



Deep sea benthic octopuses from Mauritanian waters: bring to light the *Muusoctopus* and *Bathypolypus* species.

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INTRODUCTION

Mauritanian Octopoda community probably represents the less known cephalopod group in the area. Shallow-water species are better-known than deep-water species. Of these, the shallow-water coastal benthic *Octopus vulgaris* is the most widely found and studied octopod species in the area. Other species, such as *Pteroctopus tetracirrhus*, are abundant in platform and continental slope waters. However, other incirrate octopods are poorly known. The deep-water octopods species, such as those of the genus *Muusoctopus* and *Bathypolypus*, seems to be an important component of deep-benthic fauna. However, little or no previous information exists on these species in the area. This work shows the results obtained in the study of deep sea benthic octopods collected in four multidisciplinary Spanish-Mauritanian surveys.

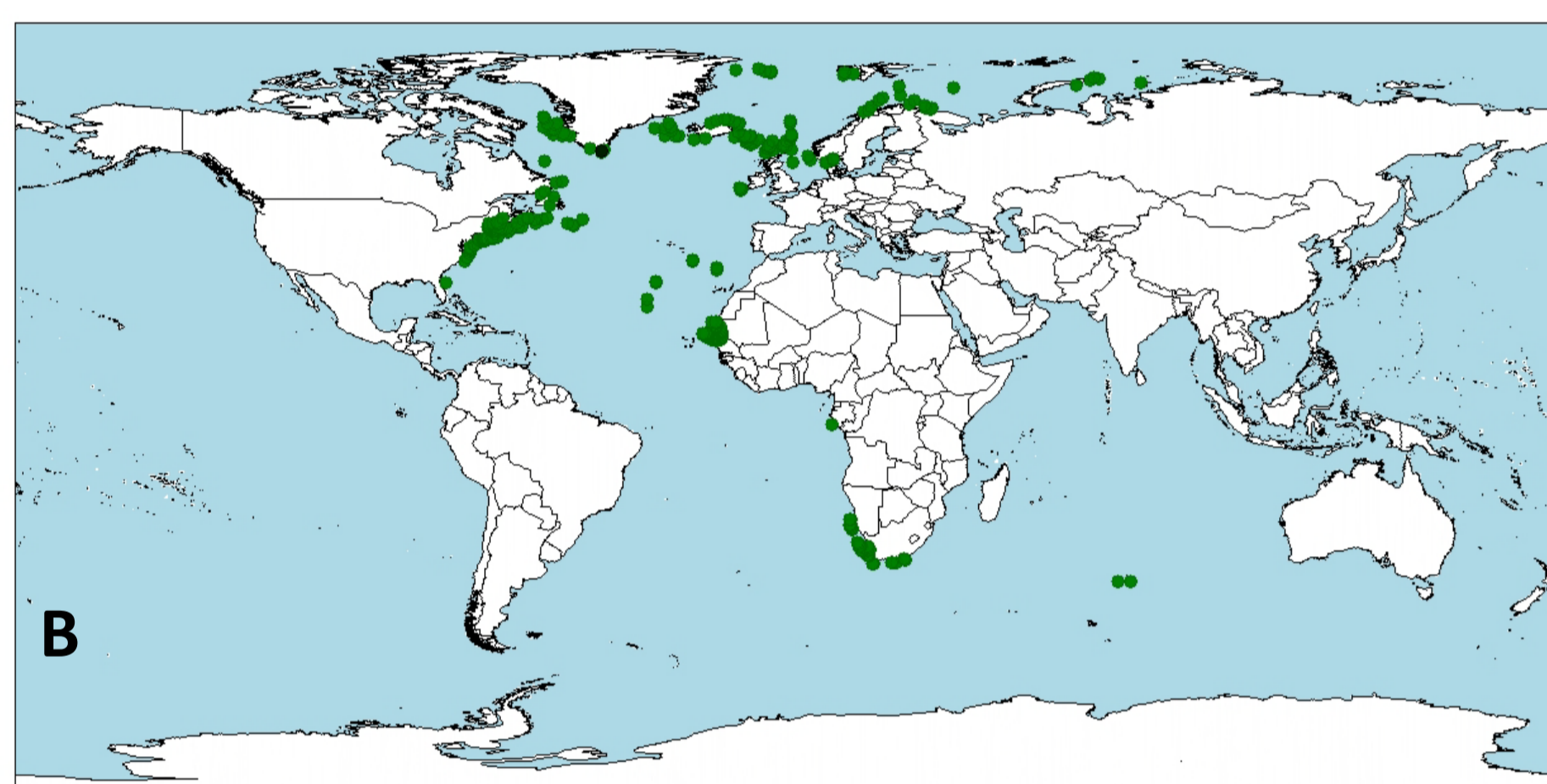
RESULTS AND DISCUSSION

Octopods community is composed by several poorly known species (Table 1). Deep-sea benthic species as *Amplioctopus burryi*, *Pteroctopus tetracirrhus*, *Scaergus unircirrhus*, *Bathypolypus ergasticus* and *B. sponsalis* have been previously cited in these waters. Six new benthic incirrate octopod species were identified for the first time in Mauritanian waters: *Muusoctopus fuscus*, *M. januarii*, *B. arcticus*, *B. biardii*, *B. valdiviae* and *Graneledone verrucosa*.

Bathypolypus species (Fig. 1A) are small to moderate-sized specimens. They are characterized to have a mantle muscular, rounded ovoid and arms 1.5 to 5 times mantle length with two sucker's rows. No enlarged suckers present and third right arm hectocotylized in males. Webs moderate to deep (20-40% of longest arm). Ink sac and anal flaps are absent. Colour patterns in fresh specimens are violet to purple with false eye-spots (ocelli) absent. Skin typically sculptured with large distinct warts and with a single large papilla over each eye. No skin ridge around lateral margin of mantle. *Bathypolypus* species are mainly present in Atlantic Ocean, although the genus has been cited in Pacific and Indian oceans (Fig. 1B). These species seem to be a cold water benthic group associated mainly to deep-water continental slopes.



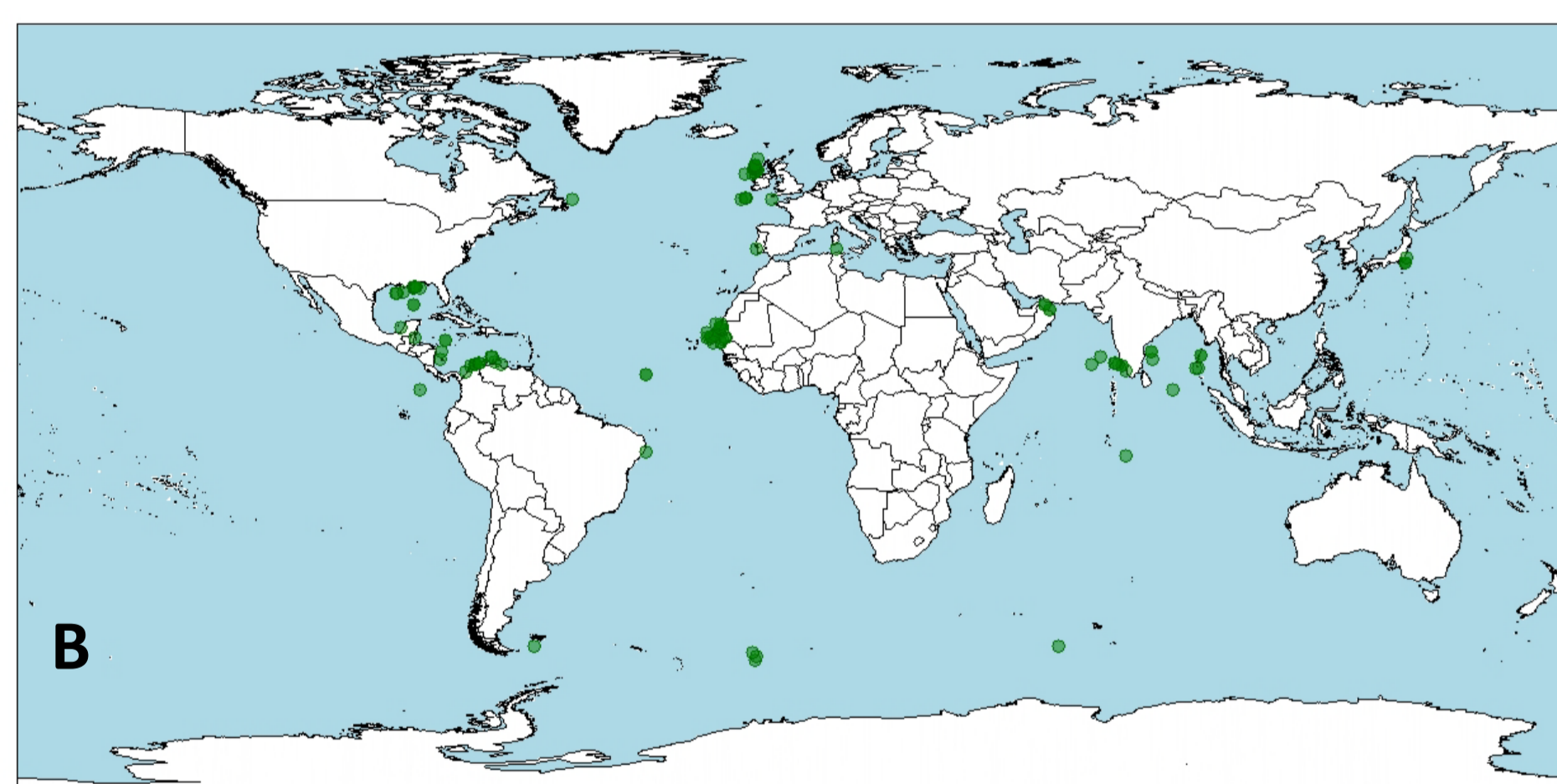
Figure 1. Specimen of *Bathypolypus biardii* (A) and geographic distribution of the genus (B).



Muusoctopus species (Fig. 2A) are small to moderate-sized specimens. They are characterized to have a mantle globose to ovoid, with head broad and eyes relatively large. Arms slender and cylindrical, 3 to 4 times mantle length, with two sucker's rows. No enlarged suckers present and third right arm hectocotylized in males. Web of moderate, subequal depth, slightly shallower between arms 3 and 4. Ink sac and anal flaps are present or absent. Skin without well defined patch and groove system and no papilla present on each eye. *Muusoctopus* species are present in Atlantic, Pacific and Indian oceans (Fig. 2B) associated to continental platform and slope, but more frequently in deep water bottoms.



Figure 2. Specimen of *Muusoctopus januarii* (A) and geographic distribution of the genus (B).



These new records of octopods in Mauritanian waters increase the list of deep benthic cephalopods in the area. These species seem to be a common element of benthic octopod fauna on the Mauritanian continental slope. It is possible that several of these species have already been caught in the region but may have been identified as *Benthooctopus* specimens. This is due to the profound confusion among *Bathypolypus*, *Benthooctopus* and *Muusoctopus* octopods that produce misidentifications and confusion between specimens belonging to these genera. In fact, the genus *Muusoctopus* was created recently for several species previously included in the poorly known *Benthooctopus* genus. Mauritanian records constitute the first report of *Muusoctopus fuscus* in Atlantic waters and the second worldwide for this species. *Muusoctopus januarii* is mainly distributed in the Western Atlantic, but with only one record for the African coast. Both *Muusoctopus* species seem to be a common element of benthic octopod fauna on the Mauritanian continental slope.

Bathypolypus ergasticus had been previously recorded in the area. *Bathypolypus biardii* is a North Atlantic species, with its southern limit in the Iberian Peninsula, whereas *B. arcticus* extends from the Eastern Atlantic to northern Great Britain and in the Western Atlantic to Florida's deep waters. Their presence in Mauritania could be related to the cold deep-water flowing from the north using Atlantic seamounts as intermediate steps between both oceanic sides. *Bathypolypus valdiviae* is the only known species of this genus in the southern hemisphere. The species expands its distribution from Agulhas Bank off the South African coast in the south to Mauritania in the north.

ACKNOWLEDGEMENTS

To Consellería de Educación e Ordenación Universitaria Xunta de Galicia (Galician Regional Government), cofunding from the European Regional Development Fund (ERDF). This work has been partially funded by the MAVA Foundation pour la Nature (MAVA contract 12/87 AO C4/2012). It was undertaken within the framework of the ECOAFRIK project.

MATERIAL AND METHODS

A total of four multidisciplinary Spanish-Mauritanian surveys (*Maurit*) carried out on Mauritanian continental shelf and slope during November- December of 2007-2010. Benthic octopods were collected using a bottom commercial trawl. Cephalopods were separated and preliminary identified onboard. Representative cephalopods subsample were fixed and preserved in 4% formaldehyde for further identification using taxonomic keys and specific literature. Species final identification was made in the University of Vigo laboratory. *Muusoctopus* and *Bathypolypus* genera geographical and Bathymetric distributions were analyzed. ModestR program was used to represent their geographical distribution patterns.

Table 1. Octopods found in Mauritanian waters with data about their habitat and bathymetry. Abisal (A), Benthic (Be), Pelagic (P), Epipelagic (E), Mesopelagic (M), Bathypelagic (Ba).

Species	Habitat	Deep range (m)
ORDER OCTOPODA Leach, 1818		
SUBORDER CIRRATA Grime, 1916		
Family CIRROTEUTHIDAE Keferstein, 1866		
<i>Cirrothauma magna</i> Hoyle, 1885	P(Ba)-A	1300-3359
<i>Cirrothauma murrayi</i> Chun, 1911	P(Ba)-A	2400-4850
Family OPISTHOTEUTHIDAE Verrill, 1896		
<i>Opisthoteuthis agassizii</i> Verrill, 1883	P(M-Ba)	227-2000
<i>Opisthoteuthis calypso</i> Villanueva, Collins, Sánchez and Voss, 2002	P(M-Ba)	365-2208
<i>Opisthoteuthis grimaldii</i> (Loubin, 1903)	P(Ba)	1135-2287
<i>Opisthoteuthis massyae</i> (Grimpe, 1920)	P(Ba)	1226-1450
Family GRIMPOTEUTHIDAE O'Shea, 1999		
<i>Grimpoteuthis megaptera</i> (Verrill, 1885)	A	4592
<i>Grimpoteuthis wuelkeri</i> (Grimpe, 1920)	P(Ba)	1550-2056
SUBORDER INCIRRATA Grime, 1916		
Family ALLOPOSIDAE Verrill, 1881a		
<i>Haliphron atlanticus</i> Steenstrup, 1861	P-A	0-6787
Family ARGONAUTIDAE Tryon, 1879		
<i>Argonauta argo</i> Linnaeus, 1758	P(E-M)	0-300
<i>Argonauta hians</i> Lightfoot, 1786	P(E-M)	0-300
Family TREMOCTOPODIDAE Tryon, 1879		
<i>Tremoctopus gelatus</i> Thomas, 1977	P(E-M)	0-250
<i>Tremoctopus violaceus</i> Delle Chiaie, 1830	P(E-M)	0-250
Family AMPHITRETIDAE HOYLE, 1886		
<i>Amphitretus pelagicus thielei</i> Robson, 1930	P(E-M)	100-2000
Family OCTOPODIDAE Orbigny, 1840		
Subfamily OCTOPODINAE Grime, 1921		
<i>Amphioctopus burryi</i> Voss, 1950	Be	200-400
<i>Callistoctopus macropus</i> (Risso, 1826)	Be	0-200
<i>Macrotritopus defilippi</i> (Verany, 1851)	Be	0-200
<i>Octopus vulgaris</i> Cuvier, 1797	Be	0-250
<i>Pteroctopus tetracirrhus</i> (Delle Chiaie, 1830)	Be	25-720
<i>Scaergus unircirrhus</i> (Delle Chiaie, 1830)	Be	50-500
Subfamily ELEDONINAE Grime, 1921		
<i>Eledone caparti</i> Adam, 1950	Be	64-150
Subfamily BATHYPOLYPODINAE Robson, 1928		
<i>Bathypolypus arcticus</i> (Prosch, 1849)	Be	37-1210
<i>Bathypolypus biardii</i> (Verrill, 1873)	Be	20-1545
<i>Bathypolypus ergasticus</i> (Fischer & Fischer, 1892)	Be	450-1400
<i>Bathypolypus sponsalis</i> (Fischer & Fischer, 1892)	Be	930-1250
<i>Bathypolypus valdiviae</i> (Thiele, in Chun, 1915)	Be	200-1000
Subfamily GRANELEDONINAE Voss, 1988		
<i>Graneledone verrucosa</i> (Verrill, 1881)	Be	850-2300
Familia Enteroctopodidae Strugnell et al., 2014		
<i>Muusoctopus fuscus</i> (Taki, 1964)	Be	600-1000
<i>Muusoctopus januarii</i> (Hoyle, 1885)	Be	350-750
Family OCYTHOIDAE Gray, 1849		
<i>Ocythoe tuberculata</i> Rafinesque, 1814	P(E)	0-200
Family BOLITAENINAE Chun, 1911		
<i>Bolitaena pygmaea</i> (Verrill, 1884)	P	100-1400
<i>Japetella diaphana</i> Hoyle, 1885	P(M)	200-1000
Family VITRELEDONELLIDAE Robson, 1932		
<i>Vitreledonella richardi</i> Joubin, 1918	P(E-M)	0-1000

