Deep-sea fauna of European seas: An annotated species check-list of benthic invertebrates living deeper than 2000 m in the seas bordering Europe. Crinoidea

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ABSTRACT: An annotated check-list is given of Crinoidea species occurring deeper than 2000 m in the seas bordering Europe. The check-list is based on published data. The check-list includes 21 species. For each species synonymy, data on localities in European seas and general species distribution are provided. Station data are presented separately in the present thematic issue.

KEY WORDS: deep-sea fauna, European seas, Crinoidea.
Phylum Echinodermata
Class Crinoidea
Order Comatulida

REMARKS: Classification of crinoids used in the present work is in accordance with that in Hess, Messing (2011).

Family Antedonidae
Genus Leptometra A.H. Clark, 1908
COMPOSITION: 2 species (Clark A.H., 1923a).
Type species: L. phalangium (J. Müller, 1841).
Unpublished molecular data suggest that the two Leptometra species are synonyms.
DISTRIBUTION: Atlantic from the northern coast of Scotland and Hebrides to Cap Blanc, the Mediterranean; perhaps also off Brazil.
DEPTH RANGE: from 42 to 1292 m (?2789–2834 m).

Leptometra phalangium (J. Müller, 1841)
Leptometra phalangium —Clark A.H., Clark A.M., 1967: 553–564, fig. 2:a, b.
REMARKS: The average depth of occurrence is 300 m (Clark A.H., Clark A.M., 1967), the only occurrence below 2000 m (Clark A.M., 1977) is erroneous. The specimen dredged on the “Atlantis II” cruise 59, St. 211 (33°57′N, 15°08.2′E) was deposited at the Smithsonian Institution under reference number E16294. Both the label and the list of the “Atlantis II” stations were checked by Cynthia Ahearn. It was concluded that the specimen cited by A.M. Clark (1977) was dredged from 500–509 m depth, not 2834–2789 m.

Genus Thaumatometra A.H. Clark, 1908
COMPOSITION: 9 species (Clark A.H., Clark A.M., 1967).
Type species: T. tenuis (Clark A.H., 1907).
DISTRIBUTION: North Pacific (1 species), northwest Pacific (4 species), Indonesia (1 species), southwest Pacific (1 species); North Indian Ocean (1 species), southwest Indian Ocean (1 species), Atlantic from Iceland and Baffin Bay to Brazil (2 species).
CENTRE OF DIVERSITY: northwest Pacific (4 species).
DEPTH RANGE: 146–3229 m.

Thaumatometra septentrionalis
A.H. Clark, 1918
LOCALITIES: INGOLF, St. 11, 18, 36 (Clark A.H., 1923a; Clark A.H., Clark A.M., 1967).

DISTRIBUTION: Baffin Bay to Iceland.
DEPTH RANGE: 2075–2623 m.

Genus Trichometra A.H. Clark, 1908
COMPOSITION: 2 species . Type species: T. cubensis (Pourtalès, 1869)
DISTRIBUTION: northwest Pacific (1 species), off Hawaiian Islands (1 species); Atlantic (2 species) from Iceland and Davis Straits to the Bay of Biscay and Brazil.
DEPTH RANGE: 223–2834 m.

Trichometra cubensis (Pourtalès, 1869)
REMARKS: A.H. Clark (1923a) recorded Trichometra delicata at the “Ingolf” station 18. 61°44′N, 30°29′W, 2075 m. A.M. Clark (1970) considered this small specimen conspecific with T. cubensis. It is possible that smaller specimens from “Helga” stations in the Bay of Biscay and from west of Ireland reported as T. delicata will also prove to be conspecific with T. cubensis (Harvey et al., 1988).
LOCALITIES: INGOLF, St. 24, and perhaps St. 18, 36 (Clark A.H., 1923a); “Discovery”, St. 7711#66 (Clark A.M., 1980); BIOGAS III, St. 1 CP 33; BIOGAS XI CP 37 (Roux, pers. com.).
DISTRIBUTION: Iceland, the Faeroe Islands southwards to Morocco, and Greenland, Davis Strait to the West Indies, northwest Pacific, off Hawaiian Islands.
DEPTH RANGE: 210–2834 m (Meyer et al., 1978; Clark A.M., 1980).

Trichometra delicata A.H. Clark, 1911
LOCALITIES: “Travailleur”, St 13, (Folin, 1887; Clark A.H., 1911; Marshall, Rowe, 1981); BIO-ACORES, St. 252 (unpublished).
DISTRIBUTION: Ireland to Portugal.
DEPTH RANGE: 700–2700 m.

Genus Pentametrocrinidae
Genus Pentametrocrinus A.H. Clark, 1908
DISTRIBUTION: northwest Pacific (1 species), northeast Pacific (1 species, Messing, 2008), west Pacific (1 species), southwest Pacific (2 species, McKnight, 1977), Indian Ocean (2 species), Atlantic (1 species, Messing, 1978).
CENTRE OF DIVERSITY: Not recognizable.
DEPTH RANGE: 374–3320 m (or 188–4851 m in accordance with Messing, 2008).
Pentametrocrinus atlanticus (Perrier, 1883)


LOCALITIES: “Talisman”, St. “45” (30°01′N, 09°25′W, depth 2215 m) (Folin, 1887; Clark A.H., 1911).

REMARKS: Pentametrocrinus atlanticus is one of four amphi-Atlantic comatulids that occur in the tropical western Atlantic. The other three are Trichometra cubensis, Zenometra columnaris and Atelecrinus balanoides (Messing, 1978; Messing, White, 2001). A.H. Clark obviously took data of “Talisman” stations from Smith (1889). However, the official list of Commandant Parfait published in the Annales Hydrographiques (1883) differs considerably from that of Smith. The reasons for this discrepancy are given in Bauchot et al. (1971).

DISTRIBUTION: northeast Atlantic from southwest of Ireland to north-west Africa, western Atlantic from the Blake Plateau to Martinique (Lesser Antilles) (Clark A.M., 1980).

DEPTH RANGE: 374–2115 m.

Genus Thaumatocrinus

P.H. Carpenter, 1883


DISTRIBUTION: northwest Pacific (1 species), west Pacific (2 species), South Australia (1 species), Antarctic (1 species), Indian Ocean (1 species), Atlantic (1 species).

CENTRE OF DIVERSITY: West Pacific (2 species).


Thaumatocrinus jungerseni

A.H. Clark, 1923

Thaumatocrinus jungerseni — Clark A.H., 1923a: 13–17, fig. 2–4; Clark A.M., 1980: 204–205.

REMARKS: Distinction between T. jungerseni and T. renovatus remains unclear (Clark A.H., Clark A.M., 1967; Clark A.M., 1980), only their geographic distribution (northern and southern hemisphere respectively) separates the two species.

LOCALITIES: “INGOLF”, St. 18 (Clark A.H., 1923a); “Discovery”, St. 7711#57, 7711#62, 7711#85 (Clark A.M., 1980); “Discovery”, St. 9640#1 (Gage et al., 1983); “Challenger”, St. SWT 12, SWT 13 (Gage et al., 1983).

DISTRIBUTION: Denmark Strait and the Rockall Trough to southern Ireland.

DEPTH RANGE: 823–3757 m.

Family Thalassometridae

Genus Thalassometra A.H. Clark, 1907

COMPOSITION: 19 species (Clark A.H., 1950; McKnight, 1977; Clark A.M., 1980; Eléaume et al., 2004). Type species: Thalassometra villosa A.H. Clark, 1907.

REMARKS: A.M. Clark (1980) suggested that a single damaged specimen identified as T. omissa and referred by Koehler (1909) to the basicurva group (i.e. Thalassometra of A.H. Clark, 1907), could refer to the Antedonidae. One of us (MPE) examined the specimen and confirmed that it belongs to the family Thalassometridae.

DISTRIBUTION: North Pacific (1 species), northwest Pacific (2 species), west Pacific (4 species), southwest Pacific (2 species), east Pacific (3 species), Indian Ocean (2 species), Antarctic and Subantarctic (2 species), Atlantic (3 species).

CENTRE OF DIVERSITY: west Pacific (4 species).

DEPTH RANGE: 148–4265 m.

Thalassometra lusitanica (P.H. Carpenter, 1884)


LOCALITIES: “Princesse Alice”, St. 1116 (Koehler, 1909), ABYPLAINE, St. CP 68 (unpublished); CYMOR II, DR 24 (Roux, pers. com.).

DISTRIBUTION: Bay of Biscay (47–49°N, 09–11°W; unpublished data) to Morocco.

DEPTH RANGE: 914–2165 m.

Family Zenometridae

Genus Zenometra A.H. Clark, 1907

COMPOSITION: 1 species (Messing, White, 2001). Type species: Z. columnaris (Carpenter, 1881).


DEPTH RANGE: 504–4015 m.

Zenometra columnaris (P.H. Carpenter, 1881)


REMARKS: This amphi-Atlantic comatulid occurs much deeper in the eastern Atlantic (3465–4014 m) than in the western Atlantic (504–1034 m).


DISTRIBUTION: as for the genus.

DEPTH RANGE: 504–4015 m.

Family Bathycrinidae

Genus Bathycrinus Thomson, 1872

**Bathycrinus aldrichianus**

**Thomson, 1876**

*Bathycrinus campbellianus* — Carpenter, 1884: 238–240, fig. 15; pl. 7a, 22, 23; *Bathycrinus serratus* — Clark A.H., 1908: 205–207, fig. 1; *Bathycrinus aldrichianus* — Macurda, Meyer, 1976: 647–667, figs. 1–5; pl. 1–5; Eléaume et al., 2012: 3–4, fig. 1.

**REMARKS:** The Atlantic species *B. aldrichianus* and *B. gracilis* are very closely related and may perhaps ultimately prove to be identical. In the northeastern Atlantic, *B. aldrichianus* is known only as fragments of two stems (Clark A.H., 1949; Macurda, Meyer, 1976), therefore identification is questionable.

**LOCALITIES:** “Atlantis”, cruise 152, St. 30 (Clark A.H., 1949).

**DISTRIBUTION:** west Atlantic between 38°20'N and 37°13'S, central Atlantic, and Gulf of Guinea in the East Atlantic.

**DEPTH RANGE:** 3317–5860 m.

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**Bathycrinus carpenteri**

**(Danielssen et Koren, 1877)**


**LOCALITIES:** Norwegian North-Atlantic Expedition 1876–1878, St. 40, 51, 53, 205, 295, 303 (Danielssen, 1893); *INGOLF*, St. 113 (Clark, 1923a); Swedish Arctic Expedition, Spitzbergen, 1898, St. 26, 27 (Gislén, 1938); “Sadko”, St. 1935–59, 1938–1951; BIOGAS 3, station without number (47°32.3'N, 09°36'E, depth 4256 m); BIOGAS 5, St. 4 (CP 05); St. 6 (CP 07); BIOGAS 6, St. 1 (CP 09); St. 3 (CP 13); St. 3 (CP 14); St. 3 (DS 76) POLYGAS A, St. 3 (DS 20); INCAL, St. 4 (Roux, 1985; Roux, pers. comm.).

**DISTRIBUTION:** Arctic, from the Norwegian and Greenland Seas to the Laptev Sea.

**DEPTH RANGE:** 520–3800 m.

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**Bathycrinus gracilis**

**Thomson, 1872**

*Bathycrinus gracilis* — Carpenter, 1884: 243–245, fig. 16, pl. 8a, figs 1–3; Clark A.M., 1980: 206–207, fig. 5; Roux et al., 2002: 822, Fig. 7c–d.

**LOCALITIES:** “Porcupine” 1869, St. 37 (Wyville Thomson, 1875; Carpenter, 1884); “Princesse Alice” 1896, St. 749 (Koehler, 1909); “Chain”, cruise 106, St. 328 (Clark A.M., 1977); “Meteor”, cruise 3, St. 24, 30 AT, 38 AT (Clark A.M., 1980); “Challenger”, St. ES 27 (Harvey et al., 1988).

**DISTRIBUTION:** West European and Iberian Basins, Porcupine Abyssal Plain, Porcupine Seabight and Rockall Trough.

**DEPTH RANGE:** 2880–5275 m.

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**Monachocrinus A.H. Clark, 1917**

**Monachocrinus australis**

**Perrier, 1885**

*Ilycrinus recuperatus* — Perrier, 1886: 273, figs. 193, 242, 2; *Bathycrinus perrieri* — Koehler, Vaney, 1910: 27–28, figs. 1–2; *Monachocrinus coelus* — Clark A.H., 1923b: 229, pl. 8:1; *Monachocrinus recuperatus* — Gislén, 1951: 52–53, fig. 1; Roux et al., 2002: 823, Fig. 7e.

**LOCALITIES:** “Talisman” 1883, St. 136, St. 40 (Folin, 1887; Koehler, Vaney, 1910); “Michael Sars”, 1910, St. 25 A (Murray, Hjort, 1912; Grieg, 1932); Swedish Deep-Sea Expedition, St. 387 (Gislén, 1951); BIOGAS 3, station without number (47°32.3'N, 09°36'E, depth 4256 m); BIOGAS 5, St. 4 (CP 05); St. 6 (CP 07); BIOGAS 6, St. 1 (CP 09); St. 3 (CP 13); St. 3 (CP 14); St. 3 (DS 76) POLYGAS A, St. 3 (DS 20); INCAL, St. 4 (Roux, 1985; Roux, pers. comm.).

**DISTRIBUTION:** north of the Azores to South Africa.

**DEPTH RANGE:** 1620–4850 m.

**Monachocrinus sexradiatus**

**A.H. Clark, 1917**

**Monachocrinus sexradiatus** — Clark A.H., 1923a: 19, 45, figs. 5–8.
LOCALITIES: INGOLF: St. 18 (Clark A.H., 1923a).
DISTRIBUTION: southwest of Iceland.
DEPTH RANGE: 2075 m.

**Family Septocrinidae**

**Genus Zeuctocrinus A.M. Clark, 1973**

COMPOSITION: 2 species (Mironov, 2000).
DISTRIBUTION: northeastern Atlantic and northwestern Pacific (Volcano Trench).
DEPTH RANGE: 2000–6785 m.

*Zeuctocrinus gisleni* A.M. Clark, 1973

— Clark A.M., 1973: 277–281, fig. 5; pl. 2; Roux, 1977: 34, pl. I: 6–8; pl. III: 1–7; Roux et al., 2002: 823, Fig. 7a–b.
DISTRIBUTION: northeastern Atlantic from Ireland to north-west Spain (41°49′–53°11′ N).
DEPTH RANGE: 2000–2574 m.

**Family Bourgueticrinidae**

**Genus Democrinus Perrier, 1883**

COMPOSITION: 7 species. According to Roux et al. (2002), the genus includes 9 recent species. Following Messing, Dearborn (1990), the two species, *D. rawsonii* (Pourtales, 1874) and *D. brevis* Clark, 1909, are considered here as synonyms of *D. conifer* Clark, 1909. Type species: *D. parfaiti* Perrier, 1883.
DISTRIBUTION: northwest Pacific (3 species), northeast Atlantic (2 species), North Atlantic (1 species).
DEPTH RANGE: 290–3135 m.
CENTRE OF DIVERSITY: west Pacific (3 species).

*Democrinus parfaiti* Perrier, 1883

— Döderlein, 1912: 12–13, fig.4, pl. 4,7; pl.9, 2. Non *R. rawsonii* Pourtalès, 1874; *Rhizocrinus magnus* — Gislén, 1947: 4–9, figs. 1,2; *Democrinus parfaiti* — Roux, 1977: 39–40, figs. 4, 9, 10, 11B, 16A, pl. II: 6–8, pl. V, VI; Roux et al., 2002: 823, Fig. 8f–g.
REMARKS: It is difficult to maintain *D. parfaiti* as a valid species distinct from *D. rawsonii* (Pourtalès, 1874) from the western Atlantic.
LOCALITIES: “Porcupine”, St. 43 (Thomson, 1875; Carpenter, 1884, Clark A.M., 1977); “Talisman”, St. 135 (unpublished); “Princesse Alice”, 1885, St. 515 (Koehler, 1909); SKAGERAK Exp., St.28V (Gislén, 1947); “Thalassa” 1970, St. W 425, Z 453 (Roux, 1977); “Shackleton”, cruise 3, St. 152, 154, 175 (Clark A.M., 1977); “Challenger”, St. SBC 216 (Gage et al., 1983; Harvey et al., 1988); BIOGAS, St. 1 (DS 61) (Roux, 1985; pers. comm.), ABYPLAINE, St. CP 69 and CP 68 (unpublished).
DISTRIBUTION: southwest Ireland and the Rockall Trough to the Azores, Morocco and Canary Islands, including Ormonde Bank (Goringge Ridge). Probably occurs in the western Atlantic.
DEPTH RANGE: 1430–4260 m.

Genus Conocrinus d’Orbigny, 1850

COMPOSITION: 7 recent species (Roux et al., 2002) and numerous fossils. Type species: *D. thorenti* (d’Archiac, 1846); Eocene.
DISTRIBUTION: west Pacific (3 species), northeast Atlantic (2 species), North Atlantic (1 species).
DEPTH RANGE: 290–3135 m.
CENTRE OF DIVERSITY: west Pacific (3 species).

*Conocrinus lofotensis* (Sars, 1868)

— Clark A.H., 1923a: 23–37, figs. 12–58; Clark A.M., 1970 (pt.): 19–22, fig. 4.a–d; *Conocrinus lofotensis* — Roux, 1985: 480.
LOCALITIES: INGOLF, St. 11, 18, 37 (Clark A.H., 1923a).
DISTRIBUTION: Norwegian coast (70°N) and Iceland to Ireland, Davis Strait to Massachusetts (?Florida).
DEPTH RANGE: 140–3135 m.

*Conocrinus cabiochi* Roux, 1976

DISTRIBUTION: Bay of Biscay and Iberian Basin.
DEPTH RANGE: 1975–2700 m.

**Family Phrynocrinidae**

**Genus Porphyrocrinus Gislén, 1925**

COMPOSITION: 4 species (Clark, 1982; Roux et al., 2002; Messing, 2007). Type species: *P. verrucosus* Gislén, 1925.
DISTRIBUTION: west Pacific (1 species), southwest Indian Ocean (1 species), northeast Atlantic (2 species), central Atlantic (1 species).
DEPTH RANGE: 218–2780 m.
CENTRE OF DIVERSITY: northeast Atlantic (2 species).

*Porphyrocrinus thalassae* Roux, 1977

— Roux, 1977: 34–38, figs. 1A, 2, 3, 5, 11, pl. I; Clark A.M., 1982: 124, 125, fig. 1; Roux et al., 2002: 824, Fig. 8a–b; Hemery et al., 2013: 515.

DEPTH RANGE: 800–2584 m.

Order Isocrinida
Family Isselicrinidae
Genus Endoxocrinus (Diplocrinus)
A.H. Clark 1923
COMPOSITION: 3 species (David et al., 2006).

DISTRIBUTION: northwest, west and southwest Pacific (1 species), west Atlantic (2 species), northeast Atlantic (1 species).

DEPTH RANGE: 187–2070 m.

Endoxocrinus (Diplocrinus) wyvillethomsoni (Jeffreys, 1870)
Diplocrinus (Annacrinus) wyvillethomsoni — Macurda, Roux, 1981: 170, 171, 173–178, 181, 182, text-figs. 2d, 5B; pls. 7–14, 16, 7–12; Endoxocrinus (Diplocrinus) wyvillethomsoni — David et al., 2006: 39.


DISTRIBUTION: Bay of Biscay to Morocco, Madeira, the Canary Islands and Azores.

DEPTH RANGE: 1246–2070 m.

REMARKS: Conan et al. (1981) noted that the depth of 2133 m for a specimen in the Museum of Berlin sampled by “Porcupine” off Portugal (Clark A.H., 1912) is likely to be erroneous.

Order Hyocrinida
Family Hyocrinidae
Genus Anachalypsicrinus Clark, 1973

DISTRIBUTION: Mid-Atlantic region from 53°N to 36°N, off Newfoundland and the Bay of Biscay.

DEPTH RANGE: 1850–2810 m.

Anachalypsicrinus nefertiti A.M. Clark, 1973

LOCALITIES: “Discovery”, St. 7711#66 (Clark, 1973); “Akademik Mstislav Keldysh”, St. 3988 (unpublished). Deep sea photographs: CYMOR II, Shamrock Canyon, Pendragon Escarpment (Roux, 1985; pers. comm.); FAMOUS expedition, 36°56.5′–36°57.5′N, 33°05′–33°06′W, 2220, 2500, 2650 and 2700 m; 36°49.6′–36°51.5′N, 33°15′–33°16.5′W, 2519, 2600, 2630 and 2810 m (Roux, 1980b).

DISTRIBUTION: Mid-Atlantic from 53°N to 36°N, Bay of Biscay.

DEPTH RANGE: 2000–2810 m.

Genus Gephyrocrinus
Koehler et Bather, 1902
COMPOSITION: 2 species (Roux, Lambert, 2011).

DISTRIBUTION: northeast Atlantic (1 species) and northeast Pacific (1 species). Perhaps it occurs also in the equatorial part of the Mid-Atlantic Ridge (1°47′N, 24°26′W) at the depth 3330 m.

DEPTH RANGE: 1420–2445 (?3330) m.

Gephyrocrinus grimaldii Koehler et Bather, 1902
Gephyrocrinus grimaldii — Koehler, 1909: 256–264, pl. I: 12; pl. XXXII: 1–9; Roux et al., 2002: 821, Fig. 10.c,d; Roux, Bohn, 2010: 429–434, Figs. 2–8; Hyocrinus (Gephyrocrinus) grimaldii — Roux, 1980a: 33–34, 39, 43, 49, pl. I; text-fig.1.

LOCALITIES: Deep sea photographs, CYMOR II, Shamrock Canyon, Pendragon Escarpment (Roux, 1985; pers. comm.). DISTRIBUTION: Bay of Biscay to Madeira and the Canary Islands. Perhaps it occurs also in the equatorial part of the Mid-Atlantic Ridge (1°47′N 24°26′W).

DEPTH RANGE: 1420–2445 (?3330) m.

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