Beginners' Guide to Keys for Marine Benthic Macrofaunal Invertebrates from British Seas

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Identifying marine fauna can be a bit daunting for a beginner, unfamiliar with the various keys and literature used to identify fixed specimens in the laboratory. This guide is aimed at the novice lab taxonomist tasked with identifying preserved invertebrate macrofauna extracted from benthic samples collected in coastal waters of the British Isles. It is based on the author's own experience processing samples from Scottish waters for over forty years.

It should enable beginners to select the right keys to get started and hopefully identify the most frequently occurring species. It is by no means comprehensive and additional literature may be needed for rarer taxa. Over the years many excellent working keys have been developed at taxonomic workshops on various groups of British fauna and have been widely used in UK laboratories. These unpublished keys, both current and older versions, are now available from the NMBAQC website: NMBAQC - Literature and Taxonomic Keys (nmbaqcs.org). The website also holds full taxonomic bibliographies for marine fauna and flora of the north-east Atlantic.

This guide is arranged by sections: 1. General; 2. Polychaeta/Oligochaeta; 3. Crustacea; 4. Mollusca; 5. Minor Phyla. There are sub-divisions by family or order as appropriate. Many of the marine groups in British seas are covered by the Synopses of the British Fauna series (highlighted **SBF** herein) produced by the Linnean Society of London. The "new series" of the synopses commenced with No.1 on Ascidians in 1970 and is now on No.63 on Heterobranch Gastropods. However, many marine invertebrate groups (eg. within the Polychaeta) remain uncovered by synopses and many of the earlier synopses already require revision. Hence the suggestion herein of consulting recently published Spanish volumes of the Fauna Iberica series for some of the polychaete families – at least for the excellent figures if your Spanish is a bit limited!

KEYS and GUIDES

1. GENERAL GUIDES

The original two volume Hayward & Ryland (1990) guide to marine fauna is the most comprehensive introductory guide. It has excellent line drawing and keys covering a huge range of the fauna found in coastal waters of the UK. However, it does not include all species that occur here, so other guides must be consulted. Note that subsequent single volume Hayward and Ryland Handbook versions in 1996 and 2017 are not as comprehensive.

Hayward P.J. & Ryland, J.S. (1990). *The Marine Fauna of the British Isles and North-West Europe.* Volumes 1 and 2. Oxford University Press, 800pp.

2. POLYCHAETA / OLIGOCHAETA

Families Aphroditidae, Polynoidae, Sigalionidae, Pholoidae, Pisionidae (Scaleworms and allies)

The best place to start is Chambers & Muir (1997) but refer to Barnich (2011) for more comprehensive coverage of all UK species including some newer species.

> Chambers, S. & Muir, A. (1997). *Polychaetes: British Chrysopetaloidea, Pisionoidea and Aphroditoidea.* **SBF No. 54,** Field Studies Council, 202 pp.
>
> Barnich, R. (2011). Identification of scale worms in British and Irish waters. NMBAQC Workshop Guide. (see NMBAQC website)

Also useful for Scottish scaleworms are the "blue books" from the Royal Scottish Museum:

> Tebble, N. & Chambers, S. (1982). *Polychaetes from Scottish Waters. Part 1. Family Polynoidae.* Royal Scottish Museum Studies, 73 pp.
>
> Chambers, S. (1985). *Polychaetes from Scottish Waters. Part 2. Families Aphroditidae, Sigalionidae and Polyodontidae*. Royal Scottish Museum Studies, 38 pp.

For *Pholoe* check:

> Petersen, M.E. (1998). *Pholoe* (Polychaeta: Pholoidae) from northern Europe: a key and notes on the nearshore species. *Journal of the Marine Biological Association of the United Kingdom*, 78(4), 1373-1376.
>
> Meissner, K, Gotting, M. & Nygren, A. (2020). Do we know who they are? On the identity of *Pholoe* (Annelida: Sigalionidae: Pholoinae) species from northern Europe. *Zoological Journal of the Linnean Society,* 2020, 189, 178–206.

For *Malmgrenia* check:

> Jourde, J. *et al.,* (2015). *Malmgrenia louiseae* sp. nov., a new scale worm species (Polychaeta: Polynoidae) from southern Europe with a key to European *Malmgrenia* species. *Journal of the Marine Biological Association of the United Kingdom*, 2015, 95(5), 947–952

Family Phyllodocidae (Paddle-worms)

> Pleijel, F. & Dales, R.P. (1991). *Polychaetes: British Phyllodocoideans, Typhloscolecoideans and Tomopteroideans.* **SBF No. 45**. Universal Book Services/Dr. W. Backhuys, 202pp.

For genus *Pseudomystides* see excerpt from:

> Pleijel, F. (1993). *Polychaeta Phyllodocidae.* Marine Invertebrates of Scandinavia, 8, Scandinavian University Press, 159pp.

For *Paranatais* see:

Nygren, A. Eklof, J. & Pleijel, F. (2009). Arctic-boreal sibling species of *Paranaitis* (Polychaeta, Phyllodocidae). *Marine Biology Research,* 2009; 5: 315-327.

Families Glyceridae (Bloodworms) and Goniadidae

O'Connor, B. & Worsfold, T. (2006). Keys to and Literature on Glyceridae and Goniadidae. (see unpublished – see NMBAQC website)

This is the current key for *Glycera* but has no figures and needs to be used in conjunction with the large monograph volume: Böggemann (2002). *Revision of the Glyceridae. w*hich covers whole world!

For UK species the O'Conner's 1987 paper is still very useful, but names have since changed for several species:

O'Connor, B.D.S. (1987). The Glyceridae (Polychaeta) of the North Atlantic and Mediterranean with descriptions of two new species. *J.Nat.Hist*. 21,167-189.

For Goniadidae and update on names for *Glycera* see:

Worsfold, T. (2007). Identification guides for the NMBAQC Scheme: 2. Goniadidae, with notes on Glyceridae (Polychaeta) from shallow seas around the British Isles. *Porcupine Marine Natural History Society Newsletter*, 22, 19-23. (see NMBAQC website)

Family Sphaerodoridae (Bobble-back worms)

Fauchald, K. (1974). Sphaerodoridae (Polychaeta: Errantia) from worldwide areas. *J. Nat. Hist*. 8, 257-289.

Capa, M. *et al*. (2019). Systematic re-structure and new species of Sphaerodoridae (Annelida) after morphological revision and molecular phylogenetic analyses of the North East Atlantic fauna. *ZooKeys* 845: 1–97 (2019)

Family Hesionidae

Jarvis, S. (2011). Hesionidae (Grube, 1850) – A provisional guide to the identification of the British species. 10pp. (unpublished - see NMBAQC website)

Family Syllidae (Bead-worms)

San Martin, G, (2012). *Guide and keys for the identification of Syllidae (Polychaeta) from the British Islands (reported and expected species).* NMBAQC Workshop, Dove Marine Laboratory, Cullercoats, 28pp. (unpublished see NMBAQC website - Updated version published in 2015 in *Zookeys* 488, 1-29.)

The NMBAQC/Zookeys guide is the most comprehensive and up-to-date guide but has few illustrations. Excellent figures for many British species are available in The Fauna Iberica volume 21:

San Martín, G., (2003). *Annelida, Polychaeta II: Syllidae*. In: Fauna Iberica, 21. Ramos, M.A. et al. (Eds). Museo Nacional de Ciencias Naturales. CSIC. Madrid, 554 pp.

However, some of the old workshop keys with sketches are still very useful and probably the best place for beginners to start – especially:

Garwood P.R. (1985). Family Syllidae. EBSA Errant Polychaete Workshop, Heriot-Watt University, 1985 (unpublished - see NMBAQC website

Garwood P.R. (1990). Family Syllidae ECSA Polychaete Workshop, Fort Popton April 1990. (unpublished - see NMBAQC website)

Family Nereidae (Ragworms)

Chambers, S.J. & Garwood P.R. (1992). *Polychaetes from Scottish Waters. A Guide to Identification. Part 3. Family Nereidae*. National Museums of Scotland, Edinburgh, 64pp.

This is the best guide and covers most UK species. Includes keys for both with and without everted pharynx. Note some additional species found further south in England and Wales are not included.

Family Nephtyidae (Catworms)

Dnestrovskaya, N.Yu. & Jirkov, I.A. (2011). Identification key for Nephtyidae (Polychaeta) of the Eastern Atlantic and the North Polar Basin. NMBAQC 2008 taxonomic workshop, Dove Marine Laboratory. 7pp, October 2011. (unpublished - see NMBAQC website)

The above is the current standard key. The old ECSA workshop key by Garwood 1990 with thumbnail sketches is still very useful:

Garwood, P.R. (1990). British Nephtyidae. ECSA Polychaete Workshop, Fort Popton, April 1990, 7 pp. (unpublished - see NMBAQC website)

Families Eunicidae, Lumbrineridae, Dorvilleidae, Onuphidae

George, J.D. & Hartmann-Schroeder, G. (1985). *Polychaetes: British Amphinomida, Spintherida & Eunicida*. **SBF No. 32**., E.J.Brill/ Dr. W. Backhuys, 221pp.

The above synopsis covers all four families but for Lumbrineridae check:

Oug, E. (2012). Guide to identification of Lumbrineridae (Polychaeta) in north east Atlantic waters v.3.2. NMBAQC 2010 taxonomic workshop, Dove Marine Laboratory. 31pp, February 2012. (unpublished - see NMBAQC website)

Family Orbiniidae

For *Scoloplos* and *Leitoscoloplos* use:

Mackie, A.S.Y. (1987). A review of species currently assigned to the genus *Leitoscoloplos* Day, 1977 (Polychaeta:Orbiniidae), with descriptions of species newly referred to *Scoloplos* Blainville,1828. *Sarsia* 72, 1-28.

For *Orbinia* and *Phylo* use keys in Kingston & Duff (1987) with figures in Hartmann-Schroder (1971) volume:

Kingston, P & Duff, A. (eds.) (1987). *Key to the Polychaete annelids from the North Sea and Baltic approaches.* A translation of the keys contained in *Die Tierwelt Deutschlands und angrenzender Meeresteile, Annelida, Borstenwurmer, Polychaeta* by Dr Gesa Hartmann-Schroder (1971). Institute of Offshore Engineering Heriot-Watt University, Edinburgh.

Hartmann-Schröder, G., (1971). *Annelida, borstenwurmer, polychaeta 2., neubearbeitete Auflage mit 295 Abbildungen. Die tierwelt Deutschlands und der angrenzden meeresteile*, 58 (First edition). Gustav Fischer, Jena, 645pp.

Family Paraonidae

For UK species:

Hartley, J.P. (1981). The family Paraonidae (Polychaeta) in British waters: a new species and new records with a key to species. *Journal of the Marine Biological Association of the United Kingdom*, 61, 133-149.

For broader European species:

Gil, J, (2016). Keys to European Paraonidae Cerruti, 1909. NMBAQC Taxonomic Workshop 2016. Millport. (unpublished - see NMBAQC website)

Neither of above have any figures. Good figures of many species can be found in:

Strelzov, V.E. (1979). *Polychaete Worms of the Family Paraonidae Cerruti,1909 (Polychaeta,Sedentaria)*. Smithsonian Institution and National Science Foundation, Washington, 212pp.

Aguirrezabalaga, F. & Gil, J. (2009). Paraonidae (Polychaeta) from Capbreton Canyon (Bay of Biscay, NE Atlantic) with a description of eight new species. *Scientia Marina* 73(4), 631-666.

Laubier, L. (1967). Sur quelques Aricidae (Polychetes, Paranoidae) de Banyuls-Sur-Mer. *Vie et Milieu* 18:99-132.

See also the Fauna Iberica – Vol. 36 – Polychaeta III

Family Spionidae

Radashevsky, V.I. (2017). Identification keys and comments on the taxonomy of spionid polychaetes (Annelida: Spionidae) from the continental shelf of northern Europe. NMBAQC Ring Test no. 54, 52pp. (unpublished - see NMBAQC website).

This is the current definitive key for the family in European waters but unfortunately does not include figures or a list of references. The family is in considerable flux with various name changes as the taxonomy is gradually being clarified.

For *Prionospio* figures see:

Mackie, A.S.Y. (1984). On the identity and zoogeography of *Prionospio cirrifera* Wiren 1883 and *Prionospio multibranchiata* Berkeley 1927 (Polychaeta:Spionidae). *Proc.1st Intern. Poly.Conf.* Sydney. Pp.35-37.

Sigvaldadottir, E. & Mackie, A.S.Y. (1993). *Prionospio steenstrupi*, *P. fallax* & *P. dubia* (Polychaeta,Spionidae): Re-evaluation of identity and status. *Sarsia* 78:203-219.

For *Polydora* figures see:

Blake, J. A. (1971). Revision of the genus *Polydora* from the north east coast of North America (Polychaeta: Spionidae). *Smithsonian Contributions to Zoology* 75:1-32.

For *Pseudopolydora* figures see:

Radashevsky, V. (2021). *Pseudopolydora* (Annelida: Spionidae) from European and adjacent waters with a key to identification and description of a new species. *Marine Biodiversity* (2021) 51:31

For *Spio* see:

Bick, A., Otte, K. & Meissner, K. (2010). A contribution to the taxonomy of *Spio* (Spionidae, Polychaeta, Annelida) occurring in the North and Baltic Sea, with a key to species recorded in this area. *Mar Biodiv* 40:160-180.

Meissner, K., Bick, A. & Bastrop, R. (2011). On the identity of *Spio filicornis* (O.F.Muller, 1776) – with the designation of a neotype, and the description of two new species from the North East Atlantic Ocean based on morphological and genetic studies. *Zootaxa* 2815: 1-27.

Sikorski, A.V. (2013). New combination for *Malacoceros jirkovi* and a key for Spio (Polychaeta: Annelida) from Norwegian waters and adjacent Arctic areas. *Zoosystematica Rossica*, 22(2): 172–180.

For *Laonice* see:

Sikorski, A. V. *et al*., (2021). Revision of the *Laonice bahusiensis* complex (Annelida: Spionidae) with a description of three new species. *Zootaxa* 4996 (2): 253–283.

Family Magelonidae (Spade-worms)

Mackie, A.S.Y., (2001). Key to Magelonidae. ECSA Taxonomic Workshop, Portaferry, Oct. 2001, (unpublished - see NMBAQC website)

Taylor, A. & Mortimer. K. (2023). An essential guide to Magelonidae, UK and European species. *Porcupine Marine Natural History Society.* (see NMBAQC website)

Family Cirratulidae (Tangle-worms)

Worsfold, T.M., (2009). Progress on the identification of Cirratulidae in British and Irish waters through the NMBAQC Scheme: 1996-2009. Report to the NMBAQC Scheme, cir09, July 2009, 114pp., (unpublished - see NMBAQC website)

For *Chaetozone* see:

Blake, J.A. & Lavesque, N. (2017). A new species of *Chaetozone* (Polychaeta, Cirratulidae) from the Bay of Biscay offshore France, together with a review of *Chaetozone* species from the North Atlantic and adjacent waters. *Zootaxa* 4312 (3): 565–579.

For *Tharyx* see:

Blake, J.A. & Goransson, P. (2015). Redescription of *Tharyx killariensis* (Southern) from Ireland and description of two new species of *Tharyx f*rom the Kattegat, Sweden (Polychaeta, Cirratulidae). *Zootaxa* 4039 (4): 501–515.

For *Protocirrineris* see:

Lezzi, M. Cinar, A. & Giangrande, M.E. (2016). Two new species of Cirratulidae (Annelida: Polychaeta) from the southern coast of Italy. *Marine Biodiversity*, 46(3), 681-686. DOI 10.1007/s12526-015-0418-5

Lezzi, M, & Van Haaren, T. (2024). *Protocirrineris stormae*: A New Species of Polychaete from The Netherlands (Annelida: Polychaeta: Cirratulidae). *Taxonomy* 2024, 4, 303–313.

Family Capitellidae (Gallery Worms)

Unicomarine, (2000). A key to British Capitellidae; adapted from ECSA workshop key. Unicomarine Key, 1p. (unpublished see NMBAQC website)

Family Maldanidae (Bamboo Worms)

Garwood, P. R. (2007). Family Maldanidae - A guide to species in waters around the British Isles. NMBAQC 2006 taxonomic workshop, Dove Marine Laboratory. (unpublished - see NMBAQC website)

Family Opheliidae

Rowe, G. A. (2010). A Provisional Guide to the family Opheliidae (Polychaeta) from the shallow waters of the British Isles. Report to the NMBAQC 2008 taxonomic workshop participants - Dove Marine Laboratory. EMU Report, (unpublished - see NMBAQC website)

Family Scalibregmatidae

Worsfold, T.M., (2006). Identification guides for the NMBAQC Scheme: 1. Scalibregmatidae (Polychaeta) from shallow seas around the British Isles. *Porcupine Marine Natural History Society Newsletter*, 20: 15-18.

Family Flabelligeridae

Use keys in Kingston & Duff (1987) in conjunction with figures in Hartmann-Schroder (1971) volume:

Kingston, P & Duff, A. eds. (1987). *Key to the Polychaete annelids from the North Sea and Baltic approaches.* A translation of the keys contained in *Die Tierwelt Deutschlands und angrenzender Meeresteile, Annelida, Borstenwurmer, Polychaeta* by Dr Gesa Hartmann-Schroder (1971). Institute of Offshore Engineering Heriot-Watt University, Edinburgh.

Hartmann-Schröder, G., (1971). *Annelida, borstenwurmer, polyc*haeta 2., neubearbeitete Auflage mit 295 Abbildungen. Die tierwelt Deutschlands und der angrenzden meeresteile, 58 (first edition). Gustav Fischer, Jena, 645pp.

For *Diplocirrus* see:

Darbyshire, T. & Mackie, A.S.Y. (2009). Two new species of *Diplocirrus* (Polychaeta: Flabelligeridae) from the southern Irish Sea and South Africa. *Zoosymposia* 2: 91–103.

Family Oweniidae (Shingle Worms)

For *Owenia* see:

Koh, B-S., Bhaud, M.R. & Jirkov, I.A. (2003). Two new species of *Owenia* (Annelida: Polychaeta) in the northern part of the North Atlantic Ocean and remarks on previously erected species from the same area. *Sarsia* 88:175-188.

For *Myriochele* and *Galathowenia* see:

Nilsen, R. & Holthe, T. (1985). Arctic and Scandinavian Oweniidae (Polychaeta) with a description of *Myriochele fragilis* sp. n. and comments on the phylogeny of the family. *Sarsia* 70: 17-32.

Terebellomorpha – Families Pectinariidae, Ampharetidae, Terebellidae, Trichobranchidae

(Cone-worms, Lamella-worms, Spaghetti Worms, Medusa Worms, Pompom worms etc.)

Best place to start for UK species is the Holthe volume which suffices for most of the common species:

> Holthe, T. (1986). *Polychaeta Terebellom*orpha. Marine Invertebrates of Scandinavia, No.7, Norwegian University Press. 192pp.

However, a broader and more recent key is also available:

> Jirkov, I.A. & Leantovic, M.A. (2013). Identification keys for Terebellomorpha (Polychaeta) of the eastern Atlantic and the North Polar Basin. *Invertebrate Zoology*, 10: 217-243. (see NMBAQC website)

For a thorough review of the numerous taxonomic changes within the European Terebellomorpha check out the Sphaghetti worm project:

> Lavesque, N. *et al*. (2021). The "Spaghetti Project": the final identification guide to European Terebellidae (sensu lato) (Annelida, Terebelliformia*). European Journal of Taxonomy* 782: 108–156.

For *Ampharete* see:

> Parapar *et al*. (2019). A new species of *Ampharete* (Annelida: Ampharetidae) from the West Shetland shelf (NE Atlantic Ocean), with two updated keys to the species of the genus in North Atlantic waters. *European Journal of Taxonomy* 531: 1–16.
>
> Jirkov, I.A., (2020). Revision of *Ampharete* (superspecies *finmarchica*) (Annelida: Ampharetidae). *Invertebrate Zoology*, 20(1), 1-26.
>
> Krüger, L., Dietrich, A, Bastrop, R. & Bick, A., (2022). From synonym to valid species: redescriptions of *Ampharete acutifrons* (Grube, 1860) and *A. cirrata* Webster & Benedict, 1887, and brief descriptions of *A. baltica* Eliason, 1955 and *A. grubei* Malmgren, 1865 (Annelida: Terebellida: Ampharetidae). *Zootaxa*, 5174(4), 357-380.

<u>Families Sabellidae and Fabriciidae (Fanworms)</u>

The current definitive key for is:

> Giangrande, A., Licciano, M. & Wasson, B. (2015). Guide to identification of Sabellidae and Fabriciidae (Polychaeta) in north-east Atlantic and Mediterranean waters. NMBAQC 2014 taxonomic workshop, Dove Marine Laboratory. 91pp, January 2015. (Unpublished - see NMBAQC Website)

However, for UK species it is easier to start with the old EBSA workshop keys:

> Knight-Jones, P. (1984). Draft Keys to families Sabellidae, Serpulidae and Spirorbidae, 12,8, &3pp. EBSA Sedentary Polychaete Workshop, Swansea, April 1984. (Unpublished - see NMBAQC Website)

The Knight-Jones keys and figures were reproduced, with minor revisions, in the Hayward & Ryland (1990) volume.

For *Myxicola* see:

> Darbyshire, T. (2023). Designation of a neotype for *Myxicola infundibulum* (Montagu, 1808) (Annelida: Sabellidae) and a new species from the UK. *European Journal of Taxonomy* 900: 106–137

For good illustrations of **many UK polychaetes** see the **Fauna Iberica** volumes:

Vol. 25 – Polychaeta I

> Key to Families; Families Phyllodocidae, Hesionidae, Pilargidae, Nereidae, Nephtydae, Paralacydoniidae, Chrysopetalidae, Pisionidae.

Vol. 21 – Polychaeta II

> Family Syllidae.

Vol. 36 – Polychaeta III

> Lacydoniidae, Sphaerodoridae, Amphinomidae, Euphrosinidae, Spintheridae, Orbiniidae, Paraonidae, Cossuridae, Opheliidae, Nerillidae.

Vol. 41 – Polychaeta IV

> Glyceridae, Goniadidae, Aphroditidae, Polynoidae, Acoetidae, Sigalionidae, Pholoidae, Capitellidae.

Vol. 45 – Polychaeta V (Includes planktonic, parasitic and interstitial polychaetes)

> Alciopidae, Lopadorrhynchidae, Tompoteridae, Typhoscolecidae, Iospilidae, Icthyotomidae, Chrysopetalidae (Calamyzinae), Lumbrineridae, Oenonidae, Stauronereidae, Aberrantidae, Parergodrilidae, Fauveliopsidae, Maldanidae, Arenicolidae, Dinophilidae, Polygordiidae, Protodrilidae, Protodriloididae, Saccocirridae, Diurodrilidae, Myzostomatidae.

Vol. 47 – Polychaeta VI

> Sabellidae, Fabriciidae, Serpulidae (inc. Spirorbidae).

Oligochaeta

The simplest guide for marine oligochaetes is:

> Worsfold, T.M., (2003). Introduction to Oligochaetes. Report to the NMBAQC 2003 Taxonomic Workshop participants - Dove Marine Laboratory. Unicomarine Report NMBAQC olig03, 22pp, November 2003 (Unpublished - see NMBAQC website).

The standard synopsis guide below provides additional details but is very technical for beginners:

Brinkhurst, R.O. (1982). British and other marine and estuarine Oligochaetes. **SBF. No. 21.,** Cambridge University Press, 127pp.

For upper estuaries with freshwater influence use:

Brinkhurst, R.O. (1971). A guide for the identification of British Aquatic Oligochaeta. (2nd Edition). Freshwater Biological Association, Scientific Publication No.22, 55 pp.

3. CRUSTACEA

a) CIRRIPEDIA (Barnacles)

The easiest guide for barnacles is the Hayward & Ryland (1990) volume. For a fuller assessment of all UK species see:

Southward, A.J. (2008). Barnacles. **SBF No. 57**, Field Studies Council, 140 pp.

b) OSTRACODA

Benthic ostracods are mostly meiofauna size and are rarely found in macrofauna samples. Occasionally larger benthic Myodocopid ostracods are found and can be simply recorded as Myodocopida. Some of these can be identified via:

Poulsen, E. M. (1969). Ostracoda I. Myodocopa. Sub-order: Cypridiniformes. Families: Cypridinidae, Rutidermatidae, Sarsiellidae, Asteropidae. *Fiches d'identification du zooplankton.* Sheet 115. 5pp. Conseil International Pour L'Exploration de La Mer.

c) COPEPODA

Benthic copepods are generally regarded as meiofauna and are rarely found in macrofauna samples. Occasionally larger planktonic Calanoids are found from wash-water and are simply recorded as Copepoda or Calanoida.

Parasitic and commensal copepods may be found with various benthic invertebrates. Most can be identified with:

Gotto, R.V. (2004). Parasitic and commensal copepods associated with Marine Invertebrates. **SBF No. 46. (Second Edition**), Field Studies Council, 352pp.

c) LEPTOSTRACA

The taxonomy of UK Leptostracans has changed in recent years with new species recognised in our waters. Mauchline's 1984 synopsis on Euphausiid, Stomatopod and Leptostracan Crustaceans (**SBF No. 30.)** is out of date for leptostracans.

An up-to-date key for British Leptostracans can now be found in:

McCormack, E., Ashelby, C.W. & McGrath, D. (2016). A review of the Leptostraca of the British Isles with discussion of the genus *Sarsinebalia* Dahl. *Nauplius*, 24, e2016006, 1-19.

For fuller figures of some of the species from our waters you will need to check:

Dahl, E. (1985). Crustacea Leptostraca, principles of taxonomy and a revision of European shelf species. *Sarsia* 70, 135-165.

Moreira, J., Gestoso, L. & Troncoso, J.S. (2003). Two new species of *Sarsinebalia* (Crustacea, Leptostraca) from the Northeast Atlantic, with comments on the genus. *Sarsia*, 88, 189-209.

Moreira, J., Kocak, G. & Katagan, T. (2007). *Nebalia kocatasi* sp. nov., a new species of leptostracan (Crustacea: Phyllocarida) from Izmir Bay (Aegean Sea, eastern Mediterranean). *Journal of the Marine Biological Association of the United Kingdom*, 87, 1247-1254.

Moreira, J., Díaz-Agras, G., Candás, M., Señarís, M.P. & Urgorri, V., (2009). Leptostracans (Crustacea: Phyllocarida) from the Ría de Ferrol (Galicia, NW Iberian Peninsula), with description of a new species of *Nebalia* Leach, 1814. *Scientia Marina*, 73(2), 269-285.

d) MYSIDACEA

The Field Studies guide will identify most mysids in our coastal waters:

Makings. P. (1977). A Guide to the British Coastal Mysidacea. *Field Studies* 4:575-595.

e) AMPHIPODA - Gammaridea

For benthic amphipods always start with Lincoln's monograph:

Lincoln, R.J. (1979). British Marine Amphipoda: Gammaridea. British Museum (Natural History), 658 pp.

However, since its publication there has been numerous updates for specific families or taxa, the most relevant are below (in family order of Lincoln, 1979). For a fuller list check Worsfold *et al*. 2024 Taxonomic Bibliography on NMBAQC website.

Lysianassidae

Kilgallen, N.M., Myers, A.A. & McGrath, D. (2006). A review of the genus *Tryphosella* (Crustacea: Amphipoda) from Britain and Ireland, with the description of a new species *Tryphosella lowryi*. *J.mar.biol.Ass.U.K.*, 86(5), 1067-1081.

Kilgallen, N.M., Myers, A.A. & McGrath, D. (2006). Re-establishment of *Orchomenella crenata* (Crustacea: Amphipoda) as a distinct species, with a first record of its occurrence in the British Isles. *J.mar.biol.Ass.U.K.*, 86(6), 1389-1400.

Kilgallen, N.M., Myers, A.A. & McGrath, D. (2006). A revision of the north Altlantic amphipod genus *Normanion* (Crustacea: Amphipoda: Lyssianassoidea). *Zootaxa*, 1363, 1-21.

Kilgallen, N.M., Myers, A.A. & McGrath, D, (2007). The genus *Sophrosyne* (Crustacea: Amphipoda: Lysianassoidea) in the North Atlantic, with a confirmation of the status of *S. robertsoni. J.mar.biol.Ass.U.K.*, 87(5), 1243-1246.

Lowry, J.K. & Stoddart, H.E. (2010). Sophryosynidae, a new family in the Lysianassoidea (Crustacea: Amphipoda) with a revision of the genus *Sophryosyne. Zootaxa*, 2370, 1-35.

Stoddart, H.E. & Lowry, J.K. (2012). Revision of the lysianassoid genera *Acidostoma* and *Shackletonia* (Crustacea: Amphipoda: Acidostomatidae fam.nov.). *Zootaxa*, 3307, 1-34.

Ampeliscidae

Dauvin, J.C. & Bellan-Santini, D. (1988). Illustrated Key to *Ampelisca* Species from the North-Eastern Atlantic. *J.mar.biol.Ass.U.K.*, 68(4), 659-676.

Myers, A.A., McGrath, D. (1991). The *Ampelisca diadema* group of species (Amphipoda: Gammaridea) in British and Irish waters. *J.mar.biol.Ass.U.K*., 71:265-279.

Myers, A.A., McGrath, D. (1994). *Ampelisca dalmatina* and *A. provincialis* (Amphipoda: Gammaridea) in Irish waters. *J.mar.biol.Ass.U.K*., 74:403-412.

Acanthonotozomatidae

Myers, A.A., McGrath, D. & Costello, M.J. (1987). The Irish species of *Iphimedia* Rathke (Amphipoda: Acanthonotozomatidae). *J.mar.bio.Ass.U.K*., 67:307-321.

Moore, P.G. (1984). *Acanthonotozoma serratum*, an Arctic amphipod new to Britain. *J.mar.bio.Ass.U.K.*, 64, 731-732.

Leucothoidae

Myers, A.A. & McGrath, D. (1982). Taxonomic studies of British and Irish amphipoda. Re-establishment of *Leucothoe procera. J.mar.biol.Ass.U.K*., 62: 693-698.

Myers, A.A. & Costello, M.J. (1986). The amphipod sibling pair *Leucothoe lilljeborgi* and *L. incisa* in British and Irish waters. *J.mar.biol.Ass.U.K*., 66:75-82.

Talitridae

Wildish, D.J. (1987). Estuarine species of *Orchestia* (Crustacea: Amphipoda: Talitroidea) from Britain. *J.mar.biol.Ass.U.K*., 67: 571-583.

Melitidae

Myers, A.A., McGrath, D. & Musk, W., (2017). First recorded occurrence of *Cheirocratus robustus* Sars, 1894 in the British Isles. *Marine Biodiversity Records* (2017), 10(3), 1-4

Gouillieux, B. (2019). *Cheirocratus pseudosundevalli* (Amphipoda, Cheirocratidae), a new species from Archachon Bay, Bay of Biscay. *Crustaceana*, 92 (8) 943-955.

Haustoriidae

Udekem d'Acoz, C. (2004). The genus *Bathyporeia* Lindstrom in western Europe (Crustacea, Amphipoda, Pontoporeiidae). *Zoologische Verhandelingen*, Leiden, 348, 180pp.

Oedicerotidae

Moore, P.G. (1984). The amphipod *Monoculodes gibbosus* (Crustacea) in British waters. *J.mar.biol.Ass.U.K.*, 64(2), 271-278.

Myers, A.A. & Ashelby, C.W. (2022). A revision of the genus *Pontocrates* Boeck, 1871 (Amphipoda, Oedicerotidae) with the description of *P. moorei* sp. nov. and the re-establishment of *P. norvegicus* (Boeck, 1860). *Zootaxa* 5115(4): 582-598.

Phoxocephalidae

King, R.A., Myers, A.A, & McGrath, D. (2004). A review of shallow-water Irish and British *Harpinia* Boeck (Crustacea: Amphipoda: Phoxocephalidae) species including the first detailed description of the males of *Harpinia laevis* Sars and *Harpinia pectinata* Sars. *Journal of Natural History* 38, 1263-1286.

Lilljeborgiidae

Myers, A. A. and McGrath, D. (1983). The Genus *Listriella* (Crustacea: Amphipoda) in British and Irish Waters, with the description of a new species. *J. mar. biol. Ass. U.K*., 63: 347-353.

Aoridae

Myers, A.A. & Costello, M.J. (1984). The amphipod genus *Aora* in British and Irish waters. *J.mar.biol.Ass.U.K*., 64:279-283.

Isaeidae

Myers, A. A. and McGrath, D. (1981). Taxonomic studies of the British and Irish Amphipoda. The genus *Photis* with the re-establishment of *P. pollex* (=*P. macrocoxa*). *J.mar.biol.Ass.U.K*., 61:759-768.

Myers, A. A. and McGrath, D. (1982). Taxonomic studies on British and Irish Amphipoda. The Genus *Gammaropsis. J. mar. biol. Ass. U.K*., 62: 93-100.

Corophiidae

Myers A.A. & McGrath D. (1979). The British and Irish species of *Siphonoecetes* Kroyer (Amphipoda-Gammaridea). *Journal of Natural History* 13:211-220.

Ischyroceridae

Myers, A. A. and McGrath, D. (1984). A revision of the North-East Atlantic species of *Ericthonius* (Crustacea:Amphipoda). *J.mar.biol.Ass.U.K*., 64: 379-400.

King, R.A. & Holmes, J.M.C. (2004). A new species of *Ischyroceras* (Crustacea: Amphipoda) from Ireland, with a review of *Ischyroceras anguipes* and *Ischyroceras minutus* from the North-East Atlantic. *Journal of Natural History*, 38 (14), 1757-1772.

Conlan, K.E., Desiderato, A. & Beerman, J. (2021). *Jassa* (Crustacea: Amphipoda): a new morphological and molecular assessment of the genus. *Zootaxa,* 4939, 1 – 191.

h) AMPHIPODA – Caprellidea

A useful place to begin for Caprellideans is the Hayward & Ryland (1990) volume. However, this is not comprehensive, and the current standard key is:

Guerra-García, J.M. (2014). Caprellidea. Identification guide to British Caprellids v.3.3. NMBAQC 2012 Taxonomic Workshop, Dove Marine Laboratory. 17pp, September 2014. (Unpublished - see NMBAQC Website)

The Guerra-García key is helpful to distinguish *Parvipalpus capillaceous* – a small species previously overlooked. However, the key for *Caprella* is based mostly on mature male specimens and may mis-key some species such as *Caprella mutica*. For *C. mutica* females see the description (under the synonym of *C. macho*):

Platvoet, D., de Bruyne, R.H., Gmelig Meyling, A.W. (1995). Description of a new Caprella-species from the Netherlands: *Caprella macho* nov. spec. (Crustacea, Amphipoda, Caprellidae). *Bulletin Zoölogisch Museum, Universiteit van Amsterdam*. 15: 1-4.

The old series synopsis key may also still prove useful:

Harrison, R.J. (1944). Caprellidea (Amphipoda, Crustacea). Synopses of the British Fauna. No.2, 27 pp.

For distinguishing *Caprella linearis* and *C. septentrionalis* see:

Guerra-García, J.M. (2002). Re-descriptions of *Caprella linearis* (Linnaeus, 1767) and *C. septentrionalis* Kröyer, 1838 (Crustacea: Amphipoda: Caprellidea) from Scotland, with an ontogenetic comparison between the species and a study of the clinging behaviour. *Sarsia*, 87, 216-235.

i) ISOPODA

A useful place to begin for Isopods is the Hayward & Ryland (1990) volume. However, the standard key for inshore species is:

Naylor, E. & Brandt, A. (2015). Intertidal marine isopods. Keys and notes for the identification of the species. **SBF No. 3**. **(Second Edition)**, Published for The Linnean Society of London by Field Studies Council, Shrewsbury, 144pp.

Excellent figures of many offshore species can be found in the Sars volume:

Sars, G.O. (1896-9). An Account of the Crustacea of Norway, Vol.2, 270pp, 104 plates.

Additional papers:

Bamber, R.N. & Robbins, R.S., (2010). Rediscovery, redescription and resurrection of *Metamunna typica* Tattershall, 1905 (Pericarida, Isopoda, Asellota, Paramunnidae). *Porcupine Marine Natural History Society Newsletter*, 28, 10-14.

j) TANAIDACEA

A useful place to begin for Tanaidaceans is the Hayward & Ryland (1990) volume.

However, the standard key for inshore species is:

Holdich, D.M. & Jones, J.A. (1983). Tanaids. **SBF No. 27**, Cambridge University Press, 98 pp.

An updated key with potential additional species is found in:

Holdich, D.M. and Bird, G. (1988). British Shallow Water Tanaidacea - EBSA Small Crustacean Workshop, Bangor, Wales, 1988, 19pp. (Unpublished - See NMBAQC Website)

Subsequent papers with additional species include:

Bird, G.J. (2002). A re-evaluation of the genus *Tanaissus* (Crustacea, Tanaidacea) in British and adjacent waters. *Sarsia* 87, 152-166.

Holdich, D.M. and Bird, G. (1986). Tanaidacea (Crustacea) from sublittoral waters of West Scotland, including the description of two new genera. *Journal of Natural History* 20, 79-100.

k) CUMACEA

A useful place to begin for Cumaceans is the Hayward & Ryland (1990) volume. However, this is not comprehensive. For many years the standard guide has been Jones (1976). This is still very useful but an updated key with additional species has since been produced via the NMBAQC scheme in 2011:

Jones, N.S. (1976). British Cumaceans. Synopses of the British Fauna **SBF No. 7**, Academic Press, 66 pp.

Shalla, S. (2011). Cumacea. Identification guide to British Cumaceans. 46 pp. (Unpublished - see NMBAQC Website)

l) EUPHAUSIACEA

Mauchline, J. (1984). Euphausiid,Stomatopod and Leptostracan Crustaceans. **SBF No. 30,** E.J.Brill / Dr W Backhuys, 91 pp.

m) DECAPODA

There are a variety of guide-books on the different sub-groups of decapods:

Crothers, J. & Crothers, M. (1988). A key to the Crabs and Crab-like animals of British inshore waters. *Field Studies* 5:753-806.

Ingle, R.W. (1983). Shallow-water Crabs. Keys and notes for the identification of species. **SBF No. 25**. Cambridge University Press, 206 pp.

Ingle, R.W. & Christiansen, M.E. (2004). Lobsters, Mud Shrimps and Anomuran Crabs. **SBF No. 55**. Field Studies Council, 271 pp.

Smaldon, G. (1993). British Coastal Shrimps and Prawns. **SBF No. 15**. Second edition revised by Holthius, L.B. & Fransen, C., Field Studies Council, 142 pp.

4. MOLLUSCA

The Hayward & Ryland volume (1990) offers an excellent overview of the molluscan groups with many illustrated by line drawings. The marine mollucan groups (Caudofoveata/Solenogastres, Polyplacophora, Scaphopoda, Opisthobranchia, Gastropoda) are well covered by the **SBF** guides, exception for the bivalves (Pelecypoda).

Unfortunately, the higher-level classification of Gastropods (Prosobrachs /Opisthobranchs) has changed recently. Under the old classification all the Prosobranch and Opisthobranch gastropods are conveniently covered in two synopses **(SBF Nos. 2 and 8**). Under the new classification the gastropods are covered in five synopses (**SBF Nos. 60, 61, 62, 63** and a fifth yet to be published including Saccoglossa and Nudibranchia). The adoption of different Sub-class names (Patellogastropoda, Vetigastropoda, Caenogastropoda, Neogastropoda and Heterobranchia) can be confusing to those more familiar with the old classification but does bring the taxonomy up to date. There have also been numerous species names changes in the new synopses!

a) For Caudofoveata, Solenogastres, Polyplacophora, and Scaphopoda:

Jones, A.M. & Baxter, J.M. (1987). Molluscs: Caudofoveata, Solenogastres, Polyplacophora and Scaphopoda. **SBF No. 37**, E.J. Brill / Dr W Backhuys, 123 pp.

b) For GASTROPODS – Following old Classification:

OPISTHOBRANCHIA (bubble shells, sea slugs):

Thompson, T. E. & Brown, G. H. (1988). British Opisthobranch Molluscs. **SBF No. 8, (Second Edition)** E.J.Brill/ Dr W Backhuys, 356 pp, plates I – VIII.

PROSOBRANCHIA (Snails):

Graham, A. (1988). Molluscs: Prosobranch & Pyramidellid Gastropods. S**BF No. 2 (Second edition),** E.J. Brill / Dr W Backhuys, 662 pp.

c) For GASTROPODS – Following New Classification: (and updated species names)

Wigham, D. & Graham, A (2017). Marine Gastropods 1: Patellogastropoda and Vetigastropoda. **SBF No. 60**. Field Studies Council, 172 pp. (Covers True Limpets and Top Shells)

Wigham, D. & Graham, A (2017). Marine Gastropods 2: Littorinimorpha and other, unassigned, Caenogastropoda. **SBF No. 61**. Field Studies Council, 343 pp.

Wigham, D. & Graham, A (2018). Marine Gastropods 3: Neogastropoda. **SBF No. 62**. Field Studies Council, 206 pp. (Covers Whelks and Spindle Shells etc.)

Wigham, D. (2022). Marine Gastropods 4: Heterobranchia 1. **SBF No. 63**. Field Studies Council, 299 pp.

d) PELECYPODA (Bivalves):

The standard bivalve guide is Tebble (1966) which includes keys and figures but much of the nomenclature has changed. Many bivalves are also nicely figured in the Hayward & Ryland (1990) volume. An excellent photographic guide to all UK bivalves from shallow and deeper waters is available on the National Museum of Wales website.

Tebble, N. (1966). British Bivalve Seashells. A Handbook for Identification. The British Museum (Natural History), 212pp.

National Museum of Wales – Bivalve Guide
https://naturalhistory.museumwales.ac.uk/BritishBivalves/home.php

5. MINOR PHYLA

a) FORAMINIFERA

Mostly considered as meiofauna but some taxa (eg. Rhizomorpha) reach macrofaunal sizes.

Gabel B. (1971). Die Foraminiferan der Nordsee. *Helgolander wissensschaftliche Meeresuntersuchungen* 22:1-65.

Murray, J.W. (1979). British Nearshore Foraminifera. **SBF No. 16**, Academic Press, 68 pp.

b) CNIDARIA

A useful place to begin for benthic Cnidarians including Hydrozoa and Anthozoa is the Hayward & Ryland (1990) volume. However, this is not comprehensive, and fuller keys are provided in SBF volumes:

For **Hydrozoa (Sea Firs)**:

Cornelius, P.F.S. (1995). North-West European Thecate Hydroids and their Medusae. **SBF No. 50. Part 1**: Introduction, Laodiceidae to Haleciidae (347pp.) & **Part 2**: Sertulariidae to Campanulariidae (386pp.).

Schuchert, P., (2012). *Athecate hydroids and their medusae*. **SBF No. 59**., Field Studies Council, 364 pp.

For **Anthozoa (Sea Anemones, Sea Pens, Soft Corals, Cup Corals)**:

Manuel, R.L. (1981). British Anthozoa. **SBF No. 18**, Academic Press, 241 pp.

c) PLATYHELMINTHES (Flatworms)

Prudhoe, S. (1982). British Polyclad Turbellarians. **SBF No.26**, Cambridge University Press, 77 pp.

d) NEMATODA (Round Worms)

Generally regarded as meiofauna, although some larger genera such as *Pontonema* can be viewed as macrofauna. For nematode nerds they are covered by the three SBF volumes below. The large *Pontonema alaeospicula* nematode, a species indicative of organic enrichment, was described by Bett & Moore (1988).

Bett, B. J. & Moore, C. G. (1988). The taxonomy and biology of a new species *Pontonema* (Nematoda, Oncholaimidae) dominant in organically polluted sublittoral sediments around Scotland, with a review of the genus. *Journal of Natural History.* 22, 1363-1377.

Platt, H.M. and Warwick, R.M. (1983). Free-Living Marine Nematodes. Part I. British Enoplids. **SBF No. 28**, Cambridge University Press, 307 pp.

Platt, H.M. and Warwick, R.M. (1992). Free-Living Marine Nematodes. Part II. British Chromadorids. **SBF No. 38**, E.J.Brill / Dr W Backhuys, 502 pp.

Warwick, R.M, Platt, H.M. and Somerfield, P.J. (1998). Free-Living Marine Nematodes. Part III. British Monhysterids. **SBF No. 53**, Field Studies Council, 296 pp.

e) NEMERTEA (Ribbon Worms)

Brunberg L. (1964). On the Nemertean Fauna of Danish waters. *Ophelia* 1(1):77-111, 4 plates.

Gibson, R. (1994). Nemerteans. **SBF No. 24, (Second Edition),** Field Studies Council, 224 pp.

f) PRIAPULIDA, SIPUNCULIDA, ECHIURIDA, HEMICHORDATA
(Penis-worms, Peanut-worms, Spoon-worms, Acorn-worms)

The Hayward & Ryland volume (1990) offers an excellent overview of these groups with many illustrated by line drawings. Sipunculans are covered in detail by Gibbs (1977).

Gibbs, P.E. (1977). British Sipunculans. **SBF No. 12**, Academic Press, 35 pp.

g) PYCNOGONIDA (Sea Spiders)

The original SBF guide by King (1974) has been updated by Bamber (2010). The second edition includes many deep-water species but conveniently has a separate key, with thumb-nail sketches for shallow-water species.

King, P.E. (1974). British Sea Spiders. Arthropoda: Pycnogonida. Keys and Notes for the Identification of the species. **SBF No. 5**, Academic Press, 68 pp.

Bamber, R.N. (2010). Sea-Spiders of the north-east Atlantic. **SBF No. 5 (Second Edition)**, Field Studies Council, 255 pp.

i) BRYOZOA (Moss Animals)

The Hayward & Ryland volume (1990) offers an excellent overview of Bryozoans with many illustrated by line drawings. For more details check the **SBF** guides, **Nos. 10, 14, 33, and 34**. Note that updated second editions of SBF guides Nos. 10 and 14 were issued in 1998 and 1999.

Ryland, J.S. & Hayward, P.J. (1977). British Anascan Bryozoans. **SBF No. 10**, Academic Press, 188 pp.

Hayward,P.J. & Ryland, J.S. (1979). British Ascophoran Bryozoans. **SBF No. 14**, Academic Press, 312 pp.

Hayward, P.J. (1985). Ctenostome Bryozoans. **SBF No. 33**, E.J.Brill / Dr W Backhuys, 169 pp.

Hayward, P. J. and Ryland, J. S., (1985). Cyclostome Bryozoans. **SBF No. 34**, E.J.Brill / Dr W. Backhuys, 147 pp.

Hayward, P.J. & Ryland, J.S., (1998). *Cheilostomatous Bryozoa Part 1: Aeteoidea – Cribilinoidea*. **SBF No. 10. (Second Edition).** Field Studies Council, 366pp.

Hayward, P.J. & Ryland, J.S., (1999). *Cheilostomatous Bryozoa Part 2, Hippothooidea - Celleporoidea*. **SBF, No. 14**. **(Second Edition)**. Field Studies Council, 416pp.

j) PHORONIDA (Horse-shoe Worms)

Phoronids are difficult to extract from their tubes and only rarely can be identified to species.

Emig, C.C. (1979). British and Other Phoronids. **SBF No. 13**, Academic Press, 57 pp.

k) ECHINODERMATA (Starfish, Brittle-stars, Sea Lilies, Sea Urchins, Sea Cucumbers)

Southward, E.C. & Campbell, A.C. (2006). Echinoderms. **SBF No. 56**. Field Studies Council, 271 pp.

L) ASCIDIACEA (Sea Squirts)

The original SBF guide by Miller (1971) is quite out of date now as many additional non-native species have been recognised in UK waters (see NMBAQC Ring Test Bulletin No. 66). Hayward & Ryland volume (1990) offers and excellent overview of Ascidians with many illustrated by line drawings.

Miller, R. H. (1970). British Ascidians. **SBF No. 1**, Academic Press, 88 pp.