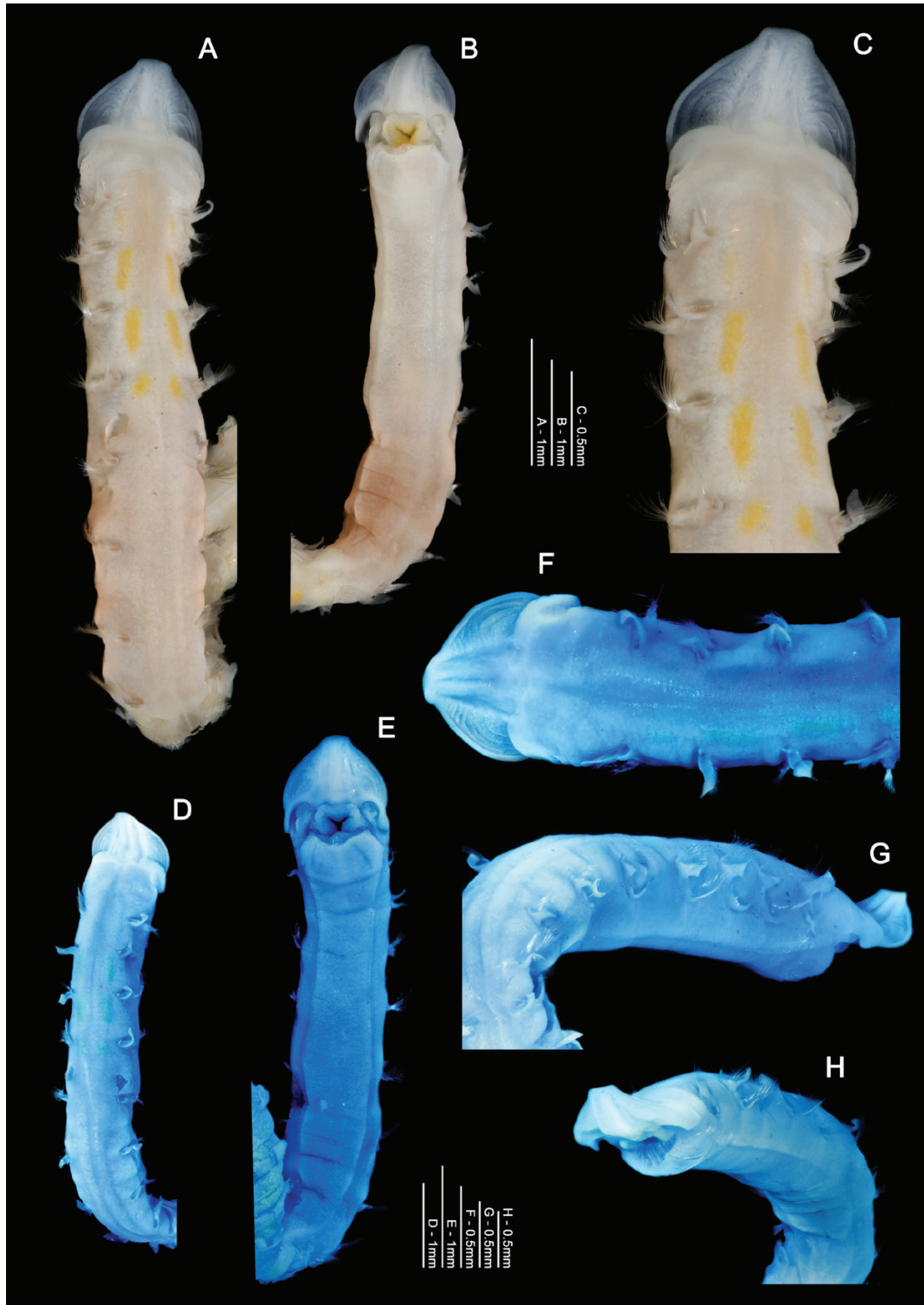
Prostomium rounded laterally (Figs 11A, B, 12A–F), wider than long (L : W ratio 0.85). Proximal prostomial corners extend around bases of palps towards ventral surface (Fig. 12B, E, H). Distally, prostomium squared into ‘rudimentary horns’, anterior margin roughly straight but with a small, medial rise on holotype. One pair of distinct, longitudinal, dorsal muscular prostomial ridges, thick and abutting for majority of length, although diverging for distal quarter. No obvious outer pair of ridges. Distinct arched markings either side of ridges, becoming smaller transverse markings towards distal tip. Small, white speckles present sporadically on surface of prostomial markings. Burrowing organ partially everted in one specimen (ZMBN107336), oval with light longitudinal stripes inferiorly. Buccal region on ventral side of prostomium comprised of three lips: a larger triangular upper lip, surmounting two smaller lateral lips (Fig. 12B, E), inner surface of which is heavily speckled, cream/yellow in colour. Palps retained on one specimen (ZMBN107336, RH palp now detached but present in vial), thick, short and appearing frilly due to length and abundance of papillae. Palps approximately 7 mm long, non-papillated region reaching approximately chaetiger 3. Papillae long, proximally five rows either side of an inconspicuous mid-palp line, devoid of papillae, four rows either side medially and two rows distally. Only palp stumps either side of buccal region retained on holotype (Fig. 12E).

Achaetous region behind the prostomium, roughly twice the length of chaetiger 1 (Figs 11A, 12A, C, F). Chaetigers 1–8 similar; parapodia biramous (Fig. 11C–M). Notopodia with low, rounded, prechaetal lamellae confluent with slender, smooth-edged, foliaceous, postchaetal lamellae with rounded tips, of similar size along thorax. Those of chaetiger 8 slightly more foliaceous, with pointier tips. Single, long,





**Figure 11.** *Magelona nanseni*. Holotype (Nigeria St. 5N-11) (A–O, fluid preserved specimen; P, dissected chaetiger, slide mounted, ZMBN132141): A, anterior region (dorsal view); B, prostomium (dorsal view); C, parapodium of chaetiger 1 (anterior view); D, ventral neuropodial lamella of chaetiger 1 (ventral view); E, parapodium of chaetiger 2 (anterior view); F, ventral neuropodial lamella of chaetiger 2 (ventral view); G, H, parapodia of chaetigers 3–4 (anterior views); I, neuropodia of chaetiger 5 (anterior view); J–K, notopodium and neuropodium of chaetiger 6, respectively (anterior views, from opposing parapodia of the same chaetiger); L–O, parapodia of chaetigers 7, 8, 9 and 13, respectively (anterior views); P, abdominal tridentate hooded hook from the notopodium of chaetiger 26 (oblique frontal view).



**Figure 12.** *Magelona nanseni*. Holotype (Nigeria St. 5N-11, ZMBN132141): A, B, anterior region (dorsal and ventral views, respectively, pigmentation in posterior thorax visible); C, prostomium and first four chaetigers (dorsal view, showing dorsal speckled regions); D, E, anterior region (dorsal and ventral views, respectively); F, prostomium and first four chaetigers (dorsal view); G, H, anterior region (posterolateral and anterolateral views, respectively). D–H, stained with methyl green.

tapering, superior dorsal lobe present on all thoracic chaetigers, except chaetiger 9, decreasing slightly in size in posterior thorax. Neuropodia with low pre- and postchaetal lamellae, encircling chaetae cuff-like and confluent with slender, triangular lamellae, directly under chaetae (Fig. 11D, F), decreasing in size in posterior thorax. Initially slightly prechaetal but becoming completely ventral by chaetiger 4.

Chaetiger 9: shorter and narrower than preceding chaetigers (Figs 11A, 12B). Notopodial prechaetal lamellae low, confluent with larger, slender, triangular, postchaetal lamellae, of similar length to preceding chaetigers (Fig. 11N). No superior dorsal lobes observed. Neuropodia similar, but chaetae emerging below postchaetal lamellae from low inferior ridge. Occasionally inferior edge of ridge slightly raised but never appearing as a distinct process. Chaetae of chaetigers 1–9 simple bilimbate, winged capillaries.

Parapodia of abdominal chaetigers (Fig. 11O) with broad, spatulate, lateral lamellae with pointed tips, of similar size in both rami. Basally constricted, but with no obvious postchaetal expansion behind chaetal rows. Small, triangular processes (DML, VML) observed at inner margins of chaetal rows. Abdominal chaetae tridentate hooded hooks (Fig. 11P) of a similar size, superior two fangs parallel, above main fang. Hooks in two approximately equal groups for each ramus, main fangs *vis-à-vis* (Fig. 11O). Approximately ten hooks per ramus in the anterior abdomen. No abdominal pouches observed, but material only possessing up to 26 abdominal chaetigers. Pygidium unknown.

**Colour:** No living material observed. Preserved specimens cream in colour, faint reddish to brown pigment present in the posterior thorax, between chaetigers 5–8 (Fig. 12A, B). Pigmentation slightly darker in 96% ethanol preserved specimen (ZMBN107336), particularly ventrally. Pigmentation of freshly preserved specimens unknown, pigment is likely to have faded to some degree for the holotype after 13 years of preservation. Obvious elongate, yellow, dorsal patches (glandular?) present between chaetigers 1–5, adjacent to parapodia and either side of the mid-dorsal line (Fig. 12A, C). Staining with methyl green (Fig. 12D–H) shows no distinct pattern, just weak stain all over. However, speckled areas of the prostomium, thoracic region, as well as interparapodial abdominal patches, more noticeable in stained specimens.

**Distribution:** Only known from five stations, off three countries, Liberia to Nigeria, at depths of 25–29 m (Fig. 1).

**Remarks:** This new species can be distinguished from all other pigmented magelonid species within the MIWA region based on the following characters. In possessing

thoracic superior dorsal lobes, *M. nanseni* differs from *M. alleni* and *M. fasciata*, in which they are absent. In possessing tridentate abdominal hooks, it further differs from *M. fasciata* and, additionally, *M. mackiei*, in which they are bidentate. It also differs from the latter two species and *M. picta* in not having small processes below the chaetal bundles in the neuropodia of chaetiger 9. Of the MIWA species, *M. nanseni* is closest to *M. picta*, as noted above, but differs in having less foliaceous notopodial lamellae in the thorax, more basally constricted abdominal lamellae and in terms of body pigmentation (see above).

Of the other magelonid species known to carry posterior thoracic pigmentation, *M. nanseni* differs from *M. cincta*, *M. equilamellae*, *M. japonica*, *M. symmetrica*, *M. polydentata* and *M. variolamellata* in possessing thoracic superior dorsal lobes (absent in the others). It further differs from *M. polydentata* in possessing tridentate hooded hooks in the abdomen rather than polydentate.

Of all the previously described African species, *M. nanseni* shares affinities with *M. cepiceps* from the Seychelles, particularly in the nature of the prostomium, which is somewhat onion-shaped in the latter species. However, they differ in the lamellae of chaetiger 9; the latter species possessing thoracic superior dorsal lobes on all thoracic chaetigers (absent on chaetiger 9 in *M. nanseni*) and low, rounded, postchaetal neuropodial lamellae, with small, ventral processes below the chaetal bundle (as opposed to slender, elongate triangular postchaetal lamellae for the new species).

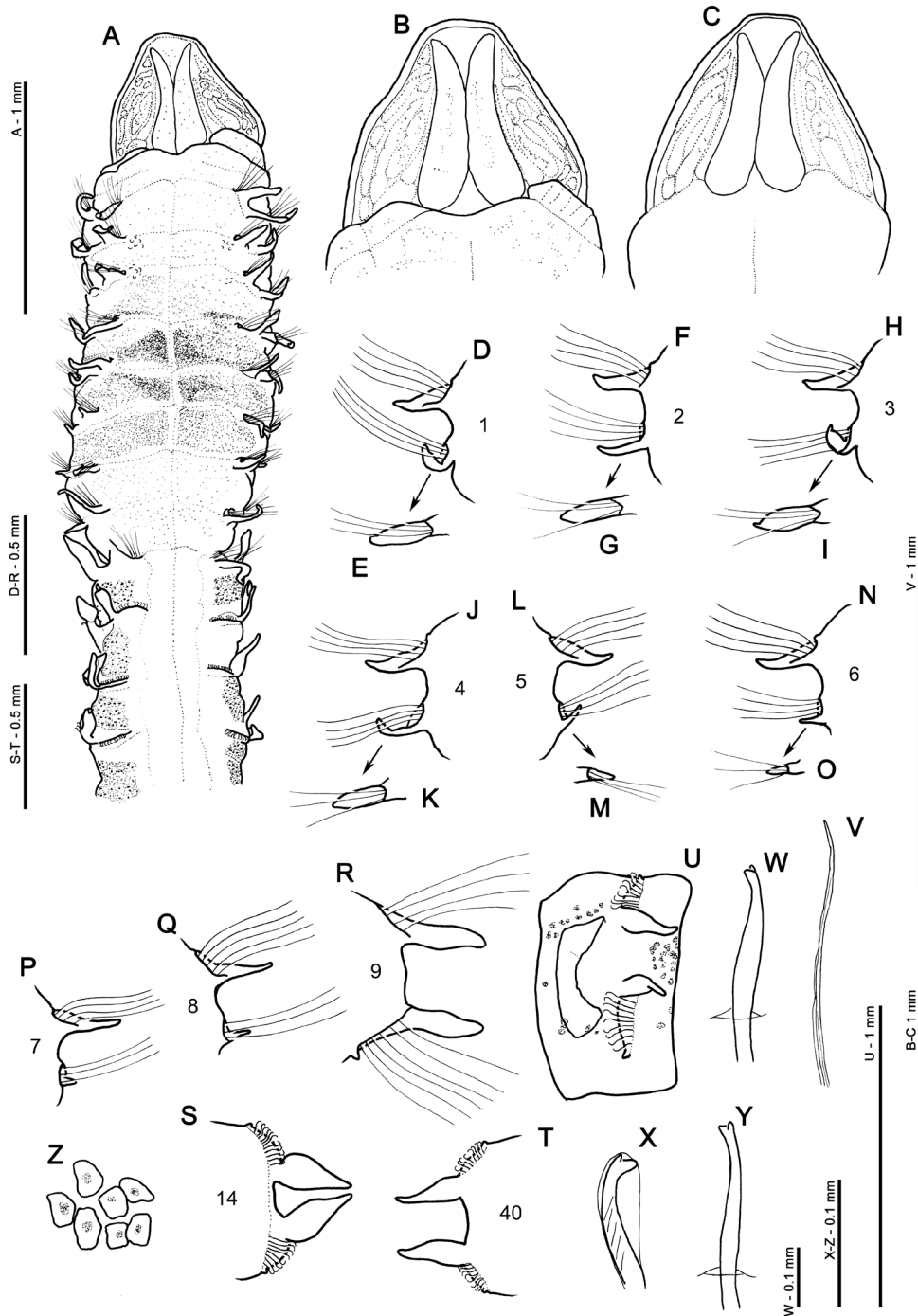
#### *MAGELONA FASCIATA* SP. NOV.

(Figs 13–15)

**Zoobank registration:** urn:lsid:zoobank.org:act:C0848517-9D34-48BB-95B9-52819F88949D.

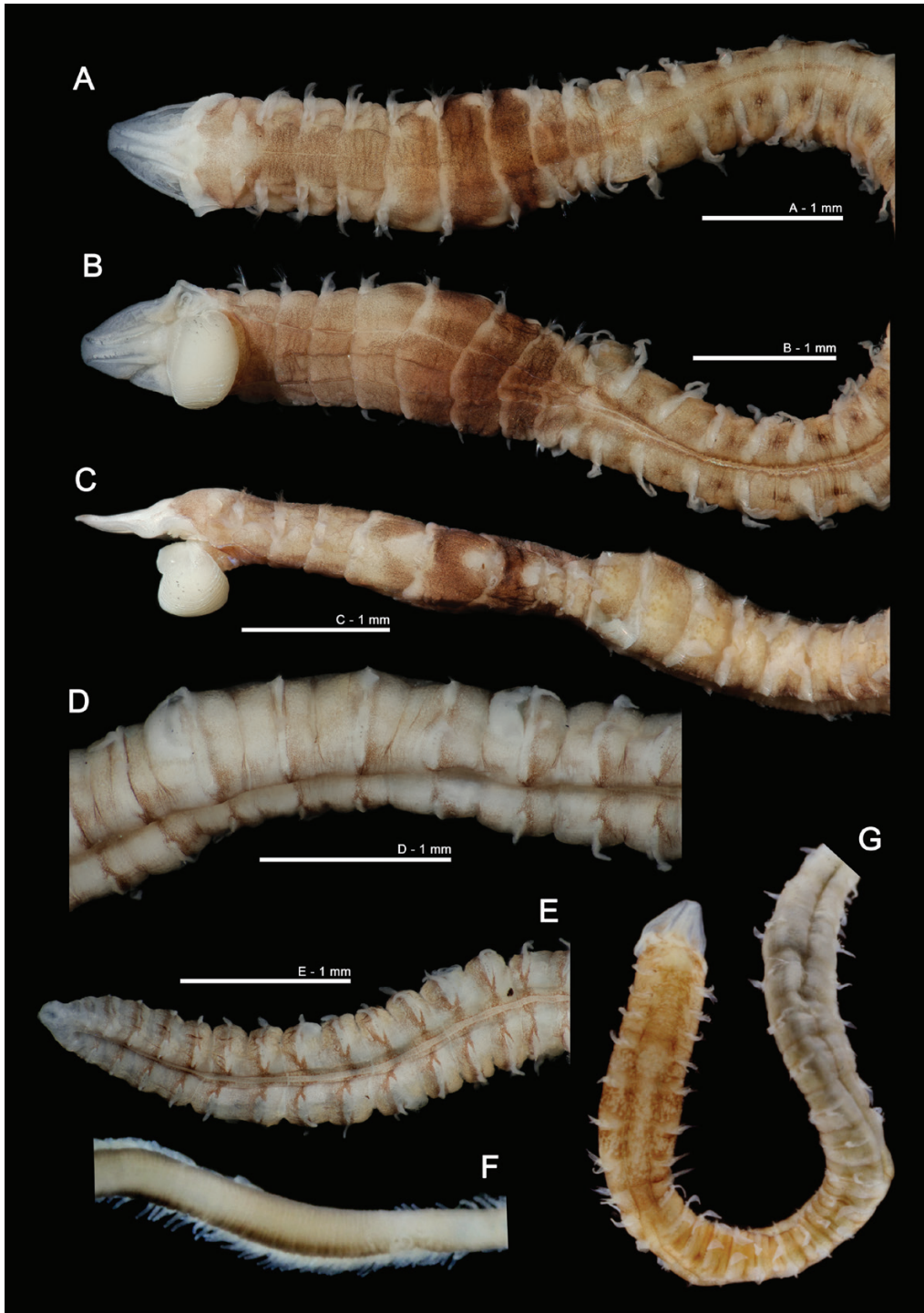
**Type locality:** Ghana, 4.9169°N 2.6495°W, 40 m depth.

**Type material:** Holotype, Ghana: St. 7GH-02, af in 75%EtoH (ZMBN132144). Paratypes, Mauritania: St. 2011410-SL20, 1af in 96%EtoH (ZMBN107337, DNA-voucher); St. 2012404-SL20, 1af in 96%EtoH (ZMBN115741, DNA-voucher). Senegal: St. 2011410-SL11, 1af in 96%EtoH (ZMBN115738, DNA-voucher); 1af in 96%EtoH (ZMBN115739, DNA-voucher); St. 2011410-SL12, 15af in 75%EtoH (ZMBN132149); 236af, 27f, 7pf, 79 palps in 96%EtoH (NMW.Z.2021.001.0007); 1c, 230af, 34f, 10pf, 55 palps, in 96%EtoH (ZMBN132151); 1c, 1af in 96%EtoH (NMW.Z.2021.001.0008, imaged), 3af, pf in 96%EtoH (NMW.Z.2021.001.0009, imaged), 1af in 96%EtoH (ZMBN107311, DNA-voucher). Guinea Bissau: St. 7GB-06, 1af in 75%EtoH

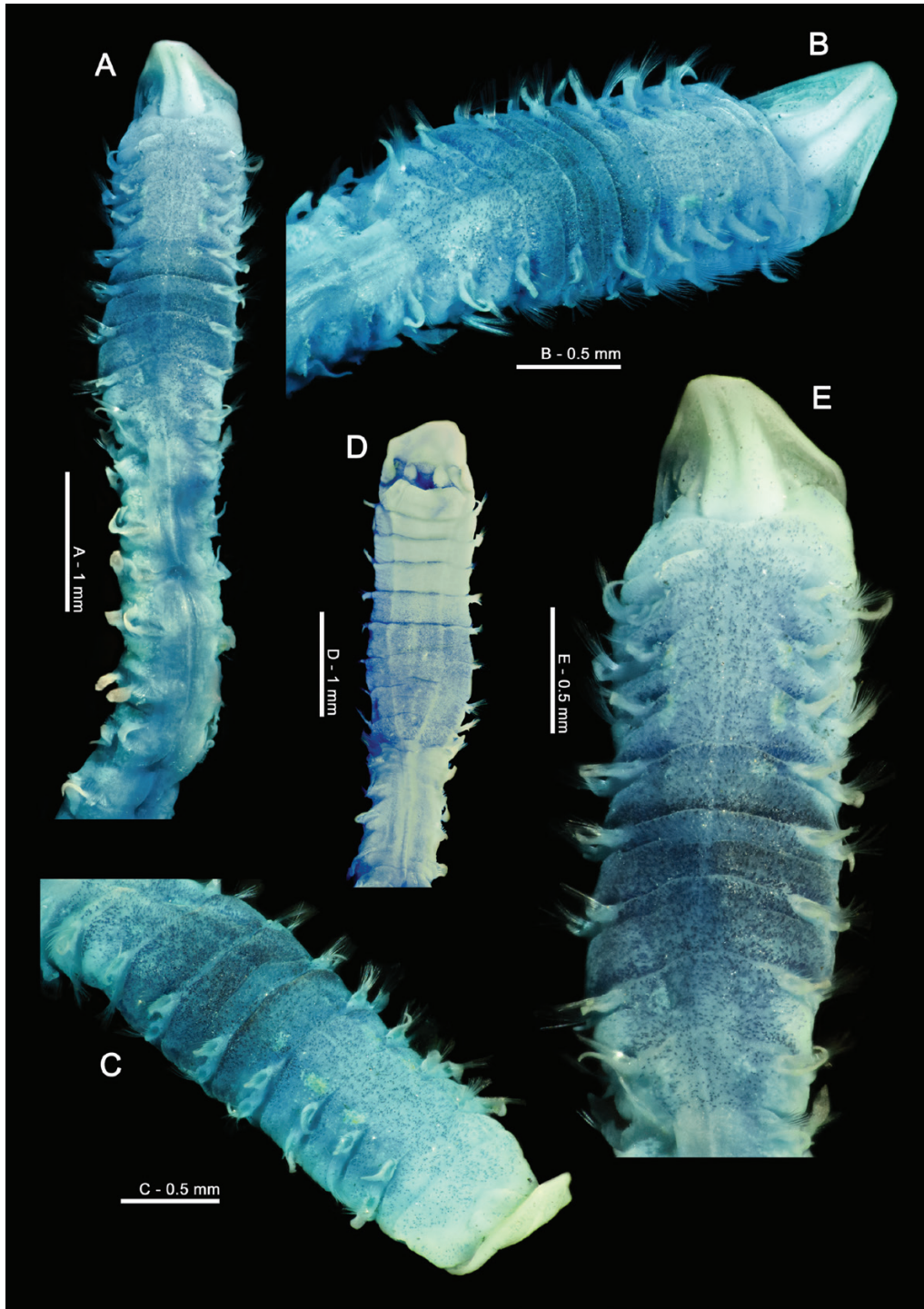


**Figure 13.** *Magelona fasciata*. (Ghana St. 7GH-02) (A, B, D–Z, holotype, ZMBN132144; C, paratype (NMW.Z.2021.001.0012): A, anterior region (dorsal view); B, C, prostomia (dorsal views); D, parapodium of chaetiger 1 (anterior view); E, ventral neuropodial lamella of chaetiger 1 (dorsal view); F, parapodium of chaetiger 2 (anterior view); G, ventral neuropodial lamella of chaetiger 2 (dorsal view); H, parapodium of chaetiger 3 (anterior view); I, ventral neuropodial lamella of chaetiger 3 (dorsal view); J, parapodium of chaetiger 4 (anterior view); K, ventral neuropodial lamella of chaetiger 4 (dorsal view); L, parapodium of chaetiger 5 (anterior view); M, ventral neuropodial lamella of chaetiger 5 (dorsal view); N, parapodium of chaetiger 6 (anterior view); O, ventral neuropodial lamella of chaetiger 6 (dorsal view); P–T, parapodia of chaetigers 7, 8, 9, 14 and 40, respectively (anterior views); U, abdominal chaetiger showing posteriorly open lateral pouch (lateral view); V, capillary chaeta from thoracic segment (lateral view); W–Y, bidentate abdominal hooded hooks (oblique lateral, lateral and posterolateral views, respectively, hoods omitted in X and Z for clarity); Z, eggs observed in the abdominal cavity.





**Figure 14.** *Magelona fasciata* (Senegal St. 2011410–SL12: A–C, NMW.Z.2021.001.0009; D, E, NMW.Z.2021.001.0008; F, Senegal St. 2011410–SL12\_5; G, St. 2011410–SL11: ZMBN115739): A, anterior region (dorsal view); B, anterior region (ventral view, showing partially everted burrowing organ); C, anterior region (lateral view, showing thoracic/abdominal junction); D, nine abdominal chaetigers, towards posterior region, showing two posteriorly open lateral pouches (ventrolateral view); E, posterior region (ventral view, showing pygidium and several lateral pouches); F, middle section of palp, showing pigmentation of the non-papillated side; G, anterior region (dorsal view).



**Figure 15.** *Magelona fasciata*. Holotype (Ghana St. 7GH-02, ZMBN132144) stained with methyl green: A, anterior region (dorsal view); B, anterior region (dorsolateral view); C, prostomium and first eight chaetigers (dorsoanterior view); D, anterior region (ventral view, showing buccal region); E, detail of thoracic region (dorsal view).

(ZMBN107287); St. 2012404–SL06, 1af in 96%Etoh (ZMBN107339, DNA-voucher); St. 2011410–SL09, 1af in 96%Etoh (ZMBN107340, DNA-voucher). **Guinea (Conakry):** St. 7GU-05, 1af in 75%Etoh (ZMBN132159);

1af in 75%Etoh (NMW.Z.2021.001.0010). **Sierra Leone:** St. 7SL-08, 1af 96%Etoh (ZMBN107329, DNA-voucher); St. 7SL-09, 1af in 75%Etoh (NMW.Z.2021.001.0011). **Ghana:** St. 7GH-01, 1af in 96%Etoh (ZMBN115743);

St. 7GH–02, 1af in 96%Etoh (ZMBN107330, DNA-voucher); 3af, 1f, 2p, in 75%Etoh (ZMBN132145); 3af in 75%Etoh (NMW.Z.2021.001.0012); 16af in 75%Etoh (ZMBN132147); St. 7GH–07, 1af in 75%Etoh (NMW.Z.2021.001.0013); St. 2009105–GP2/51, 8af in 75%Etoh (ZMBN107282); St. 2009105–GW2/52, 8af in 75%Etoh (ZMBN107283). **Nigeria:** St. 5N–12, 5af in 75%Etoh (ZMBN107286); St. 6N–15, 1af in 96%Etoh (ZMBN107333, DNA-voucher); 8af in 75%Etoh (NMW.Z.2021.001.0014); 1af in 75%Etoh (ZMBN132164); St. 6N–23, 1af in 96% (ZMBN115742). **Gabon:** St. 5G–01, 1af in 96%Etoh (ZMBN107304, DNA-voucher); St. 5G–03, 1af in 96%Etoh (ZMBN107308, DNA-voucher); St. 5G–15, 3af in 75%Etoh (ZMBN107281); 1af in 75%Etoh (NMW.Z.2021.001.0015); St. 7GA–07, 1af in 96%Etoh (ZMBN107306); St. 7GA–26, 1af in 96%Etoh (ZMBN107307, DNA-voucher). **Republic of the Congo:** St. 7CR–04, 1af in 96%Etoh (ZMBN115747, DNA-voucher). **Angola:** St. 7AN–01, 3af in 75%Etoh (ZMBN132154); St. 7AN–02, 3af 75%Etoh (NMW.Z.2021.001.0016), 1af in 96%Etoh (ZMBN115744, DNA-voucher); St. 7AN–04, 1af in 96%Etoh (ZMBN115740, DNA-voucher); 1af 96%Etoh (ZMBN107332); St. 7AN–08, 1af in 75%Etoh (ZMBN107284); St. 1997–20, 5af in 75%Etoh (ZMBN107285).

*Other examined material:* **Guinea (Conakry):** St. 2011410–GR01, 1af, juvenile, in 75%Etoh (ZMBN132170). **Ghana:** St. 7GH–06, 1af in 75%Etoh (ZMBN132169). **Nigeria:** St. 6N–14, 13af in 75%Etoh (ZMBN132171).

*Etymology:* From Latin *fascia*, meaning band, referring to the distinct banded patterns along the body in this species.

*Diagnosis:* Prostomium as wide as long. Chaetigers 1–9 with slender lamellae, although neuropodial lamellae of chaetigers 1–3, broader, almost scoop-shaped. All thoracic chaetae capillary. Abdominal lateral lamellae triangular, without basal constrictions. Abdominal hooded hooks bidentate, in two groups, *vis-à-vis*. Simple posteriorly open pouches present, pygidium with two short projections.

*Description:* A stout species; with marked distinction between thorax and abdomen (Figs 13A, 14C, 15A), thorax dorsoventrally flattened, thinner (when viewed laterally), but marginally wider than the rounded abdomen. Holotype, anterior fragment; prostomium 0.65 mm long, 0.65 mm wide; thorax 3.0 mm long (including prostomium), 0.75 mm wide; abdomen 0.6 mm wide; total length 20 mm for 43 chaetigers. Largest DNA-voucher specimen (ZMBN107311),

anterior fragment: prostomium 0.8 mm long, 0.9 mm wide; thorax 3.3 mm long (including prostomium), 1.0 mm wide; abdomen 0.8 mm wide; total length approximately 8.5 mm for 24 chaetigers (width measurements not including parapodia). Thoracic chaetigers slightly bulbous, particularly in mid-thoracic region (Figs 13A, 14A, B, 15E), thoracic width fairly uniform but tapering from chaetiger 6 to 9. Other specimens (complete and anterior fragments) 2.5–30 mm for 8–65 chaetigers.

Prostomium triangular (Figs 13B, C, 14A, B, 15B, E), width similar to, or marginally larger than, length (L : W ratio 0.89–1.00). No prostomial horns, anterior margin straight and square, lateral margins slightly rounded. Two pairs of longitudinal dorsal muscular prostomial ridges. Inner pair abutting for majority of length, diverging only at distal tips; outer pair abutting inners for entire length, fairly thin and indistinct (see RH side of Fig. 13B, for instance). Light diagonal striations apparent on inner ridges and indistinct markings present either side of ridges. Burrowing organ, partially to fully everted in 185 specimens, oval when partially everted (Fig. 14B, C), heart-shaped when fully everted (e.g. ZMBN132149); longitudinally ridged inferiorly, superior surface appearing smooth. Palps retained, at least partially, on 77 specimens, arising ventrolaterally from base of prostomium, short and thick, with a ‘frilly’ appearance due to presence of numerous long papillae. Palps reaching approximately chaetigers 13–17 (when folded backwards), non-papillated region short, reaching approximately chaetiger 2. Papillae short proximally, increasing in size in mid and distal regions, becoming long at tips. Proximally three to five rows of papillae either side of an inconspicuous mid-palp line, devoid of papillae, medially two to four rows and distally one to two rows either side. Exact number of rows difficult to discern due to length and abundance of papillae, and due to neighbouring rows overlapping each other. A higher number of rows of papillae occur on larger specimens.

Achaetous region behind the prostomium, marginally longer than chaetiger 1 (Figs 14A, 15E). Chaetigers 1–8 similar (Fig. 13D–Q); parapodia biramous. Notopodia with low prechaetal lamellae, which encircle the chaetal bundle and are confluent with smooth-edged, pointed, triangular lamellae, in a slightly subchaetal position. Notopodial lamellae of a similar size throughout the thorax. Minute prechaetal superior dorsal lobes present on thoracic chaetigers, difficult to discern in smaller specimens and on all chaetigers due to size. Neuropodia with low pre- and postchaetal lamellae, encircling chaetae cuff-like and confluent with ventral lamellae underneath chaetal bundle. Those of chaetigers one to three/four broader spatulate with bluntly rounded tips, slightly scoop-shaped (Fig. 13D–K), but not as marked as those seen



in *M. cincta*. Neuropodial lamellae reducing in length and breadth along thorax.

Chaetiger 9 shorter and narrower than preceding chaetigers (Fig. 14A): noto- and neuropodial postchaetal lamellae similar (Fig. 13R), marginally larger than on preceding chaetigers. Prechaetal lamellae low, no notopodial superior dorsal lobes observed, however, small, triangular prechaetal processes present in the neuropodia. Chaetae of chaetigers 1–9 simple bilimbate winged capillaries (Fig. 13W).

Abdominal lateral lamellae triangular, not basally constricted, and with no obvious postchaetal expansion of lamellae behind chaetal rows (Fig. 13S–U). Minute, sporadic processes (DML, VML) observed at inner margins of chaetal rows. (NB not occurring on all chaetigers and more difficult to discern in smaller specimens.) Abdominal chaetigers of mid-body region approximately twice as long as wide. Abdominal chaetae bidentate hooded hooks (Fig. 13W–Y) all of a similar size, one superior fang above main fang. Hooks in two approximately equal groups for each ramus, main fangs *vis-à-vis* (Fig. 13U). Approximately ten to twelve hooks per ramus in the anterior abdomen. Posteriorly open, abdominal lateral pouches observed on several specimens towards the posterior region (Figs 13U, 14D). Pouches simple, C-shaped, alternating from one side of the body to the other, and on alternating chaetigers, starting, for example, on chaetigers 32R and 34L for complete imaged paratype (NMW.Z.2021.001.0008). Pouches observed starting from 24 segments from the pygidium. Pygidium rounded with two slight, lateral projections (Fig. 14E). Anus almost terminal [as has been shown for *M. alleni*, see: Mills & Mortimer (2019)], but tilted towards the ventral surface [as has been shown for *M. equilamellae*, see: Mortimer *et al.* (2020)]. Holotype ovigerous, eggs approximately 80 µm in diameter (Fig. 13Z).

The paratype from St. 7 GH–07 (NMW.Z.2021.001.0013) clearly shows sediment grains within the body cavity.

**Colour:** No living material observed. Preserved specimens cream to beige in colour with obvious brown pigmentation as transverse stripes along the body to the pygidium (Fig. 14). Pigmentation of the posterior thorax wider and darker than the rest of the body, occurring as a pigment band (Fig. 14A–C). No prostomial pigmentation. Brown transverse lines present on non-papillated side of palps. Darker pigmentation running alongside the outer row of papillae, in mid-palp region (Fig. 14F) and occurring as sporadic spots towards the distal tips. Additional infrequent pigment spots amongst papillae. Specimens collected in 2005/2006 now entirely without, or with distinctly faded, pigmentation. Pigmentation around the posterior thorax is retained for the longest period

of time. White dorsal speckles (glandular?) present between chaetigers 2–4, just behind parapodia, more obvious in stained specimens (Fig. 15C). Methyl green staining pattern (Figs 13A, 15) generally indistinct, but the dorsal thoracic surface, prostomium (Fig. 15B) and ventral posterior thorax (Fig. 15D) become speckled with darker stain. Stain remaining the longest in the posterior thorax, even for several months after initial staining.

**Distribution:** Collected at 32 stations from ten countries (from Mauritania in the north, to northern Angola in the south, Fig. 1), at depths of 19–106 m.

**Remarks:** The most important distinguishing feature separating this species from all other pigmented species in the region is the presence of distinct striped or banded pigmentation along the length of the body (but note that pigmentation may fade over time). In possessing bidentate hooded abdominal hooks *M. fasciata* differs from *M. alleni*, *M. guineensis*, *M. picta* and *M. nanseni*, in which they are tridentate. In possessing scoop-shaped ventral neuropodial lamellae of the anterior abdomen, and only minute/sporadic superior dorsal lobes in the thoracic region, *Magelona fasciata* differs from *M. mackiei* in which the neuropodial lamellae have more pointed tips and the notopodial superior dorsal lobes are more distinct. They further differ in terms of prostomial shape (width similar to length in the former species but wider than long in the latter) and the presence of two pairs of prominent dorsal prostomial muscular ridges in the latter species (outer pair of which are thinner and less distinct in *M. fasciata*).

*Magelona fasciata* co-occurred at several localities alongside *M. alleni* within the sampling region, for example, St. 2011410–SL12 off Senegal. When present together, the former species was seen to occur in much higher numbers than the latter. The two can be easily separated within the same sample by the distinct stripy pigmentation of *M. fasciata* and the presence of subequal abdominal lamellae in *M. alleni*. The pigment band of *M. alleni* additionally being somewhat darker and browner in colour. The presence of papery, sediment-covered tubes was observed for *M. alleni* in these samples but not noted for *M. fasciata*.

Of the other magelonid species known to carry posterior thoracic pigmentation, *M. fasciata* shares most similarities with *M. cincta* described from South Africa. However, it can be distinguished from this species, *M. equilamellae*, *M. japonica*, *M. symmetrica*, *M. polydentata* and *M. variolamellata* in the nature of the hooded hooks, being bidentate as opposed to tridentate or polydentate.

Of all the other previously described African species, *M. fasciata* shares some similarities with



*M. cepiceps* and *Magelona mahensis* Mortimer & Mackie, 2006, from the Seychelles. However, it differs from the former in terms of prostomial shape and in possessing only minute superior dorsal lobes of the thoracic region (those of *M. cepiceps* being somewhat longer and wider, particularly in the posterior thorax), and to the latter based on the presence of abdominal processes at the end of chaetal rows (DML, VML; absent in *M. mahensis*).

**MAGELONA MACKIEI SP. NOV.**

(FIGS 16, 17)

*Zoobank registration:* urn:lsid:zoobank.org:act:92162557-7671-41A5-938A-332EA6AC397B.

*Type locality:* **Nigeria**, 3.9828°N 6.2157°E, 41 m depth.

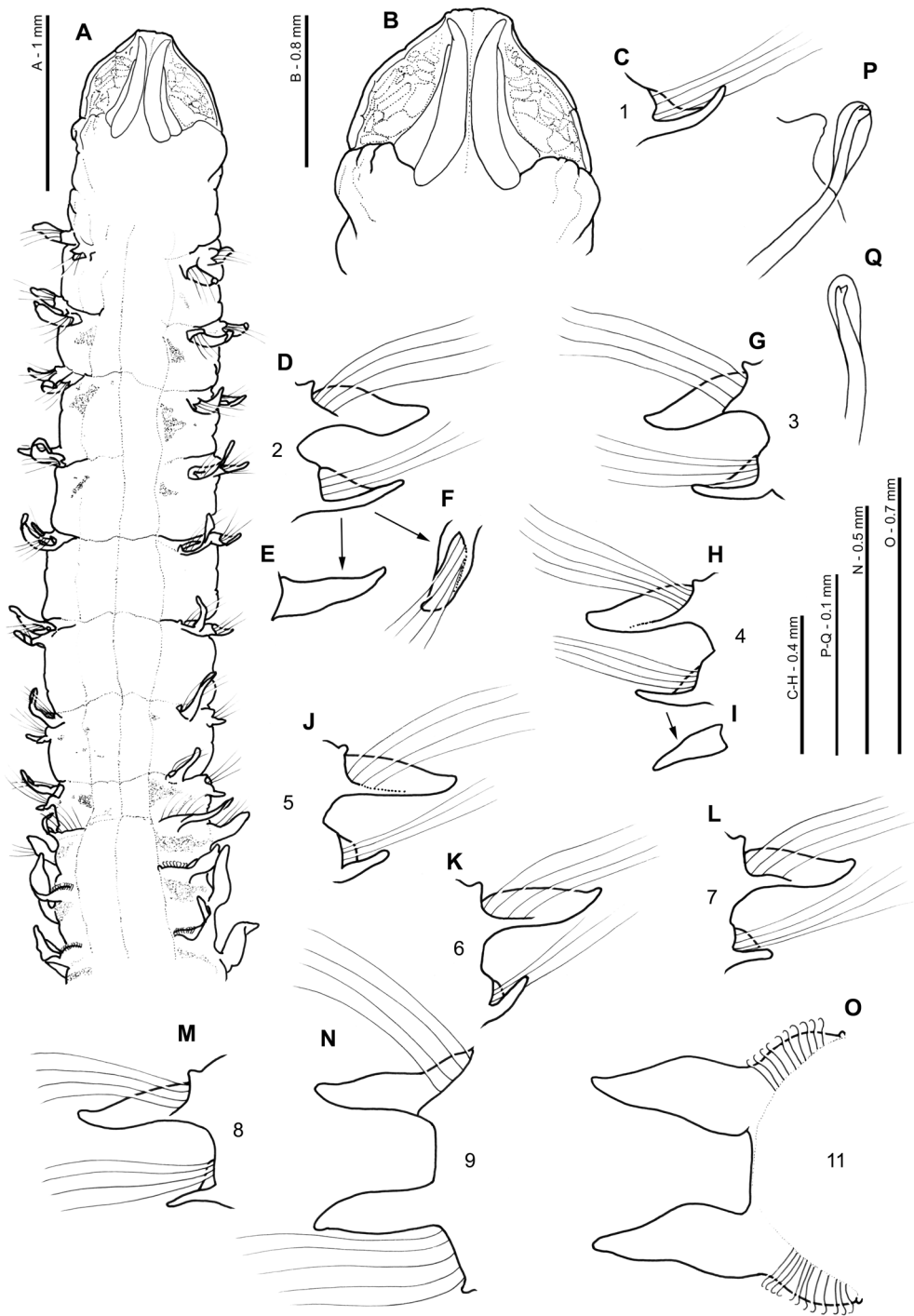
*Type material:* Holotype, **Nigeria**: St. 5N–14, af in 96% Etoh (ZMBN107309, DNA-voucher). *Paratypes:* **Sierra Leone**: St. 7SL–06, 1af in 75%Etoh (ZMBN132189). **Liberia**: St. 7LI–01, 1af in 75%Etoh (NMW.Z.2021.001.0017, imaged); 6af in 75%Etoh (ZMBN132176); St. 7LI–07, 1af in 75%Etoh (NMW.Z.2021.001.0018, imaged). **Ghana**: St. 7GH–05, 1af in 75%Etoh (ZMBN132172); 2af in 75%Etoh (NMW.Z.2021.001.0019); St. 7GH–08, 1af in 96%Etoh (ZMBN115735, DNA-voucher); 1af in 75%Etoh (ZMBN132174); St. 2011404–GE1/249, 1af in 96%Etoh (ZMBN107341, DNA-voucher); St. 2009105–GE1/28, 14af in 75%Etoh (ZMBN107290); St. 2009105–GP1/28, 2af in 75%Etoh (ZMBN107288); St. 2009105–GW4/252, 5af in 75%Etoh (ZMBN107289). **Nigeria**: St. 5N–14, 1af in 96%Etoh (ZMBN115746, DNA-voucher); 11af in 96%Etoh (ZMBN107291); St. 6N–11, 3af, 3f, in 75%Etoh (NMW.Z.2021.001.0020). **São Tomé and Príncipe**: St. 2009–T2, 3af in 75%Etoh (NMW.Z.2021.001.0021). **Gabon**: St. 5G–03, 1af in 75%Etoh (ZMBN132180); St. 5G–16, 1af in 75%Etoh (ZMBN132181); St. 8G–01, 1af in 75%Etoh (ZMBN107292), 1af in 96%Etoh (ZMBN132118). **Republic of Congo**: St. 8CR–01, 1af in 96%Etoh (ZMBN115745, DNA-voucher); 4af in 75%Etoh (ZMBN107293); 9af in 96%Etoh (ZMBN132115); 17af in 75%Etoh (NMW.Z.2021.001.0022); St. 7CR–02, 1af in 96%Etoh (ZMBN107312, DNA-voucher); 3af in 96%Etoh (ZMBN132116); 1af in 96%Etoh (ZMBN132117, imaged); St. 7CR–05, 1af in 96%Etoh (ZMBN107310). **Angola**: St. 1997–13, 1af in 75%Etoh (ZMBN132119); St. 1997–15, 1af in 75%Etoh (ZMBN132120); St. 1997–23, 1af in 75%Etoh (ZMBN132121); St. 1997–28, 1af in 75%Etoh (ZMBN132122); St. 1997–29, 2af in 75%Etoh (ZMBN132123).

*Etymology:* This new species is named in honour of Dr Andrew Mackie, who has contributed much to our understanding of magelonids and who has provided advice and support to the first author during the last 20 years.

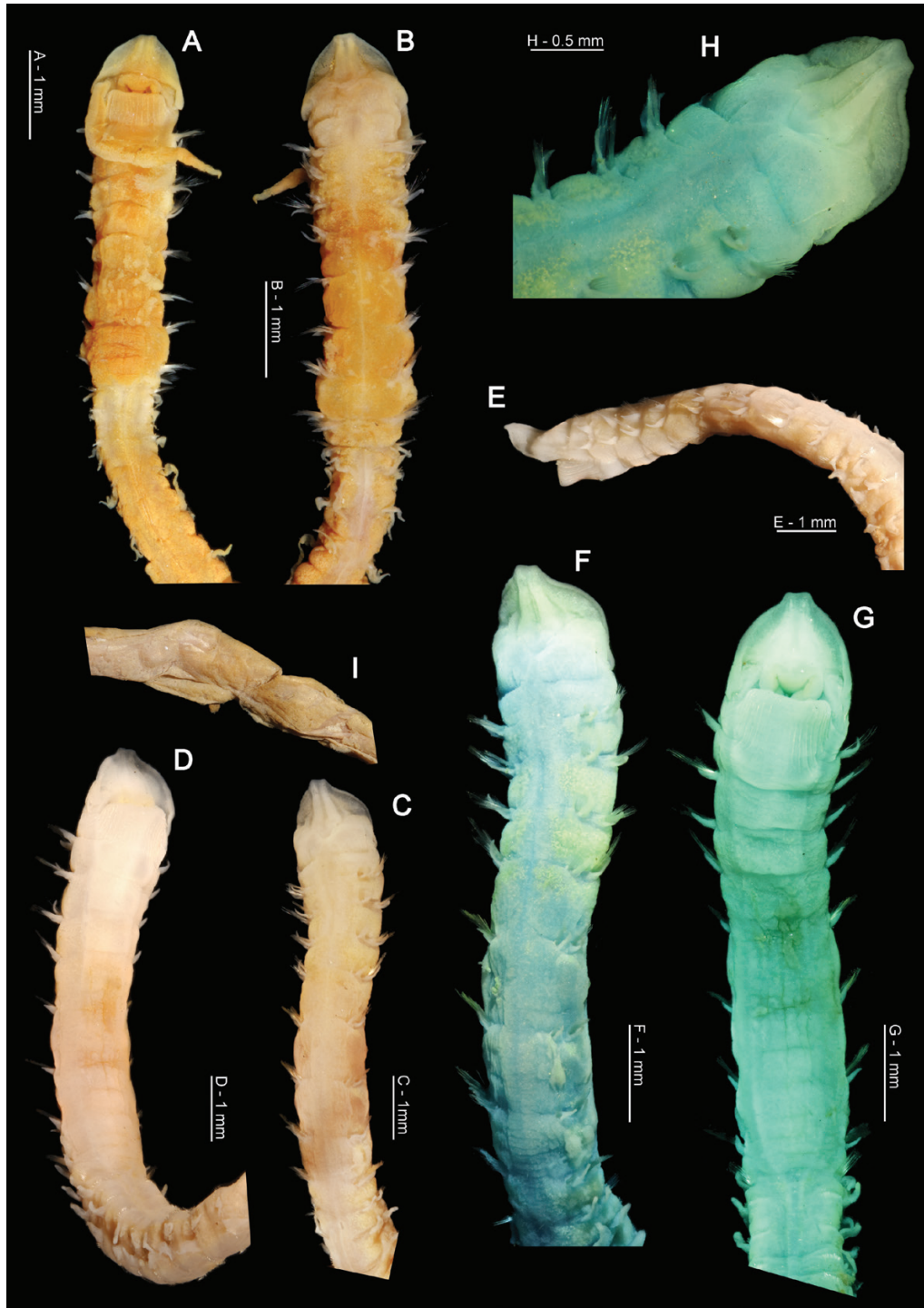
*Diagnosis:* Prostomium wider than long, with rudimentary prostomial horns. Chaetigers 1–8 with slender sinuous postchaetal lamellae, those of the notopodia with minute superior dorsal lobes. Chaetiger 9, notopodia similar but without superior dorsal lobes, neuropodia with sinuous postchaetal lamellae and additional small triangular ventral processes. All thoracic chaetae capillary. Abdominal lateral lamellae triangular. Abdominal hooded hooks bidentate, in two groups, *vis-à-vis*. No pouches observed, pygidium unknown.

*Description:* A large stout species; junction between thorax and abdomen (Fig. 17B), noticeable. Holotype, anterior fragment: prostomium 0.6 mm long, 0.8 mm wide; thorax 5 mm long (including prostomium), 1.0 mm wide; abdomen 0.75 mm wide; total length 7.75 mm for 14 chaetigers. Largest DNA-voucher specimen (ZMBN107312), anterior fragment: prostomium 0.90 mm long, 1.25 mm wide; thorax 5.25 mm long (including prostomium), 1.2 mm wide; abdomen 1.1 mm wide; total length approximately 13.5 mm for 23 chaetigers (width measurements not including parapodia). Thoracic chaetigers characteristically bulbous (Figs 16A, 17B), width greatest around chaetigers 5–6, body tapering towards chaetiger 9 (Fig. 17A, B). Other measured anterior fragments: 4.0–18.5 mm for 8–30 chaetigers.

Prostomium subtriangular (Fig. 16B), wider than long (L : W ratio 0.72–0.75). Rudimentary prostomial horns, anterior margin straight and square. Anterior prostomial margin of holotype with several minute notches, but not so distinct as crenulations, and otherwise smooth for remaining type material. Two pairs of prominent longitudinal, prostomial, dorsal muscular ridges, relatively thick; inner pair abutting for majority of length, diverging at distal tips. Outer pair, slightly shorter, abutting inners for entire length. Weak prostomial markings present either side of the muscular ridges (Fig. 16B), slightly more distinct in larger specimens. Burrowing organ, everted in four specimens, oval when partially everted. Nearly entirely everted in one specimen (ZMBN107312), heart-shaped, transversely ridged inferiorly, appearing smooth superiorly. Palps retained on several specimens, arising ventrolaterally from base of prostomium, short and thick, appearing ‘frilly’ with long numerous papillae. Specimens from the Republic of Congo (St. 8CR–01) with a short, non-papillated region, reaching approximately chaetiger



**Figure 16.** *Magelona mackiei*. Holotype (Nigeria St. 5N–14, ZMBN107309): A, anterior region (dorsal view); B, prostomium, dorsal view; C, neuropodium of chaetiger 1 (anterior view); D, parapodium of chaetiger 2 (anterior view); E, F, neuropodial lamella of chaetiger 2 (ventral and lateral views, respectively); G, parapodium of chaetiger 3; H, parapodium of chaetiger 4 (anterior view); I, neuropodial lamella of chaetiger 4 (ventral view); J–O, parapodia of chaetigers 5–9, and 11, respectively (anterior views); P, Q, bidentate hooded hooks of chaetiger 15 (oblique lateral view; P, outermost hook of ramus next to process).



**Figure 17.** *Magelona mackiei*. (A, B, Liberia St. 7LI-01, NMW.Z.2021.001.0018; C–H, Liberia St. 7LI-07, NMW.Z.2021.001.0017; I, Nigeria St. 6N-11, ZMBN132179): A, anterior region (ventral view); B, anterior region (dorsal view); C, anterior region (dorsal view); D, anterior region (ventral view); E, anterior region (lateral view); F, anterior region (dorsal view); G, anterior region (ventral view); H, prostomium and first three chaetigers (dorsolateral view); I, section of sediment tube. F–H, stained with methyl green.



1, but in larger specimens it reaches approximately chaetiger 3. Papillae short proximally but increasing rapidly in size, becoming extremely long and slender by chaetiger 2. Largest palp retained on Nigerian specimen (St. 6N–11, NMW.Z.2021.001.0020, left hand palp), approximately 0.4 mm wide and 9.0 mm long, reaching approximately chaetiger 20 (when folded backwards), other palps reaching approximately chaetigers 12–14. Proximally with three to six rows of papillae either side of an inconspicuous mid-palp line, devoid of papillae, medially four or five rows either side and distally one or two rows. Exact number of rows extremely difficult to count due to length of papillae and the overlapping of neighbouring rows.

Achaetous region behind the prostomium, roughly twice the length of chaetiger 1 (Fig. 16A). Chaetigers 1–8 similar (Fig. 16C–M); parapodia biramous. Notopodia with low prechaetal lamellae confluent with slender smooth-edged sinuous postchaetal lamellae with pointed tips, of similar size throughout the thorax. Small to minute prechaetal superior dorsal lobes present on all thoracic chaetigers (except chaetiger 9) in a slightly prechaetal position (NB these are more difficult to see on more bulbous specimens, due to parapodia occurring in furrows, or on smaller specimens). Neuropodia with low prechaetal lamellae, confluent with long slender triangular, ventral lamellae with pointed tips, which reduce in size along the thorax. Postchaetal expansion, triangular and adjoining ventral lamellae (e.g. Fig. 16D–F) approximately halfway along their length (postchaetal expansion greater in larger specimens). Ventral lamellae initially slightly prechaetal but becoming more postchaetal by chaetiger 7.

Chaetiger 9 (Figs 16A, 17B): shorter and narrower than preceding chaetigers. Notopodial prechaetal lamellae low, confluent with slender, triangular, postchaetal lamellae, slightly larger than on preceding chaetigers (Fig. 16N). No superior dorsal lobes observed. Neuropodia similar to notopodia, however, postchaetal lamellae slightly larger; chaetae emerging below lamella, from a definite ridge that terminates in a small triangular process. Chaetae of chaetigers 1–9 simple bilimbate, winged capillaries, those of chaetiger 8, slightly longer and characteristically splayed.

Parapodia of abdominal chaetigers (Fig. 16O) with long, triangular, lateral lamellae with pointed tips (NB tips easily broken). Lamellae slightly constricted basally, but with no obvious postchaetal expansion behind chaetal rows. Tiny sporadic processes (DML, VML) observed at inner margins of chaetal rows. Abdominal chaetae bidentate hooded hooks (Fig. 16P–Q) of a similar size, one superior fang above main fang. Hooks in two approximately equal groups for each ramus, main fangs *vis-à-vis* (Fig. 16O). Approximately ten to 14 hooks per ramus in the anterior abdomen.

No abdominal pouches observed, although posterior chaetigers unknown (no specimens with more than 30 chaetigers examined). Posterior region and pygidium unknown. Distinct sediment covered, layered tubes present on several specimens (Fig. 17I), inner layers often difficult to remove from specimens.

**Colour:** No living material observed. Preserved specimens creamy orange in colour with faint reddish pigment in the posterior thorax (Fig. 17C, D). Pigment strongest between chaetigers 5–7 but not as strong as other magelonid species in the MIWA region. However, the majority of material examined has been preserved for over 10 years, and personal observations have shown pigmentation in magelonids can fade within a similar time frame. Observation of live or freshly preserved specimens is needed to clarify whether this species has darker pigmentation. Many specimens have an orange tint (Fig. 17A, B). Light dorsal speckles (glandular?) present between chaetigers 2–5 (Fig. 16A, F, H), more obvious in stained specimens. Staining with methyl green (Fig. 17F–H) shows a weak overall stain, with no distinct pattern.

**Distribution:** Collected from 23 stations in the Gulf of Guinea (from Sierra Leone in the north to northern Angola in the south, Fig. 1), at depths of 8–340 m.

**Remarks:** Of all the pigmented species in the MIWA region, *Magelona mackiei* differs from *M. alleni*, *M. guineensis*, *M. nanseni* and *M. picta* by possessing bidentate and not tridentate abdominal hooded hooks. As noted above, *M. mackiei* differs from *M. fasciata* in terms of prostomial shape, pigmentation patterns (although note fading of pigmentation) and the nature of the thoracic neuropodial lamellae. Although the two species share many similarities, they can be easily separated in samples by observing the neuropodial lamellae of chaetigers 1–3, being broad almost scoop-shaped in *M. fasciata* and distinctly slender and pointed in *M. mackiei*.

Of the other magelonid species known to carry posterior thoracic pigmentation, *M. mackiei* differs from *M. cincta*, *M. equilamellae*, *M. japonica*, *M. variolamellata*, *M. symmetrica* and *M. polydentata* in the nature of the hooded hooks, which are bidentate as opposed to tridentate or polydentate. It further differs from *M. symmetrica* in possessing neuropodial lamellae in a distinctly ventral position, as opposed to a postchaetal position. The pigmentation of *M. mackiei* is noticeably faint in comparison to other MIWA magelonid material. Whilst it is unclear, at present, whether pigmentation is darker in live or freshly preserved specimens, *M. symmetrica* is a species in



KEY TO ADULT SPECIMENS OF *MAGELONA* FROM WESTERN AFRICA CARRYING POSTERIOR THORACIC PIGMENTATION

The geographical region included within the following key runs from Morocco in the north to Algoa Bay, South Africa in the south (Fig. 1).

1. Thoracic superior dorsal lobes absent to minute..... 2
  - Distinct thoracic superior dorsal lobes clearly developed..... 5
2. Abdominal hooded hooks bidentate..... 3
  - Abdominal hooded hooks tridentate ..... 4
3. Ventral neuropodial lamellae of anterior thorax scoop-shaped, distinct stripy pigmentation along length of animal (NB this may fade over time)..... *M. fasciata*
  - Ventral neuropodial lamellae of anterior thorax not scoop-shaped. Pigmentation light and limited to posterior thorax..... *M. mackiei*
4. Abdominal lateral lamellae of roughly equal size in each ramus..... *M. cincta*
  - Abdominal lateral lamellae subequal, notopodial being noticeably larger than the neuropodial .... *M. alleni*
5. Thoracic superior dorsal lobes short, thoracic notopodial lamellae slender and in a slightly subchaetal position. Small, triangular processes below neurochaetae on chaetiger 9..... *M. guineensis*
  - Thoracic superior dorsal lobes long, thoracic notopodial lamellae more foliaceous, postchaetal. No processes below neurochaetae on chaetiger 9 ..... 6
6. Foliaceous abdominal lateral lamellae heavily pigmented (NB this may fade over time), with only a slight basal constriction. Thoracic notopodial lamellae foliaceous, neuropodial lamellae of a similar length along the thorax (only marginally shorter towards posterior thorax). Abdominal lamellae with obvious postchaetal expansion behind chaetal rows, distinct, triangular ..... *M. picta*
  - Spatulate abdominal lateral lamellae without pigmentation, basal constriction distinct. Thoracic notopodial lamellae slender foliaceous, marked reduction in the length of neuropodial lamellae along the thorax. Abdominal lamellae without postchaetal expansion behind chaetal rows in the abdomen ..... *M. nanseni*

The minimum, maximum and mean depths from which all MIWA pigmented species were collected are given in Table 6. The results indicate that whilst *M. mackiei* can be found in shallow waters, it appears to more abundant in waters over 100 m deep. The remaining five pigmented species in the region were encountered more frequently at depths of 26–58 m.

which pigmentation was similarly observed to be pale and sporadic, even in freshly preserved specimens (Mortimer *et al.*, 2012).

Of all the other previously described African *Magelona* species, *M. mackiei* shares some similarities with *M. cepiceps* and *M. mahensis*. However, it differs from *M. cepiceps*, which has an onion-shaped prostomium and tridentate abdominal hooded hooks, and from *M. mahensis* in which thoracic superior dorsal lobes are absent. *Magelona mackiei* shares affinities with *Magelona capax* Hartman, 1965 described off the mouth of the Amazon River. However, it differs in the shape of the prostomium, having a more distinct anterior prostomial margin, which is almost horn-like for *M. capax*.

## DISCUSSION

DNA sequencing substantiated the initial perception of five new species observed from sorting and identification of morphotypes. Different approaches to molecular species delimitation (Table 4) returned

similar results and interspecific versus intraspecific distances indicate that there is a barcode gap that can function well as a diagnostic tool to support morphological identification (Table 5). Pairwise *COI p*-distances between the recognized species are around 20%, except in the *M. guineensis*, *M. nanseni*, *M. picta* group, where the distances are about 10%, but still well above the 2–3% threshold for species delimitation that has frequently been used to define operational taxonomic units (OTUs) (Ratnasingham & Hebert, 2013). Phylogenetic analysis of the concatenated dataset returned high support for the majority of groupings (Fig. 2; Table 4) and Rosenberg's test for reciprocal monophyly (Rosenberg, 2007) was significant for all branch splits including more than one individual.

Until now the number of magelonid species carrying posterior thoracic pigmentation within a given geographic area has been limited to one or two species, e.g. *M. alleni* and *M. equilamellae* in European waters (Mortimer *et al.*, 2020), *M. cincta* in South Africa waters, *M. variolamellata* off Brazil and *M. japonica* in the

**Table 6.** Characters of West African magelonid species with pigmentation in the posterior thorax. \*Not observed, posterior unknown

<b>Species/characters</b>	<b><i>M. alleni</i></b>	<b><i>M. fasciata</i></b>	<b><i>M. guineensis</i></b>	<b><i>M. machiei</i></b>	<b><i>M. nanseni</i></b>	<b><i>M. picta</i></b>
<b>Size/Dimensions</b>	Stout	Stout	Moderate	Stout	Stout	Moderately stout
<b>Prostomium</b>						
Horns	Absent	Absent	Absent	Rudimentary horns	Rudimentary horns	Absent
Shape	Triangular, anterior margin straight	Triangular, anterior margin straight	Subtriangular, rounded lateral margins, anterior margin straight	Subtriangular, anterior margin straight	Rounded laterally, anterior margin straight	Rounded subtriangular, anterior margin straight
L : W ratio	Roughly equal	Roughly equal	Roughly equal	Wider than long	Wider than long	Marginally wider than long
No. of ridges	2 pairs, outer pair minute at prostomial base	2 pairs	2 pairs	2 pairs	1 pair	2 pairs, outer pair minute at prostomial base
<b>Thorax</b>						
No. of thoracic chaetigers	Nine	Nine	Nine	Nine	Nine	Nine
Notopodial lamellae	Triangular, postchaetal	Pointed triangular, slightly subchaetal	Sinuous postchaetal	Sinuous postchaetal, pointed tips	Slender foliaceous, postchaetal	Foliaceous, postchaetal
Superior Dorsal Lobes	Absent	Minute, 1–8	Small, 1–8	Small to minute, 1–8	Long, 1–8	Long, 1–8
Neuropodial lamellae	Triangular, ventral	Chaetigers 1–3/4 scoop-shaped, 5–8 digitiform reducing in size	Slender triangular with rounded tips, ventral	Slender triangular, pointed tips	Slender triangular	Slender, triangular, rounded tips
Chaetae	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate
<b>Chaetiger 9</b>						
Notopodial lamellae	Triangular, postchaetal	Triangular, rounded tips	Slender triangular, postchaetal	Slender triangular, postchaetal	Slender triangular, postchaetal	Digitiform, rounded tips, postchaetal
Superior Dorsal Lobes	Absent	Absent	Absent	Absent	Absent	Absent
Neuropodial lamellae	Slender, ventral process	Triangular, rounded tips with small, triangular prechaetal processes	Slender triangular, small triangular prechaetal cesses	Slender triangular, small triangular prechaetal cesses	Slender triangular, postchaetal	Digitiform, rounded tips, postchaetal
Chaetae	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate	Smooth, bilimbate

Table 6. Continued

Species/characters	<i>M. alleni</i>	<i>M. fasciata</i>	<i>M. guineensis</i>	<i>M. machiei</i>	<i>M. nanseni</i>	<i>M. picta</i>
<b>Abdomen</b>						
Lamellae	Subequal, notopodial larger	Triangular, not basally constricted	Spatulate to broad triangular, slight basal constriction	Long, triangular, pointed tips, slightly constricted basally	Broad spatulate, pointed tips, basally constricted	Sinuuous to foliaceous, slight basal constriction
Postchaetal expansion	Absent	Absent	Absent	Absent	Absent	Triangular
Medial lobes	Absent	Minute, sporadic	Small	Tiny, sporadic	Small, triangular	Small, triangular
Hook orientation	<i>Vis-à-vis</i>	<i>Vis-à-vis</i>	<i>Vis-à-vis</i>	<i>Vis-à-vis</i>	<i>Vis-à-vis</i>	<i>Vis-à-vis</i>
Hook dentition	Tridentate	Bidentate	Tridentate	Bidentate	Tridentate	Tridentate
Lateral pouches – Anteriorly opening	Absent	Absent	Absent	Absent	Absent	Absent
Lateral pouches – Posteriorly opening	Absent	Present, alternating	Absent*	Absent*	Absent*	Absent*
Pygidium	2 stout, lateral projections	Rounded with two slight, lateral projections	Unknown	Unknown	Unknown	Unknown
Anus	Large, terminal	Almost terminal, tilted ventrally	Unknown	Unknown	Unknown	Unknown
<b>Colour</b>	Dark pigment band chaetigers 5–9	Brown transverse stripes, pigment band in posterior thorax	Faint reddish pigment between chaetigers 5–8	Faint reddish pigment, chaetigers 5–7. Overall slight orange tint	Faint reddish to brown pigment, chaetigers 5–8	Distinct dark brown pigment, 5–8. Weaker pigmentation over much of the body. Abdominal lamellae heavily pigmented
<b>Tube building</b>	Paper-like tube, covered in sand	Unknown	Unknown	Distinct sediment covered, layered tubes	Unknown	Unknown
<b>Type locality</b>	Plymouth, UK	Ghana	São Tomé and Príncipe	Nigeria	Nigeria	Angola
<b>Depth Range</b>	Intertidal to 106 m	19–106 m	8–92 m	8–340 m	25–29 m	50 m
<b>Mean Depth</b>	38.5 m	57.9 m	31.8 m	141.3 m	26.8 m	50 m
<b>Distribution</b>	Norway to São Tomé and Príncipe	Mauritania to northern Angola	Gulf of Guinea, from Sierra Leone to Angola	Sierra Leone to northern Angola	Liberia to Nigeria	Currently only known from Angola
<b>Species</b>	<i>M. alleni</i>	<i>M. fasciata</i>	<i>M. guineensis</i>	<i>M. machiei</i>	<i>M. nanseni</i>	<i>M. picta</i>

Korean Archipelago. This paper indicates that as many as six pigmented species are present off western Africa. This highlights the need for more thorough investigations into pigmented species, the diversity of which may be higher than is currently recorded in other regions.

*Magelona cincta*, the pigmented species described off Algoa Bay, South Africa, was not observed in any of the western African samples herein, despite Day (1967) and Intès & Le Loeuff (1977) considering it to occur off Morocco and tropical western Africa. Their assumptions appears to be based on records by Fauvel (1936) off Morocco and that of Kirkegaard (1959) off French Guinea, the Ivory Coast, Nigeria and Angola. However, both records have been subsequently disregarded by Wilson (1958) and Mortimer & Mackie (2009), respectively. The current results concur with the latter authors, suggesting that *M. cincta* does not occur in western African waters. Given the currents within the region (i.e. the Angola–Benguela front between the southward flowing Angola Current and the northward flowing Benguela Current), this is entirely likely. Furthermore, although Day (1967) listed records of *M. cincta* from the Cape, Natal and Mozambique, his drawings show parapodia that do not entirely match the re-descriptions of the species by Wilson (1958) and Mortimer & Mackie (2009). Although his specimens have not been examined, it is likely that there may, in fact, be more than one pigmented magelonid species in southern African waters, from southern Angola to Mozambique.

The observation of *M. fasciata*, with distinct striped pigmentation along the body, and *M. picta* possessing pigmentation on the body and lamellae, highlights the importance in observing pigmentation patterns in live specimens. It has already been noted that pigment bands fade over time (e.g. Mortimer & Mackie, 2009). However, there is no information available at present to detail whether fixation/preservation methods may affect pigmentation fading or retention. Certainly, the stripy pigmentation patterns of *M. fasciata* were more obvious in specimens preserved in 96% ethanol, than formalin fixed.

Little information about the distribution ranges for different magelonid species exists, and those that have been previously documented may need corroboration in light of recent taxonomic work. Previously, *M. papillicornis* was believed to be a widespread species, occurring off North and South America, Africa, Europe, New Zealand and India amongst others (for a full listing, see: Jones, 1977). However, with increased taxonomic work, it is now recognized that this species has a more restricted distribution and specimens erroneously identified as *M. papillicornis* have now been referred to several other species, such as *M. debeerei*, *M. mirabilis* or *M. johnstoni*. Beyond that, the distributions of many magelonid species are

unknown. However, the application of both molecular and morphological work has shown that the European species *M. alleni* extends as far south as the Gulf of Guinea, and at least to Norway at the northern point of its range. At this time, other magelonid species in the MIWA area, such as *M. picta* and *M. nanseni*, appear to have much more restricted distributions. The crossover of African and European species is being further investigated by the current authors and preliminary results of molecular characterization of four European species based on specimens collected from their type localities suggest that several other European magelonid species are present in west African waters.

Several of the pigmented magelonid species treated herein (e.g. *M. alleni* and *M. fasciata*) co-occur at the same localities and have overlapping distributions, something noted recently for *M. alleni* and the morphologically similar *M. equilamellae* (Mortimer *et al.*, 2020). This highlights the importance of the availability of detailed descriptions to enable more precise identifications. Whilst pigmentation patterns may enable some species to be separated easily (as noted above), DNA-barcodes may resolve cases in which morphological identification of fragmented individuals or larvae may be difficult.

Although this survey of magelonid species carrying posterior thoracic pigmentation in West African waters is relatively extensive, at present it provides no information on species from littoral or shallow sublittoral waters within the region. Information about habitat preferences for the new species described herein are likely to increase as records are obtained from further surveys. At present, *M. mackiei* appears to occur more frequently at deeper depths than the other pigmented magelonids in the region. Further work on the remaining magelonid species of the region is in progress.

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#### DATA AVAILABILITY

The specimen data and sequences underlying this article are available in <https://boldsystems.org/>. Individual records can be accessed with process numbers (see Table 3). The complete dataset has access code DS-MAGELONA. Sequences can also be accessed from <https://www.ncbi.nlm.nih.gov/> using accession numbers listed in Table 3.

#### REFERENCES

- Aguirrezabalaga F, Ceberio A, Fiege D. 2001.** *Octomagelona bizkaiensis* (Polychaeta: Magelonidae) a new genus and species from the Capbreton Canyon (Bay of Biscay, north-east Atlantic). *Journal of the Marine Biological Association of the United Kingdom* **81**: 221–224.
- Amoureux L. 1973.** Quelques annélides polychètes de l'Afrique occidentale et équatoriale. *Cahiers O.R.S.T.O.M. Série Océanographique* **11**: 41–65.
- Amoureux L. 1976.** Annélides polychètes récoltés par J. Stirn en 1969, sur les côtes Marocaines du Détroit de Gibraltar. *Cuadernos de Ciencias Biológicas, Universidad de Granada* **5**: 5–33.
- Bayed A, Glémarec M. 1987a.** Apports de la mission Biomar à la connaissance des annélides polychètes des côtes du Maroc. *Bulletin de l'Institut Scientifique, Rabat* **11**: 147–153.
- Bayed A, Glémarec M. 1987b.** La plate-forme continentale atlantique nord-marocaine: bionomie et zoogéographie. *Oceanologica Acta* **10**: 111–121.
- Bolívar GA, Lana PC. 1986.** Magelonidae (Annelida: Polychaeta) do litoral sudeste do Brasil. *Neritica* **1**: 131–147.
- Boykin LM, Armstrong KF, Kubatko L, De Barro P. 2012.** Species delimitation and global biosecurity. *Evolutionary Bioinformatics* **8**: 1–37.
- Brown SDJ, Collins RA, Boyer S, Lefort M-C, Malumbres-Olarte J, Vink CJ, Cruickshank RH. 2012.** Spider: an R package for the analysis of species identity and evolution, with particular reference to DNA barcoding. *Molecular Ecology Resources* **12**: 562–565.
- Capa M, Parapar J, Hutchings P, Mortimer K. 2019.** 4. Palaeoannelida. In: Purschke G, Böttgeman M, Westheide W, eds. *Annelida: Vol. 1: Annelida basal groups and Pleistoannelida, Sedentaria I*. Berlin, Boston: De Gruyter, 91–132. <https://doi.org/10.1515/9783110291582-004>.
- Carr CM, Hardy SM, Brown TM, Macdonald TA, Hebert PDN. 2011.** A tri-oceanic perspective: DNA barcoding reveals geographic structure and cryptic diversity in Canadian polychaetes. *PLoS One* **6**: e22232. <https://doi.org/10.1371/journal.pone.0022232>
- Carrington B. 1865.** On the chaetopod annelides of the Southport sands. *Proceedings of the Literary and Philosophical Society of Manchester* **4**: 176–188.
- Clarke RB, Milne A. 1955.** The sublittoral fauna of two sandy bays on the Isle of Cumbrae, Firth of Clyde. *Journal of the Marine Biological Association of the United Kingdom* **34**: 161–180.
- Clarke DT, Paterson GLJ, Florence WK, Gibbons MJ. 2010.** A new species of *Magelona* (Polychaeta: Magelonidae) from southern Namibia. *African Natural History* **6**: 77–82.
- Cunningham JT, Ramage GA. 1888.** The Polychaeta Sedentaria of the Firth of Forth. *Transactions of the Royal Society of Edinburgh* **33**: 635–684.
- Day JH. 1955.** The Polychaeta of South Africa. Part 3. Sedentary species from Cape shores and estuaries. *Journal of the Linnean Society of London, Zoology* **42**: 407–452.
- Day JH. 1961.** The polychaete fauna of South Africa, Part 6. Sedentary species dredged off Cape coasts with a few new records from the shore. *Journal of the Linnean Society of London, Zoology* **44**: 463–560.
- Day JH. 1967.** *A monograph on the Polychaeta of Southern Africa, part 2. Sedentaria*. London: Trustees of the British Museum (Natural History), 656.
- Ehlers E. 1908.** Die bodensässigen Anneliden aus dem Sammlungen der deutschen Tiefsee-Expedition. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer 'Valdivia' 1898–1899* **16**: 1–167.
- Eliason A. 1962.** Undersökningar över Öresund. XXXXI. Weitere Untersuchungen über die Polychaetenfauna des Öresunds. *Acta Universitatis Lundensis, Avd. 2* **58**: 1–98.
- Fauvel P. 1936.** Contribution à la faune des annélides Polychètes du Maroc. *Mémoires de la Société des Sciences Naturelles du Maroc* **43**: 1–143.
- Fiege D, Licher F, Mackie ASY. 2000.** A partial review of the European Magelonidae (Annelida: Polychaeta): *Magelona mirabilis* redefined and *M. johnstoni* distinguished. *Journal of the Marine Biological Association of the United Kingdom* **80**: 215–234.
- Ford E. 1923.** Animal communities of the level sea-bottom in the waters adjacent to Plymouth. *Journal of the Marine Biological Association of the United Kingdom* **13**: 164–224.
- Fujisawa T, Barraclough TG. 2013.** Delimiting species using single-locus data and the Generalized Mixed Yule Coalescent approach: a revised method and evaluation on simulated data sets. *Systematic Biology* **62**: 707–724. <https://doi.org/10.1093/sysbio/syt033>

- Gil M, Ramil F. 2021.** Plumularioidea (Cnidaria, Hydrozoa) from the Guinea Current Large Marine Ecosystem (GCLME). *Marine Biology Research* **17**: 172–184. <https://doi.org/10.1080/017451000.2021.1913187>
- Glémarec M. 1967.** Les Magelonidae des côtes de Bretagne. Description de *Magelona wilsoni* n. sp. *Vie et Milieu* **17**: 1077–1085 [dated 1966, published April 1967].
- Gouy M, Guindon S, Gascuel O. 2010.** SeaView v.4: a multiplatform graphical user interface for sequence alignment and phylogenetic tree building. *Molecular Biology and Evolution* **27**: 221–224.
- Guindon S, Dufayard JF, Lefort V, Anisimova M, Hordijk W, Gascuel O. 2010.** New algorithms and methods to estimate maximum-likelihood phylogenies: assessing the performance of PhyML 3.0. *Systematic Biology* **59**: 307–321.
- Harmelin JG. 1964.** Étude de l'endofaune des 'mattes' d'herbiers de *Posidonia oceanica* Delile. *Recueil des Travaux de la Station Marine d'Endoume* **35**: 43–105.
- Hartman O. 1965.** Deep-water benthic polychaetous annelids off New England to Bermuda and other North Atlantic areas. *Occasional Papers of the Allan Hancock Foundation* **28**: 1–384.
- Hartman O. 1971.** Abyssal polychaetous annelids from the Mozambique Basin off southeast Africa, with a compendium of abyssal polychaetous annelids from world-wide areas. *Journal of the Fisheries Research Board of Canada* **28**: 1407–1428.
- Hernández-Alcántara P, Solís-Weiss V. 2000.** Magelonidae from the Mexican Pacific and northern Gulf of Mexico, with the description of a new genus (*Meridithia*) and four new species. In: Reish DJ, Lana P, eds. Proceedings of the 6th International Polychaete Conference, Curitiba, Brazil, 1998. *Bulletin of Marine Science* **67**: 625–644.
- Intès A, Le Loeuff P. 1977.** Les annélides polychètes de Côte d'Ivoire. II. – Polychètes sédentaires – Compte rendu systématique. *Cahiers O.R.S.T.O.M. Série Océanographie* **15**: 215–249.
- Johnston G. 1865.** *A catalogue of the British non-parasitical worms in the collection of the British Museum*. London: Trustees of the British Museum.
- Jones ML. 1963.** Four new species of *Magelona* (Annelida, Polychaeta) and a redescription of *Magelona longicornis* Johnson. *American Museum Novitates* **2164**: 1–31.
- Jones ML. 1971.** *Magelona berkeleyi* n. sp. from Puget Sound (Annelida: Polychaeta) with a further redescription of *Magelona longicornis* Johnson and a consideration of recently described species of *Magelona*. *Journal of the Fisheries Research Board of Canada* **28**: 1445–1454.
- Jones ML. 1977.** A redescription of *Magelona papillicornis* F. Müller. In: Reish DJ, Fauchald K, eds. *Essays on polychaetous annelids in memory of Dr Olga Hartman*. Los Angeles: Allan Hancock Foundation, University of Southern California, 247–266.
- Jones ML. 1978.** Three new species of *Magelona* (Annelida, Polychaeta) and a redescription of *Magelona pitelkai* Hartman. *Proceedings of the Biological Society of Washington* **91**: 336–363.
- Kearse M, Moir R, Wilson A, Stones-Havas S, Cheung M, Sturrock S, Buxton S, Cooper A, Markowitz S, Duran C, Thierer T, Ashton B, Mentjies P, Drummond A. 2012.** Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics* **28**: 1647–1649.
- Kirkegaard JB. 1959.** The Polychaeta of West Africa part I. Sedentary species. *Atlantide Report* **5**: 7–117.
- Kirkegaard JB. 1996.** Bathyal and abyssal polychaetes (sedentary species I). *Galathea Report* **17**: 57–77.
- Kumar S, Stecher G, Tamura K. 2016.** MEGA7: molecular evolutionary genetics analysis v.7.0 for bigger datasets. *Molecular Biology and Evolution* **33**: 1870–4.
- Mackie ASY, Gobin J. 1993.** A review of the genus *Johnstonia* Quatrefages, 1866 (Polychaeta, Maldanidae), with a description of a new species from Trinidad, West Indies. *Zoological Scripta* **22**: 229–241.
- Mackie ASY, Oliver PG, Rees EIS. 1995.** Benthic biodiversity in the southern Irish Sea. Studies in marine biodiversity and systematics from the National Museum of Wales. *BIOMÔR Reports* **1**: 1–263.
- Mackie ASY, James JWC, Rees EIS, Darbyshire T, Philpott SL, Mortimer K, Jenkins GO, Morando A. 2006.** The Outer Bristol Channel Marine Habitat Study. Studies in marine biodiversity and systematics from the National Museum of Wales. *BIOMÔR Reports* **4**: 1–249 and A1–A227, + DVD-ROM (2007).
- Malaquias MAE, Ohnheiser LT, Oskars TR, Willassen E. 2016.** Diversity and systematics of philinid snails (Gastropoda: Cephalaspidea) in West Africa with remarks on the biogeography of the region. *Zoological Journal of the Linnean Society* **180**: 1–35.
- Mare MF. 1942.** A study of a marine benthic community with special reference to micro-organisms. *Journal of the Marine Biological Association of the United Kingdom* **25**: 517–554.
- Masters BC, Fan V, Ross HA. 2011.** Species delimitation – a Geneious plugin for the exploration of species boundaries. *Molecular Ecology Resources* **11**: 154–157.
- Meibner K, Darr A. 2009.** Distribution of *Magelona* species (Polychaeta: Magelonidae) in the German Bight (North Sea): a modelling approach. *Zoosymposia* **2**: 567–586.
- Mills K, Mortimer K. 2018.** Redescription of *Magelona minuta* Eliason, 1962 (Annelida), with discussions on the validity of *Magelona filiiformis minuta*. *Zootaxa* **4527**: 541–559. <https://doi.org/10.11646/zootaxa.4527.4.5>
- Mills K, Mortimer K. 2019.** Observations on the tubicolous annelid *Magelona allenii* (Magelonidae), with discussions on the relationship between morphology and behaviour of European magelonids. *Journal of the Marine Biological Association of the United Kingdom* **99**: 715–727. <https://doi.org/10.1017/S0025315418000784>.
- Monro CCA. 1933.** The Polychaeta Sedentaria collected by Dr. C. Crossland at Colón, in the Panama region, and the Galapagos Islands during the expedition of the S.Y. 'St. George'. *Proceedings of the Zoological Society of London* **1933**: 1039–1092.
- Moore JP. 1907.** Descriptions of new species of spioniform annelids. *Proceedings of the Academy of Natural Sciences of Philadelphia* **59**: 195–207.
- Mortimer K, Mackie ASY. 2003.** The Magelonidae (Annelida: Polychaeta) from the Seychelles, with the description of three new species. In: Sigvaldadóttir E, Mackie ASY, Helgason GV, Reish DJ,

- Svavarsson J, Steingrímsson SA, Gudmundsson G, eds. Advances in polychaete research. *Hydrobiologia* **496**: 163–173.
- Mortimer K, Mackie ASY. 2006.** The Magelonidae (Annelida: Polychaeta) from the Seychelles. 2. Description of four additional species, three new to science. In: Sardá R, San Martín G, López E, Martín D, George D, eds. Scientific advances in polychaete research. *Scientia Marina* **70**: 125–137.
- Mortimer K, Mackie ASY. 2009.** Magelonidae (Polychaeta) from Hong Kong, China; with discussions on related species and redescription of three species. In: Maciolek NJ, Blake JA, eds. *Proceedings of the Ninth International Polychaete Conference. Zoosymposia* **2**: 179–199.
- Mortimer K, Mackie ASY. 2014.** Morphology, feeding and behaviour of British *Magelona* (Annelida: Magelonidae), with discussions on the form and function of abdominal lateral pouches. *Memoirs of Museum Victoria* **71**: 177–201.
- Mortimer K, Cassà S, Martin D, Gil J. 2012.** New records and new species of Magelonidae (Polychaeta) from the Arabian Peninsula, with a re-description of *Magelona pacifica* and a discussion on the magelonid buccal region. *Zootaxa* **3331**: 1–43.
- Mortimer K, Mills K, Mackie ASYM. 2018.** New insights into the lives of British shovelhead worms (Annelida: Magelonidae). *Bulletin of the Porcupine Marine Natural History Society* **10**: 30–34.
- Mortimer K, Mills K, Jordana E, Pinedo S, Gil J. 2020.** A further review of European Magelonidae (Annelida), including redescription of *Magelona equilamellae* and *Magelona filiformis*. *Zootaxa* **4767**: 89–114. <https://doi.org/10.11646/zootaxa.4767.1.4>.
- Müller F. 1858.** Einiges über die Anneliden fauna der Insel Santa Catharina an der brasilianischen Küste. *Archiv für Naturgeschichte* **24**: 211–220.
- Okuda S. 1937.** Spioniform polychaetes from Japan. *Journal of the Faculty of Science, Hokkaido University, Series 6, Zoology* **5**: 217–254.
- Palumbi SR, Martin A, Romano S, McMillan WO, Stice L, Grabowski G. 1991.** *The simple fool's guide to PCR*. Honolulu: University of Hawaii at Manoa, Department of Zoology.
- Passamaneck YJ, Schander C, Halanych KM. 2004.** Investigation of molluscan phylogeny using large-subunit and small-subunit nuclear rRNA sequences. *Molecular Phylogenetics and Evolution* **32**: 25–38.
- Puillandre N, Lambert A, Brouillet S, Achaz G. 2012.** ABGD, automatic barcode gap discovery for primary species delimitation. *Molecular Ecology* **21**: 1864–1877.
- Rambaut A. 2006–16.** *FigTree. Tree figure drawing tool*. Software available at <http://tree.bio.ed.ac.uk/software/figtree/> (date last accessed 12 January 2021).
- Rambaut A, Drummond AJ, Xie D, Baele G, Suchard MA. 2018.** Posterior summarization in Bayesian phylogenetics using Tracer 1.7. *Systematic Biology* **67**: 901.
- Ratnasingham S, Hebert PDN. 2013.** A DNA-based registry for all animal species: the barcode index number (BIN) system. *PLoS One* **8**: e66213.
- Robinson KA, Darbyshire T, Van Landegham K, Lindenbaum C, McBreen F, Creaven S, Ramsay K, Mackie ASY, Michell NC, Wheeler A, Wilson JG, O'Berin F. 2009.** Habitat mapping for conservation and management of the southern Irish Sea (HABMAP). I: Seabed surveys. Studies in marine biodiversity and systematics from the National Museum of Wales. *BIOMÓR Reports* **5**: 1–234.
- Rodrigo AG, Bertels F, Heled J, Noder R, Shearman H, Tsai P. 2008.** The perils of plenty: what are we going to do with all these genes? *Philosophical Transactions of the Royal Society London Series B, Biological Sciences* **363**: 3893–3902.
- Ronquist F, Teslenko M, Van der Mark P, Ayres DL, Darling A, Höhna S, Larget B, Liu L, Suchard MA, Huelsenbeck JP. 2012.** MrBayes 3.2: efficient Bayesian phylogenetic inference and model choice across a large model space. *Systematic Biology* **61**: 539–42.
- Rosenberg NA. 2007.** Statistical tests for taxonomic distinctiveness from observations of monophyly. *Evolution* **61**: 317–323.
- Ross HA, Murugan S, Li WLS. 2008.** Testing the reliability of genetic methods of species identification via simulation. *Systematic Biology* **57**: 216–230.
- Rouse GW. 2001.** *Magelona* Müller, 1858. In: Rouse GW, Pleijel F. *Polychaetes*. Oxford: Oxford University Press, 261–263.
- Rullier F. 1965.** Contribution à la faune des annélides polychètes du Dahomey et du Togo. *Cahiers O.R.S.T.O.M. Série Océanographie* **3**: 5–66.
- Shakouri A, Mortimer K, Dehani E. 2017.** A new species and new records of *Magelona* (Annelida: Magelonidae) from Chabahar Bay, Gulf of Oman, south-eastern Iran. *Journal of the Marine Biological Association of the United Kingdom* **97**: 1537–1552.
- Struck TH, Purschke G, Halanych KM. 2006.** Phylogeny of Eunicida (Annelida) and exploring data congruence using a partition addition bootstrap alteration (PABA) approach. *Systematic Biology* **55**: 1–20.
- Wesenberg-Lund E. 1949.** Polychaetes of the Iranian Gulf. *Danish Scientific Investigations in Iran* **4**: 247–400.
- Wilson DP. 1958.** The polychaete *Magelona alleni* n. sp. and a re-assessment of *Magelona cincta* Ehlers. *Journal of the Marine Biological Association of the United Kingdom* **37**: 617–626.
- Wilson DP. 1959.** The polychaete *Magelona filiformis* sp. nov. and notes on other species of *Magelona*. *Journal of the Marine Biological Association of the United Kingdom* **38**: 547–556.
- Zhang J, Kapli P, Pavlidis P, Stamatakis A. 2013.** A general species delimitation method with applications to phylogenetic placements. *Bioinformatics* **29**: 2869–2876.

## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site.

**Figure S1.** Maximum likelihood gene tree computed from COI sequences using the GTR+G model. See Material and Methods for details.