Cunha MR, Matos FL, Génio L, Hilário A, Moura CJ, Ravara A, Rodrigues CF (2013) Are organic falls bridging reduced environments in the deep sea? – Results from colonization experiments in the Gulf of Cadiz. PLoS ONE 8(10): e76688. doi:10.1371/journal.pone.0076688

Supporting Information

Text S1. Environmental and biological characterization of the three study sites.

Figure S1. Location of the three study sites (Mercator, Meknès and Darwin mud volcanoes) in the Gulf of Cádiz. Black dots show the position of other mud volcanoes in the region.

Table S1. List of the taxa identified from the colonization experiments (CHEMECOLI) deployed in the Gulf of Cádiz. Classification according to the World Register of Marine Species (www.marinespecies.org accessed May 2013). The taxa in blue were found only in the external parts of the CHEMECOLI. The occurrence of new records (in bold) and background fauna in the substrata enclosed by the 2mm mesh net is shown for each sub-region (El Arraiche, Carbonate Province) and substrate type (wood, alfalfa, carbonate). Each taxon was assigned to one of 20 different trophic groups.

Table S2. Breakdown of percentual contributions from SIMPER analysis for comparisons between mud volcanoes: Mercator (Mer); Meknès (Mek) and Darwin (Dar). The taxa listed contribute at least 1.5%. Numbers in bold mark the six dominant species at each site.

Table S3. Breakdown of percentual contributions from SIMPER analysis for comparisons between substrate types: wood (W), alfalfa (A) and carbonate (C). The taxa listed contribute at least 1.5%. Numbers in bold mark the six dominant species in each substrate type.
Supporting Information

Text S1. Environmental and biological characterization of the three study sites

Mercator MV. The shallowest study site, Mercator (350 m), is located at the El Arraiche field on the upper slope of the Moroccan margin [1] where the proximity to the euphotic zone and to the African coast adds to the great productivity observed in the area. Colonisation experiments were deployed in the crater at the top of Mercator where the seafloor shows patches of disturbed sediments from which gas venting is occasionally observed [2]. The sediment consists of brown pelagic silty clay covering grey matrix-supported breccia with clasts of different lithology and size with disseminated sulphides (pyrite-marcasite) and filled fractures. The sulphides form frambooidal aggregates, generally less than 2mm and several carbonated cemented clasts within clayey matrix. Mercator MV is an example of gas production by admixture of thermogenic sources from different depths and influence of evaporite deposits. Nuzzo et al. [3] the porewater is extremely enriched in chloride (Cl$^-$ reaching up to 5.3 M thus, exceeding normal seawater values by a factor of 9) and SO$_4$$^2-$ consistent with the dissolution of minerals (e.g. halite and gypsum), additionally, the fluids are highly enriched in Li and B indicating a deep fluid source from mineral dewatering reactions at elevated temperatures [4]; radiogenic $^{87}\text{Sr}/^{86}\text{Sr}$ ratios are consistent with a terrigenous/continental deep source of the fluids [5], and the carbon isotopic signature of methane ($\delta^{13}\text{C}: -33.8$ to $-38.8\%$) indicates high thermal maturity [3,6,7]. The upward fluid flow rates were estimated as ~6 cm/a at the top of the MV, gradually decreasing to 0.3 cm/a towards the rim [4].

The megafauna at Mercator mud volcano is sparse, with some fish (*Helicolenus* sp.), crinoids and cidarid echinoids associated mainly to the boulders in the crater and the sea-pen *Pennatula aculeata* anchored in the sediments at the rim. Solitary corals (*Caryophyllia* sp.) accompanied by Cidaridae echinoids and Onuphidae polychaetes (*Hyalinoecia tubicola*) are the most conspicuous organisms seen during video surveys of the crater. Over 300 macrofaunal species are known to occur in Mercator MV [8, MR Cunha unpublished data]. The chemosymbiotic fauna recorded in this mud volcano includes the bivalves *Solemya elarraichensis*, *Lucinoma asapheus*, *Axinulus*...
croulinensis (mixotrophic species); Thyasira granulosa (mixotrophic species) and five Frenulata species, Polybrachia sp.1, Siboglinum Ib, Siboglinum Ic, Siboglinum Id, and Siboglinum sp.1 [9].

**Meknès MV.** In the Moroccan margin the extensive authigenic Carbonate Province at intermediate depths (700-1200m) is accompanied by the frequent occurrence of mounds, thickets and debris of mostly dead cold-water scleractinean corals. Meknès MV is the southernmost mud volcano in this region rising isolated among an extensive field of small coral mounds at ca. 700m depth. The porewater is characterized by a moderate depletion of Cl$^-$ [5,7]. The carbon isotopic signature of methane is more depleted ($\delta^{13}C$: -48.9 to -52.8‰) than in Mercator MV suggesting lower thermal maturity [3].

Colonisation experiments were deployed at the crater which is formed by stiff, sometimes heavily disturbed, greenish grey mud breccia with scattered clasts of different lithology and size (2mm -5 cm in diameter) and a striking large number of empty shells of the gastropod Neptunea contraria. The surveys over Meknès showed coral rubble and small coral thickets colonised by sponges and octocorals at the lower flanks of the mud volcano contrasting with the almost bare mud breccia of the crater inhabited only by N. contraria, Paromola cuvieri and Helicolenus sp. Except for a few individuals of these three species, living megafauna is rarely sighted in the crater. Over 175 macrofaunal species are known to occur in Meknès MV [8, M.R. Cunha unpublished data]. The chemosymbiotic fauna recorded in this mud volcano includes the bivalve Solemya elarraichensis and two Frenulata species Siboglinum If and Siboglinum sp.2 [9].

**Darwin MV.** The carbonate province also includes the Darwin mud volcano (ca. 1100m). Darwin MV differs from the other mud volcanoes in this area because its crater is completely covered by large carbonate slabs and crusts; the fissures among slabs and depressions with scattered crust are filled with abundant shell ash and occasionally small clumps of living “Bathymodiolus” mauritanicus. Paromola cuvieri, soft corals and other epifauna were occasionally sighted on the surface of rocks and sediment. Over 100 macrofaunal species are known to occur in Darwin MV (MR. Cunha unpublished data) where the gastropod fauna is particularly diverse [10]. The chemosymbiotic fauna recorded in this mud volcano includes the bivalves Isorropodon megadesmus, Solemya
elarraichensis and “Bathymodiolus”mauritanicus, and two Frenulata species, *Siboglinum* Ia and *Siboglinum* Ie [9].

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| Major taxa | Family | Species name/code | Habit | Mode | Food type | TG | EA | CP |
|------------|--------|-------------------|-------|------|-----------|----|-----|-----|
| PORIFERA   | Unassigned | Porifera unassigned | Ep/S/R | Om/Su | pom | 16 | - | - | - | - | U |
| CNIDARIA   | Hydrozoa | Hydrozoa unassigned | Ep/S/A | Ca/Su | zoo | 5 | U | U | - | - | U |
|            | Anthoathecata | Tubiclavoididae | Tubiclavoides striatum | Ep/S/A | Ca/Su | zoo | 5 | - | - | - | - |
|            | Eudendriidae | Eudendrium sp. | Ep/S/A | Ca/Su | zoo | 5 | - | - | - | - | L |
|            | Leptothecale | Clyta linearis | Ep/S/A | Ca/Su | zoo | 5 | R | R | - | - | R |
|            | Campanulariae | Campanulinidae | Campanulinidae unassigned | Ep/S/A | Ca/Su | zoo | 5 | - | - | U | - |
|            |            | Campanulina panicula | G.O. Sars, 1874 | Ep/S/A | Ca/Su | zoo | 5 | - | L | - | - |
|            | Haleciidae | Halcium cf. tenellum | Hincks, 1861 | Ep/S/A | Ca/Su | zoo | 5 | R | - | - | - |
|            | Lafoeidae | Cryptolaria pectinata | (Allman, 1888) | Ep/S/A | Ca/Su | zoo | 5 | - | R | - | - |
|            |            | Filellum serratum | Clarke, 1879 | Ep/S/A | Ca/Su | zoo | 5 | L | L | - | - |
|            | Tiarannidae | Modeeria rotunda | (Quoy & Gaimard, 1827) | Ep/S/A | Ca/Su | zoo | 5 | - | - | - | - |
| Scyphozoa  | Actiniaria | Actiniaria unassigned | Ep/S/A | Ca/Su | zoo | 5 | - | - | U | - | - |
| NEMERTEA   | Coronata | Nausithoidae | Nausithoe sp. | Ep/S/A | U | - | - |
| SIPUNCULA  | Unassigned | Nemertea unassigned | Ss/M/F | Ca/Pr | mac | 6 | U | - | - | - |
|            | Unassigned | Sipuncula unassigned | Str/D/F | Om/Dt | pom;mic;mac | 12 | U | - | U | - | U |
| ANNELIDA | Oligochaeta | Unassigned | Oligochaeta unassigned | Ss/M/F | Om/Dt | pom;mic | 1 |
|---|---|---|---|---|---|---|---|
| Polychaeta | Incerate sedis | Protodrilidae | Protodrilus sp. | Sr/M/F | Mc/Gr | mic | 11 |
| | | | Linoperus cf. hemuli (Fauchald, 1972) | Ss/M/F | Ca/Pr | mac | 6 |
| | | | Pareyrythoe cf. borealis (M. Sars, 1862) | Ss/M/F | Ca/Pr | mac | 6 |
| | Aciculata | Dorvilleidae | Ophryotrocha sp01 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp02 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp03 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp04 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp05 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp06 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp07 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | | Ophryotrocha sp08 | Sr/M/F | Om/Sc;Gr | pom;mic;mei | 2 |
| | | Protodorvillea kefersteini (McIntosh, 1869) | Ss/M/F | Ca/Pr | mei | 8 |
| | Lumbrineridae | Lumbrineridae unassigned | Ss/M/F | Ca/Pr | mei;mac | 8 |
| | | | Lumbrineriopsis paradoxa (Saint-Joseph, 1888) | Ss/M/F | Ca/Pr | mei;mac | 8 |
| | | Chrysopetalidae | Chrysopetalidae unassigned | Ss/M/F | Ca/Pr | mei;mac | 9 |
| | | Glyceridae | Glyceridae unassigned | Ss/M/F | Ca/Pr | mac | 6 |
| | | | Glycerina tesselata Grube, 1840 | Ss/M/F | Ca/Pr | mac | 6 |
| | | Hesionidae | Hesionidae unassigned | Ss/M/F | Ca/Pr | mac | 6 |
| | | | cf. Amphiduros sp. | Ss/M/F | Ca/Pr;Sc | mac | 4 |
| | | | Leocrates atlanticus (McIntosh, 1885) | Ss/M/F | Ca/Pr | mac | 6 |
| | | | Nereimyra sp. (juveniles) | Ss/M/F | Ca/Pr | mac | 6 |
| | | | Nereimyra punctata (Muller, 1788) | Ss/M/F | Ca/Pr | mac | 6 |
| | | Nereididae | Eunereis longissima Johnston, 1840 | Ss/D/T | Om/De | sed;pom;mic | 13 |
| | | | Nicon sinica Wu & Sun, 1979 | Ss/D/T | Om/De;Pr | pom;mic;mei | 2 |
| | | Phyllocoidea | Phyllocoidea madeirensis Langerhans, 1880 | Ss/M/F | Ca/Pr;Sc | mac | 4 |
| | | Polynoidae | Harmothoe evei Kirkegaard, 1980 | Ss/M/F | Ca/Pr | mac | 7 |
| | | | Subadyte pellucida (Ehlers, 1864) | Ss/M/F | Ca/Pr | mac | 6 |
| | | Sigalionidae | Pholoides dorsipapillatus (Marenzeller, 1893) | Ss/M/F | Ca/Pr | mac | 6 |
| | | | Sthenelais cf. boa (Johnston, 1833) | Ss/M/F | Ca/Pr | mac | 6 |
| | | Syllidae | Eusyllinae unassigned | Ss/M/F | Ca/Pr | mei | 8 |
| | | Exogoninae unassigned | Sr/M/F | Mc/Gr | mic | 10 |
| Taxon          | Family          | Subfamily        | Genus          | Species         | Gender | Measurement 1 | Measurement 2 | Measurement 3 | Measurement 4 | Measurement 5 | Measurement 6 | Measurement 7 | Measurement 8 | Measurement 9 | Measurement 10 | Measurement 11 | Measurement 12 | Measurement 13 | Measurement 14 | Measurement 15 | Measurement 16 | Measurement 17 | Measurement 18 | Measurement 19 | Measurement 20 | Measurement 21 | Measurement 22 | Measurement 23 | Measurement 24 | Measurement 25 | Measurement 26 | Measurement 27 | Measurement 28 | Measurement 29 | Measurement 30 | Measurement 31 | Measurement 32 | Measurement 33 | Measurement 34 | Measurement 35 | Measurement 36 | Measurement 37 | Measurement 38 | Measurement 39 | Measurement 40 | Measurement 41 | Measurement 42 | Measurement 43 | Measurement 44 | Measurement 45 | Measurement 46 | Measurement 47 | Measurement 48 | Measurement 49 | Measurement 50 |
| Family            | Genus         | Species                      | Gender | Sr/M/F | Mc/Gr | mic | Remarks     |
|-------------------|---------------|------------------------------|--------|--------|-------|-----|-------------|
| Alvania cimicoides | (Forbes, 1844)| Alvania cf. zylensis         | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Alvania cf. zylensis Gotas & Warén, 1982 | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Marginellidae spA            | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudosetia spD              | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cimidae                      | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cimidae                      | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Marginitellidae              | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pagodula echinata (Kiener, 1840) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Graphis gracilis             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Xylodisculidae               | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Neomphalina                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudococculinidae           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Larocheidae                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Bathyxylophilia sp nov       | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Moelleriopsis messanensis (Seguenza, 1876) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Putzeysia cf. wiseri (Clacara, 1842) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Vetigastropodida             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Skeneidae                    | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cirsonella romettensis (Granata-Grillo, 1877) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | cf. Lissospora sp.           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Neomphalina                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudococculinidae           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Larocheidae                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Bathyxylophilia sp nov       | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Moelleriopsis messanensis (Seguenza, 1876) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Putzeysia cf. wiseri (Clacara, 1842) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Vetigastropodida             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Skeneidae                    | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cirsonella romettensis (Granata-Grillo, 1877) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | cf. Lissospora sp.           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Neomphalina                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudococculinidae           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Larocheidae                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Bathyxylophilia sp nov       | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Moelleriopsis messanensis (Seguenza, 1876) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Putzeysia cf. wiseri (Clacara, 1842) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Vetigastropodida             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Skeneidae                    | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cirsonella romettensis (Granata-Grillo, 1877) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | cf. Lissospora sp.           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Neomphalina                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudococculinidae           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Larocheidae                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Bathyxylophilia sp nov       | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Moelleriopsis messanensis (Seguenza, 1876) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Putzeysia cf. wiseri (Clacara, 1842) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Vetigastropodida             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Skeneidae                    | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cirsonella romettensis (Granata-Grillo, 1877) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | cf. Lissospora sp.           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Neomphalina                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Pseudococculinidae           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Larocheidae                  | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Bathyxylophilia sp nov       | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Moelleriopsis messanensis (Seguenza, 1876) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Putzeysia cf. wiseri (Clacara, 1842) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Vetigastropodida             | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Skeneidae                    | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | Cirsonella romettensis (Granata-Grillo, 1877) | Sr/M/F | Mc/Gr  | mic   | 10  | R           |
|                   |               | cf. Lissospora sp.           | Sr/M/F | Mc/Gr  | mic   | 10  | R           |

**Bivalvia**

| Family            | Genus         | Species                      | Gender | Sr/M/F | Mc/Gr | mic | Remarks     |
|-------------------|---------------|------------------------------|--------|--------|-------|-----|-------------|
| Unassigned        | Unassigned    | Bivalvia unassigned (juveniles) |       | U      | U     | mic |             |
| Heterodonta       | Cuspidariidae | Cuspidaria sp.               | Sr/D/F | Ca/Pr  | zoo;mei | 9   |             |
|                   | Pholadidae    | Xylophaga dorsalis (Turtun, 1819) | Sr/S/Z | Om/Hs;Su | pom;ter | 19  | N           |
|                   |               | Xyloredo sp.                 | Sr/S/Z | Om/Hs;Su | pom;ter | 19  | N           |
|                   | Kellieliidae  | Kelliella sp. (juveniles)    | Ss/D/F | Om/De;Su | sed;pom;mic | 13  | L           |
| Protobranchia     | Neionellidae  | Neionella laitor (Jeffreys, 1876) | Ss/D/F | Om/De | sed;mic | 13  | R           |
|                   | Yoldiidae     | Yoldiella sp.(juveniles)     | Ss/D/F | Om/De | sed;mic | 13  | R           |
|                   | Nuculidae     | Eunucula bushae (Dolphus, 1898) | Ss/M/F | Om/De | sed;pom;mic | 13  | R           |
|                   | Solemyidae    | Solemyidae (juveniles)       | Ss/D/F | Ch     |        | 20  | L           |
| Pteriomorphia     | Mytilidae     | Idas modiolaeformis (Sturany, 1896) | Ep/D/A | Om/Ch;Su | pom | 20 | N           |
|                   | Pectinidae    | Delectopecten vitreus (Gmelin, 1791) | Ep/D/F | Om/Su | pom | 16 | R           |
|                   | Propeamussidae| Propeamussium sp.            | Ep/D/F | Om/Su | pom | 16 | R           |

**ARTHROPODA**

**Maxillopoda**
| Kingdom      | Family               | Genus                | Species                | Class     | Order     | Suborder | Class     | Order     | Suborder | Size (mm) |
|--------------|----------------------|----------------------|------------------------|-----------|-----------|----------|-----------|-----------|----------|-----------|
| Malacostraca | Verrucidae           | Verruca              | sp.                    | Cirripedia| Verrucidae|          |           |           |          |           |
| Euphausiacea | Meganyctiphanes     | cf. norvegica        | (M. Sars, 1857)       |           |           |          |           |           |          |           |
| Nebaliacea   | Nebalia              | spA                  |                        |           |           |          |           |           |          |           |
|              | Nebalia              | spB                  |                        |           |           |          |           |           |          |           |
| Amphipoda    | Amphipoda            | unassigned           |                        |           |           |          |           |           |          |           |
| Aoridae      | Leptamphopus        | sp122                |                        |           |           |          |           |           |          |           |
|              | Leptamphopus        | sp123                |                        |           |           |          |           |           |          |           |
| Phoxocephalidae | Harpina           | sp.                  |                        |           |           |          |           |           |          |           |
| Phrosinidae  | Primno macropa      | Guérin-Méneville, 1836 |                        |           |           |          |           |           |          |           |
| Pleustidae   | Pleustidae           | spA                  |                        |           |           |          |           |           |          |           |
| Sebidae      | Seba aloe            | Karaman, 1971        |                        |           |           |          |           |           |          |           |
| Class          | Order                        | Family                      | Genus                  | Species                      | Habit        | Feeding habit | Motility   | Food type and size | Habits                   |
|----------------|------------------------------|-----------------------------|------------------------|------------------------------|--------------|--------------|------------|-------------------|--------------------------|
| Cumacea        | Leuconidae                   | Leuconidae                  | Leucon sp.             | Stenothoe sp.                | Sr/M/F       | Ca/Pr        | mac        | 7                 |                          |
|                | Nannastacidae                | Nannastacidae unassigned    |                        |                              |              |              |            |                   |                          |
|                | Isopoda                      | Desmosomatidae unassigned   | Desmosomatidae sp.     | Chelator sp.                | Sr/M/F       | Om/Dt        | pom;mic    | 1                 |                          |
|                |                              | Prochelator sp.             |                        |                              | Sr/M/F       | Om/Dt        | pom;mic    | 1                 |                          |
|                |                              | Munnidae                   | Munna sp.              |                              | Sr/M/F       | Om/Dt        | 12         | pom;mic           |                          |
|                |                              | Munnopsidae                | Disconectes sp.        |                              | Sr/M/F       | Om/Dt        | 12         | pom;mic           |                          |
|                |                              |                                | Ilyarachna sp.         |                              | Sr/M/F       | Om/Dt        | 12         | pom;mic           |                          |
|                |                              | Mysida unassigned           |                        |                              | U            |              |            |                   |                          |
|                | Tanaidacea                   | Apseudidae                 | Apseudes setiferus     |                              | Sr/D/F       | Om/Dt        | 12         | pom               | R                        |
|                | Unassigned                   | Tanaidomorpha unassigned    |                        |                              |              |              |            |                   |                          |
|                |                              | Leptocheliidae             | Mesotanais pinguiculus | Błazewicz-Paszkowycz, Bamber & Cunha, 2011 | Sr/D/T       | Om/Dt        | 12         | pom               |                          |
|                |                              | Leptognathiidae            | Leptognathia sp.       |                              |              |              |            |                   |                          |
|                |                              | Pseudotanaidae             | Pseudotanaidys tympanobaculum | Błazewicz-Paszkowycz, Bamber & Cunha, 2011 | Sr/D/T       | Om/Dt        | 12         | pom               |                          |
|                |                              | Tanaellidae                | Araphura macrobelone   | Błazewicz-Paszkowycz, Bamber & Cunha, 2011 | Sr/D/T       | Om/Dt        | 12         | pom               |                          |
|                |                              | Tanaella unguicillata      |                        | Błazewicz-Paszkowycz, Bamber & Cunha, 2011 | Sr/D/T       | Om/Dt        | 12         | pom               |                          |
|                |                              | Unassigned                 | Ophiurida unassigned (juv.) |                              | Sr/D/F       | Om/Su;De     | pom;mic;zoo| 15             | R                        |
|                | BRYOZOA                      | Unassigned                 | Bryozoa unassigned     |                              | Ep/S/R       | Om/Su        | 16         | U                 |                          |
|                |                              |                             |                        |                              |              |              |            |                   |                          |

**Feeding habit.** Source of food: epibenthic (Ep); seafloor surface (Sr); subsurface (Ss). Motility: mobile (M); discretely motile, movement not necessary for feeding (D); sessile (S).

Habit: free living or active burrower (F); tubiculous (T); sedentary, living in burrow (B); encrusting, requiring large area of attachment (R); attached, requiring one point of attachment (A); parasitic (X); unassigned (U). **Feeding mode.** Type of symbiosis: chemotrophic (Ch); heterotrophic (Hs). Diet: carnivorous (Ca), omnivorous (Om), feeding on microbes (Mc). Mode: deposit feeder, ingest sediment (De); detritus feeder, ingests particulate matter (Dt); suspension, filter feeder, strains particles from the water (Su); grazer, feeds by scraping (Gr); predator, eats living animals (Pr); scavenger, eats carrion (Sc); suctorial parasite (Sp); symbiotic (Sym); unassigned (U). **Food type and size.** Sediment (sed),
particulate organic matter (pom); wood and other terrestrial or coastal plant material (ter); single celled organisms (mic); meiofauna (mei); macrofauna (mac); zooplankton (zoo); fish (fis); unassigned (U). The trophic scheme is based on Macdonald et al. [1]. Trophic information was obtained from stable isotope data (mostly unpublished) and from the literature for each individual species wherever possible; if the feeding behaviour of a particular species was unknown, it was assumed to feed in a similar manner to congeneric or confamilial species, or species within the same major group.

**Trophic guilds.** For simplification we established 20 different trophic guilds based on source of food, feeding mode and diet: 1. Omnivores on subsurface items; 2. Omnivores on surface small items; 3. Omnivores on surface large items; 4. Scavengers; 5. Predators on zooplankton; 6. Predators on subsurface macrofauna; 7. Predators on surface macrofauna; 8. Predators on subsurface meiofauna; 9. Predators on surface meiofauna; 10. Microbial grazers; 11. Microbial grazers, wood specialists; 12. Detritivores; 13. Subsurface deposit feeders; 14. Surface deposit feeders; 15. Suspension feeders on surface items; 16. Suspension feeders on epibenthic items; 17. Suctorials parasites on macrofauna; 18. Suctorials parasites on fish; 19. Heterotrophic symbiosis; 20. Chemotrophic symbiosis; U. unassigned.

**Sub-regions:** El Arraïche, Mercator MV (EA); Carbonate Province, Meknès and Darwin MV (CP). **Type of substrate:** wood (W); alfalfa (A); carbonate (C). **Occurrence:** new occurrences (N); taxa previously recorded in the region (R); taxa previously recorded in the study site (L); unassigned taxa (U).

**Reference:**
1. Macdonald TA, Burd BJ, Macdonald VI, van Roodselaar A (2010) Taxonomic and feeding guild classification for the marine benthic macroinvertebrates of the Strait of Georgia, British Columbia. Can Tech Rep Fish Aquat Sci 2874: iv + 63 p.
Table S2. Breakdown of percentual contributions from SIMPER analysis for comparisons between mud volcanoes: Mercator (Mer); Meknès (Mek) and Darwin (Dar). The taxa listed contribute at least 1.5%. Numbers in bold mark the six dominant species at each site.

| Abundance (ind.m\(^{-2}\)) | % Contribution | % Contribution | % Contribution |
|-----------------------------|----------------|----------------|----------------|
|                             | Mer | Mek | Dar | TG  | Mer | Mek | Dar | Mer/Mek | Mer/Dar | Mek/Dar |
| **Total**                   | 654.1 | 637.6 | 886.0 | AS:18.4 | AS:20.6 | AS:28.7 | AS:92.4 | AS:91.6 | AS:71.2 |
| **Cnidaria**                |     |     |     |     |     |     |     |     |     |     |
| Hydrozoa                    |     |     |     |     |     |     |     |     |     |     |
| Clytia linearis            |     |     |     |     |     |     |     |     |     |     |
| **Sipuncula**              |     |     |     |     |     |     |     |     |     |     |
| Sipuncula und.             |     |     |     |     |     |     |     |     |     |     |
| **Nemertea**               |     |     |     |     |     |     |     |     |     |     |
| Nemertea und.              |     |     |     |     |     |     |     |     |     |     |
| **Annelida**               |     |     |     |     |     |     |     |     |     |     |
| incertae sedis             |     |     |     |     |     |     |     |     |     |     |
| Aciculata                   |     |     |     |     |     |     |     |     |     |     |
| Ophryotrocha sp01          | 15.0 | 1.3 | 0.0 | S-O | • | • | --- | 1.5 | • | • |
| Ophryotrocha sp02           | **16.2** | 4.0 | 4.3 | S-O | 1.7 | 3.3 | • | 1.9 | 1.5 | 1.5 |
| Ophryotrocha sp08           | 0.0  | 14.3 | 8.0 | S-O | --- | 3.7 | 2.5 | 2.0 | • | 2.3 |
| Leocrates atlanticus       | 0.5  | 1.0 | 0.3 | S-P | • | 8.3 | • | 1.5 | • | • |
| Nereimyra sp.              | 2.2  | 1.3 | 12.3 | S-P | • | 2.3 | 3.6 | • | 1.7 | 2.2 |
| Harmothoe evei             | 5.0  | 0.3 | 0.0 | S-P | 18.3 | • | --- | 2.7 | 2.1 | • |
| Sabadyte pelicuda           | 0.7  | 0.3 | 1.3 | S-P | 3.7 | • | • | • | • | • |
| Exogoninae sp.              | 0.2  | 0.0 | 7.3 | S-Gr | • | • | 1.7 | • | • | 1.5 |
| Canaliopalpata              |     |     |     |     |     |     |     |     |     |     |
| Amage sp.                  | 0.2  | 1.7 | 42.7 | S-De | • | • | 5.1 | • | 3.1 | 3.9 |
| Mellinopsis sp.            | 1.8  | **49.0** | **79.3** | S-De | • | 8.1 | 7.4 | 4.0 | 4.4 | 5.7 |
| Raricirrus beryli           | 9.0  | 4.3 | 24.3 | S-Gr | • | • | 4.6 | 1.7 | 2.5 | 3.0 |
| Polycirrus norvegicus      | 3.3  | 0.0 | 0.0 | S-De | 4.8 | • | • | • | --- | --- |
| Scolecida                  |     |     |     |     |     |     |     |     |     |     |
| Capitellidae sp05          | 1.0  | 0.0 | 0.0 | S-De | 5.7 | • | • | 1.6 | --- | --- |
| **Mollusca**               |     |     |     |     |     |     |     |     |     |     |
| Heterodonta                |     |     |     |     |     |     |     |     |     |     |
| Xylophaga dorsalis         | **362.3** | 3.7 | 3.7 | Sy | 14.1 | 1.7 | • | 8.9 | 7.5 | • |
| Protobranchia              |     |     |     |     |     |     |     |     |     |     |
| Solemyidae juv.            | 0.7  | 4.3 | 0.7 | Sy | 1.8 | • | • | • | • | • |
| Pteriomorphia              |     |     |     |     |     |     |     |     |     |     |
| Idas modiolaeformis        | 0.3  | **101.7** | **106.0** | Sy | • | 14.5 | 9.5 | 5.8 | 4.9 | 6.8 |
| Caenogastropoda            |     |     |     |     |     |     |     |     |     |     |
| Eulimidae sp01             | 0.0  | 0.0 | 0.7 | S-Sp | --- | --- | • | --- | • | --- |
| Coccoolinaformia           |     |     |     |     |     |     |     |     |     |     |
| Coccopigya sp.             | 0.5  | 7.7 | 57.0 | S-Gr | • | 4.4 | 3.7 | 1.6 | 3.1 | 3.9 |
| Heterobranchia             |     |     |     |     |     |     |     |     |     |     |
| Xyloptisculus sp.          | 0.5  | 1.7 | 31.3 | S-Gr | • | 2.3 | 2.2 | • | 2.2 | 2.8 |
| Taxonomic Group     | Species                  | TG | AS | AD | E  | S  | De | Dt | Gr | O  | P  | Sp | Su | Sy | De | % Contribution of selected taxa |
|---------------------|--------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------------|
| **Vetigastropoda**  | *Copulabysia* sp.        | 3.2| 253.7| 179.7| S-Gr | ● | 26.3| 13.7| 9.4| 6.4| 9.8 |
| **Arthropoda**      |                          |    |     |     |    |    |    |    |    |    |    |    |    |    |                                |
| Amphipoda           | *Leptamphopus* sp122     | 26.8| 0.0 | 0.0| E-P | ● | ---| ---| 2.7| 1.9| ---|
| **Orthomene grimaldii** |                        | 147.2| 0.7 | 0.0| S-O | 5.9| ● | ---| 5.7| 4.7| ● |
| Seba aloe           |                          | 0.0 | 153.7| 213.0| S-Gr | ---| 20.7| 10.9| 7.4| 6.6| 9.0 |
| Isopoda             | *Gnathia* sp.            | 10.2| 0.0 | 0.0| E-Sp | 6.5| ---| ---| 3.0| 2.2| ---|
| Janira maculosa     |                          | 0.0 | 1.7 | 0.0| S-Dt | ---| 1.7| ---| ● | ---| ● |
| Munna sp.           |                          | 0.8 | 1.3 | 0.3| S-Dt | 1.6| ● | ● | ● | ● | ● |
| Tanaidacea          | *Apseudes setiferus*     | 1.3 | 0.0 | 0.0| S-Dt | 1.9| ---| ---| ● | ● | ---|
| Mesotanais pingüiculus |                        | 0.0 | 3.7 | 59.7| S-Dt | ---| 2.9| 13.5| ● | 5.1| 5.7 |
| Echinodermata       | Ophiurida                | 0.7 | 0.3 | 24.3| S-Su | 3.7| ● | 10.3| ● | 3.1| 4.8 |
| % Contribution of selected taxa |                  | 93.5| 92.5| 93.8| 87.8| 100.0| 96.3| 74.9| 76.8| 75.7 |
Table S3. Breakdown of percentual contributions from SIMPER analysis for comparisons between substrate types: wood (W), alfalfa (A) and carbonate (C). The taxa listed contribute at least 1.5%. Numbers in bold mark the six dominant species in each substrate type.

| Density (ind.m$^{-2}$) | % Contribution | % Contribution |
|-------------------------|----------------|---------------|
|                         | W | A | C | TG | W | A | C | W/A | W/C | A/C |
| Total                   | 1302.8 | 786.3 | 35.0 | | | | | | | |

Cnidaria

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Hydrozoa              |         |                |
| Hydrozoa und          | 0.3     | 0.5            |
| Clytia linearis       | 0.5     | 0.3            |

Nemertea

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Nemertea und.         | 0.3     | 0.0            |

Annelida

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Aciculata             |         |                |
| Ophryotrocha sp01     | 23.5    | 0.0            |
| Ophryotrocha sp02     | 25.8    | 4.8            |
| Ophryotrocha sp08     | 11.8    | 5.0            |
| cf. Amphiduros sp.    | 2.8     | 1.3            |
| Leocrates atlantica   | 1.0     | 0.3            |
| Nereimyra sp.         | 8.5     | 5.0            |
| Harmothoe evei        | 3.5     | 2.8            |
| Sabadyte pelucida     | 0.6     | 1.3            |

Canalipalpata

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Amage sp.             | 24.5    | 9.0            |
| Mellinopsis sp.       | 72.3    | 26.8           |
| Raricirrus beryl      | 20.8    | 14.3           |
| Polycirrus norvegicus | 3.8     | 0.5            |
| Scolecida Capitellidae sp05 | 0.0 | 0.3 |

Mollusca

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Heterodonta           |         |                |
| Xylophaga dorsalis    | 543.3   | 0.8            |
| Pteriomorphia         |         |                |
| Idas modiolaeformis   | 88.8    | 67.5           |
| Cocculiniformia       | 9.5     | 39.8           |
| Heterobranchia        |         |                |
| Xylodiscula sp.       | 2.8     | 22.8           |
| Vetigastropoda        |         |                |
| Copulabysia sp.       | 200.5   | 129.3          |

Arthropoda

|                       | Density | % Contribution |
|-----------------------|---------|----------------|
| Leptostraca           |         |                |
| Nebalia sp01          | 1.5     | 2.5            |
| Amphipoda             |         |                |
| Ensayara carpinei     | 1.0     | 13.3           |
| Leptiamphopus sp122   | 0.0     | 40.3           |

| Density (ind.m$^{-2}$) | % Contribution | % Contribution |
|-------------------------|----------------|---------------|
|                         | W | A | C | TG | W | A | C | W/A | W/C | A/C |
| Total                   | 1302.8 | 786.3 | 35.0 | | | | | | | |
|                |                |       |       |       |       |       |       |
|----------------|----------------|-------|-------|-------|-------|-------|-------|
| **Orchomene grimaldi** |                | 61.8  | 159.5 | 0.0   | S-O   | 2.1   | ---   |
| **Seba aloe**      |                | 117.3 | 157.8 | 0.0   | S-Gr  | 6.08  | 11.6  |
| **Isopoda**        |                |       |       |       |       |       |       |
| **Gnathia sp.**    |                | 1.0   | 1.3   | 13.0  | E-Sp  | ●     | ●     |
| **Munna sp.**      |                | 2.3   | 0.0   | 0.3   | S-Dt  | 3.37  | ---   |
| **Tanaidacea**     |                | 10.8  | 35.0  | 1.8   | S-Dt  | 2.6   | ●     |
| **Echinodermata**  |                |       |       |       |       |       |       |
| **Ophiurida**      |                | 3.5   | 14.3  | 1.8   | S-Su  | 2.98  | 6.8   |
| **Mesotanais pinguiculus** |         | 10.8  | 35.0  | 1.8   | S-Dt  | 2.6   | ●     |

% Contribution of selected taxa

|                |                |       |       |       |       |       |       |
|----------------|----------------|-------|-------|-------|-------|-------|-------|
|                |                | 95.4  | 96.1  | 80.7  | 88.1  | 99.1  | 100.0 |
|                |                | 73.9  | 74.9  | 73.5  |       |       |       |

TG: trophic guild; AS: average similarity; AD: Average dissimilarity; E: epibenthic source of food; S: sediment surface or subsurface source of food; De: deposit feeder; Dt: detritus feeder; Gr: Grazer; O: Omnivore; P: predator; Sc: scavenger; Sp: suctorial parasite; Su: suspension feeder; Sy: symbiotic; ●: contributions lower than 1.5%.