

Supplement 4

Here are provided detailed descriptions of the taxonomic and functional compositions of the typological groups. These descriptions follow the MFA output in Figs. 4, 5, S3.1 and S3.2. Additional details are given in Table S1.1.

Group 1. Epi-bioconstructors of large emergent and vertically complex structures (Fig. 5c–e); includes dominantly erect corals (anthozoans and hydrozoans), then sponges, bryozoans and a few echinoderms (*Antedon* spp., *Gorgonocephalus eucnemis*); high biodeposition ability (Fig. 5b); named “Epibenthic erect” (Table S1.1), abbreviated “EpiErect”.

Group 2. Epi-bioconstructors relatively large and more horizontally spread, solitary or aggregated (Fig. 5c–e); can be erect, although vertically less complex like sea pens (*Pennatula* spp., *Umbellula encrinus*, *Viminella flagellum*); includes reef builders such as oysters and mussels (*Magallana gigas*, *Mytilus* spp., *Neopycnodonte* spp., *Ostrea edulis*), vermetid snails (*Vermetus triquetrus*), honeycomb worms (*Sabellaria* spp.), goose barnacles (*Lepas anatifera*); more or less aggregated corals (*Alcyonium* spp., *Desmophyllum dianthus*, *Leptopsammia pruvoti*), sea squirts (*Microcosmus* spp., *Styela* spp.) and sponges (*Geodia* spp., *Haliclona* spp., *Spongia* spp.); high biodeposition ability (Fig. 5b); named “Epibenthic large”, abbreviated “EpiLarge”.

Group 3. Small fouling species of various substrata, such as barnacles (*Amphibalanus* spp., *Balanus crenatus*, *Chthamalus* spp.), small epibenthic tube builders (*Platynereis* spp., *Spirobranchus* spp., *Spirorbis* spp.) and crustaceans (*Jassa* spp.); can cover the substrate and mussel or oyster beds through extended organic mats like *Jassa* spp.; distinct from other epibenthic groups along axis 7 with modality “Mat” (Fig. S3.2a,b); low to high biodeposition ability (Fig. 5b); named “Fouler”.

Group 4. Epibenthic species on hard substrata; abrade the substratum (Fig. S3.1a,c,e); includes grazing urchins (*Arbacia lixula*, *Echinus esculentus*, *Paracentrotus lividus*, *Psammechinus miliaris*, *Strogolocentrotus* spp.) and snails (*Steromphala* spp.), and boring sponges (*Chodrosia reniformis*, *Cliona* spp., *Pione vastifica*); named “Major abrader”, abbreviated “MajAbr”.

Group 5. Taxonomically specific, includes uniquely bivalves boring in hard substrata (Fig. S3.1a,c,e); among others, represented by *Barnea* spp., *Hiatella* spp. and *Lithophaga lithophaga*; more peculiar forms includes shipworms boring in logs drifting across various habitats (*Teredo* spp., *Xylophaga atlantica*, *Zirfaea crispata*); can exhibit high biodeposition ability (Fig. 5b); named “Borer”.

Group 6. Dominated by grazing gastropods that moderately abrade hard substrata (Fig. S3.1a,c); includes snails (*Lacuna* spp., *Littorina* spp., *Phorcus* spp.), limpets (*Patella* spp., *Siphonaria pectinate*, *Testudinalia testudinalis*) and chitons (*Boreochiton ruber*, *Lepidochitona* spp., *Leptochiton asellus*, *Tonicella marmorea*); named “Minor abrader”, abbreviated “MinAbr”.

Group 7. Epi-bioconstructors of small size, often aggregated and forming more or less horizontally extended structures; includes mainly sea squirts (*Aplidium glabrum*, *Botryllus schlosseri*, *Molgula citrina*), hydrozoans (*Clava multicornis*, *Ectopleura larynx*, *Plumularia setacea*), sponges (*Aplysilla sulfurea*, *Halisarca dujardini*, *Hemimycale columella*); high biodeposition ability (Fig. 5a,b); named “Epibenthic small”, abbreviated “EpiSmal”.

Group 8. Taxonomically specific, molluscs; mostly sub-sediment surface buried shelly species (Fig. 4b); bivalves of relatively limited movements (*Abra* spp., *Arctica islandica*, *Ensis* spp., *Spisula* spp.); also periodically buried ones among bivalves (*Chlamys islandica*, *Pecten* spp.) or gastropods (*Aporrhais pespelecani*, *Epitonium clathratulum*, *Euspira* spp., *Neptunea antiqua*, *Stramonita haemastoma*); dominantly biodiffusers, but discriminated as shell providers (Fig. 5c) and possibly highly biodepositors (Fig. 5b); named “Shallow shell”, abbreviated “ShalShel”.

Group 9. Mostly surficial biodiffusers of highly variable sizes, with variable degrees of burying ability, yet relatively shallow; no other specific attribute; periodically and superficially buried amphipods (*Bathyporeia* spp., *Diastylis* spp.) and deeper ones (*Urothoe* spp.), hooded shrimps (Cumacea), mysids (*Grastrosacus* spp., *Hemimysis* spp., *Praunus* spp., *Schistomysis* spp.), sand shrimps (*Crangon* spp., *Pandalus* spp.), superficial and periodically buried cephalopods (*Loligo* spp., *Octopus vulgaris*, *Sepiola affinis*); others with greater mixing ability like starfish and brittle stars (*Asterias rubens*, *Crossaster papposus*, *Ophiura* spp.), crabs (*Cancer* spp., *Carcinus* spp., *Chaceon affinis*, *Liocarcinus* spp., *Maya* spp.), urchins (*Echinocyamus pusillus*, *Gracilechinus acutus*) and errant worms (*Aphrodita aculeata*, *Eteone* spp., *Eulalia* spp., *Phyllodoce mucosa*); marginally, soft sediment sea slugs (Aplisiida, Nudibranchia); named “Surficial diffusors”, abbreviated “SurfDiff”.

Group 10. Small species, mostly superficial tubicolous occurring in wide lawns of tubes or tube protrusions (Fig. 4a,i–n), polychaetes (*Boccardia polybranchia*, *Melinna* spp., *Polydora* spp., *Spio* spp.) and amphipods (*Ampelisca* spp.); commonly biostabilisers (Fig. 4g), advectors (downward and upward conveying; Fig. 4d,e), low ventilation ability (Fig. 4h), with some degree of biodeposition (Fig. 5b); named “Small tube dweller”, abbreviated “SmallTub”.

Group 11. Closely related to group 10, but larger and more functionally heterogeneous species; also, lesser tubicolous and more burrow dwellers (I- or J-shaped; Fig. 4i), and especially deeper burrowers (Fig. 4b); representatives, *Galathowenia* spp., *Lanice conchilega*, *Laonice cirrata*, *Thelepus* spp.; others, non-tube builders like, *Phoronis* spp., *Corophium* spp. that also generates wide mats/lawns (of sediment mounds; Fig. 4l); named “Deep tube dweller”, abbreviated “DeepTub”.

Group 12. More mobile species than previously, also deeper burrowing ability and larger than in group 11; mainly polychaetes that are mostly advectors (Fig. 4d,e); representatives, *Capitella* spp., *Goniada maculata*, *Magelona filiformis*, *Mediomastus fragilis*, *Poecilochaetus serpens*; named “Minor bioturbator”, abbreviated “MinBiot”.

Group 13. Various groups, including polychaetes, brittle stars and bivalves; larger than in the previous group with deeper burrowing ability (Fig. 4b), and likely greater bioirrigation potential given wider burrows, higher ventilation and open-ended burrows in several members (Fig. 4h–k): *Amphiura* spp., *Chaetopterus variopedatus*, *Lucinoma borealis*, *Scrobicularia plana*, *Thracia* spp.; others, in I-shaped burrow such as *Mya* spp., *Lutraria lutraria*, *Yoldia limatula*, relatively sedentary; named “Sessile bioturbator”, abbreviated “SesBiot”.

Group 14. At least as deep as previously, but more mobile and non-shelly; general diffusive mixing; can “patrol” constantly over the whole sediment matrix (Fig. 4b,j) such as the large hunters *Glycera* spp. and *Nephtys* spp. building complex webs of anastomosed burrows actively irrigated; others, although differing by their funnel/chimney burrow, *Echinocardium* spp. are also large and deep active diffusers and irrigators; can occupy various depths depending on sand/mud and oxygen content; also, *Alitta* spp., *Hediste diversicolor*, *Nereis* spp., *Perinereis* spp., *Scolecopsis* spp.; named “Major bioturbator”, abbreviated “MajBiot”.

Group 15. Deepest burrowers, bulldozing effect on the sediment, long term burrows, very high level of sediment mixing and irrigation, creation of very deep and wide anastomoses or U-shaped burrows (Fig. 4a,b,i–k), with large mounds as a consequence of upward conveying that adds epi-bioconstruction (Fig. 4l), a major distinction from group 14 (also along axis 3; Fig. 5a,c); representatives, *Arenicola* spp., *Homarus gammarus*, *Nephtys novegicus*, *Callianassa subterranea*, *Calocaris macandreae*, *Maxmuelleria lankesteri*, *Upogebia* spp.; named “Deep 3D”.