

Continental shelf and littoral Nemerteans from the North and North-West Spanish Atlantic coasts.

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Abstract : Approximately 370 nemerteans specimens collected in recent years, including the second quarter of 1990, from 18 sites on the North and North-West Spanish Atlantic coasts are described and classified. They belong to 24 species, 13 of which have not been previously reported for the region.

On the whole, the sample offers an interesting picture of the nemertean fauna of the N and NW Spanish Atlantic coasts, which appears to be strongly linked to that of Brittany and the British Isles.

Résumé : Environ 370 spécimens de némerètes collectées ces dernières années, y compris au cours du deuxième trimestre 1990, sur 18 sites de la côte atlantique espagnole du nord et du nord-ouest sont décrites et classées. Elles appartiennent à 24 espèces, 13 d'entre elles n'ont jamais été signalées dans cette région.

Globalement, l'ensemble offre une intéressante image de la faune de némerètes de la côte atlantique espagnole du nord et du nord-ouest qui apparaît très étroitement correspondre à celle de la Bretagne et des Iles britanniques.

INTRODUCTION

The littoral nemerteans from the N and NW Spanish coasts have been studied by Anadón (1980, 1981, 1986-87), Mora (1980), Polo *et al.* (1982) and Saiz Salinas (1987). Some of these works involved material collected by zoologists interested in other investigations, and, thus, gave only a limited understanding of the nemerteans of this vast area.

In an effort to assess the nemertean fauna, the authors participated in a collecting trip organized under the auspices of the MERCURY program.

Nemerteans (225 in number) were collected from 11 intertidal stations during April, May and June 1990.

Sublittoral material (7 stations, 13 specimens) was collected on the continental shelf off Asturias by Anadón between June 1987 and February 1988 during the COCACE cruise (Campaña Oceanográfica del Cantábrico Central).

MATERIAL AND METHODS

The animals were collected at 18 different stations which were chosen to represent biotopes as diverse as possible.

The range of habitats in which the species were customarily found is listed as : Upper littoral = UL, Mid littoral = ML, Lower littoral = LL, Sub-littoral (0-10 meters depth) = SL, Shallow benthic (10-100 meters) = SB, Deep benthic (> 100 meters) = DB.

The littoral species were collected from different substrates : gravel, sand, mud, beneath boulders, among algae such as *Corallina officinalis*, *Gelidium latifolium*, and in *Sabellaria alveolata* reefs.

The samples from the continental shelf were collected with an anchor-dredge or an epibenthic sledge.

The granulometric characteristics of the sediment of each station are given according to Wentworth grade classification.

In the present investigation all species were studied alive (except for deep benthic specimens) in particular the arrangement of eyes, the colors, shape of head, and other external characters were noted, and all species were drawn. Some of the specimens which had to be sectioned for internal examination were anesthetized in 8 % Magnesium Chloride ; the fixative was Hollande's cupri-picri-formal-acetic fluid. Paraffin sections were cut at 7 μ m, staining being carried out by Gomori's method and Heidenhain's iron hematoxylin-eosin.

The classification proposed by Iwata (1960, 1985) is adopted here, in all supra-family levels. Families and lower taxons have been taken from Gibson (1982).

COLLECTING SITES

Fig. 1 and Fig. 2 show the geographical positions of the stations.

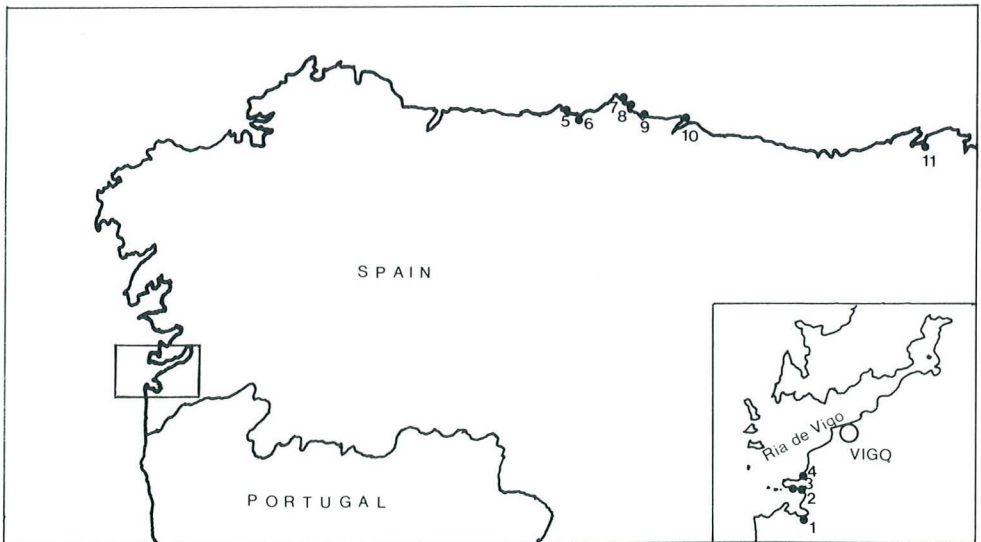


Fig. 1 : Location of the littoral study area.

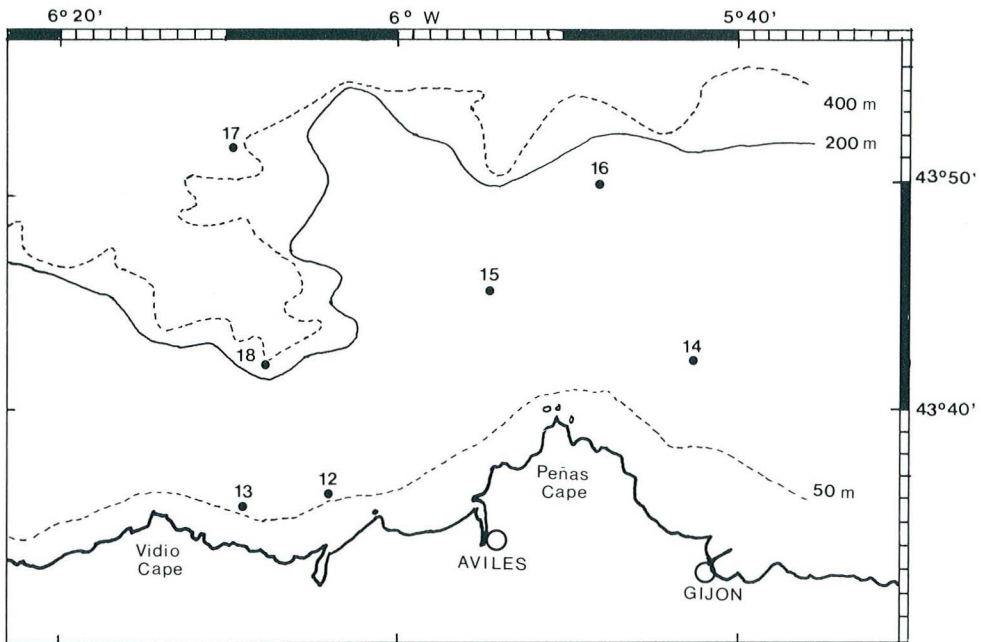


Fig. 2 : Location of the continental shelf sampling stations.

Galicia. Ría de Vigo.

- Station 1. Foz estuary. ML. Sandy and muddy bottom.
2. Areas Fofas beach. LL. Sand, beneath boulders.
3. Los Feitales beach.
- a. UL. Pebble, beneath cobbles and boulders.
 - b. LL. Sand, beneath boulders.
4. Patos beach.
- a. ML. Inside the *Sabellaria alveolata* reefs.
 - b. LL. Sand.

Asturias.

5. Artedo beach. LL. Beneath boulders.
6. San Esteban de Pravia. ML. Rocky shore.
7. Bañugues beach.
- a. UL and ML. Very coarse sand, beneath boulders.
 - b. LL. Sand, beneath boulders.

8. Luanco.
 a. Aramar beach. UL and ML. Very coarse sand, beneath boulders.
 b. Aramar rocky shore.
 b.1 ML. *Corallina officinalis*.
 b.2 LL. Crevices, beneath boulders. *Gelidium latifolium*.
9. Gijón. Near Piles estuary.
 a. UL. Sand, beneath boulders
 b. LL. Sand, beneath cobbles and boulders.
10. Villaviciosa estuary.
 a. ML. Sandy and muddy bottom and in empty tubes of *Diopatra neapolitana*.
 b. LL. Sandy and muddy bottom.
 c. LL. Sandy and muddy bottom, beneath boulders.

Cantabria.

11. Santander. El Camello beach.
 a. ML. Among *Mytilus edulis*.
 b. LL. Shelly sand and gravel.

Continental shelf off Asturias.

12. 43° 35' 37" N, 6° 04' 07" W. SB. 66 m. Very fine sand.
 13. 43° 35' 60" N, 6° 09' 60" W. SB. 60 m. Coarse sand.
 14. 43° 42' 33" N, 5° 42' 57" W. DB. 106 m. Very fine sand.
 15. 43° 45' 37" N, 5° 54' 45" W. DB. 130 m. Coarse sand.
 16. 43° 49' 87" N, 5° 48' 73" W. DB. 150 m. Boulders. Coarse sand. Fragments of dead corals.
 17. 43° 51' 50" N, 6° 09' 65" W. DB. 586 m. Silt.
 18. 43° 42' 01" N, 6° 08' 05" W. DB. 381 m. Very coarse sand.

THE SPECIES

Class ANOPLA
 Order ARCHINEMERTEA
 Family Cephalothricidae
Cephalothrix rufifrons (Johnston, 1837)

Reference and synonym lists : Hylbom, 1957 ; Gibson, 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station 3.b (3 specimens).

A slender species. Length 45 mm or more but only 0.4 mm in width. The color is translucent or whitish, the fore parts become reddish towards the head.

Procephalothrix filiformis (Johnston, 1828-1829)

Reference and synonym list : Gibson, 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 4.b (4 specimens), 8.a (23 specimens), 9.a (1 specimen), 10.c (1 specimen).

Procephalothrix filiformis attains lengths of up to about 15 cm and widths of 1 mm. Anatomically very similar to species of *Cephalothrix*, *Procephalothrix filiformis* has a tendency to coil into a spiral when disturbed.

Mature animals were collected during the first week of April 1990 (Station 8.a). Because of the presence of well developed gonads the males were whitish-yellow and females were orange. During collection, some specimens emitted their sexual products.

The animals were sometimes observed to be gregarious.

Order PALEONEMERTEA

Family Tubulanidae

Tubulanus annulatus (Montagu, 1804)

Reference and synonyme list : Gibson, 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 5 (1 specimen), 12 (1 specimen).

In this species the external characters are very typical features and sufficient for identification. 8 cm long, 1.5 mm wide. Head circular. Red or reddish-brown with one dorsal and two lateral longitudinal white stripes, and numerous white rings throughout the body. The dorsal stripe does not enter the frontal area.

Order HETERONEMERTEA

Family Baseodiscidae

Baseodiscus delineatus (Delle Chiaje, 1825)

Reference and synonym lists : Joubin 1894, Gibson 1974.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 9.b (1 specimen).

The specimen was 10 cm long, 4-5 mm wide, and marked with 13 discontinuous reddish-brown lines. Its greater body width relative to length, and the number and arrangement of the dorsal longitudinal brown stripes are as described for *B. curtus* (Hubrecht, 1879) which Gibson (1974, 1982) considered to be a variety of *B. delineatus*.

Family Lineidae

Cerebratulus fuscus (McIntosh, 1873-1874)

Reference and synonym lists : Cantell 1975, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 12 (1 specimen), 14 (2 specimens).

One specimen measured 8 cm in length. The others were broken into numerous pieces.

The head tapers anteriorly and resembles a lancet. When the worm is contracted the posterior end is blunt. The anterior half of the body on the dorsal side is reddish-brown. There are 7 eyes on each side of the head.

Cerebratulus marginatus Renier, 1804

Reference and synonym lists : Cantell 1975, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 1 (1 specimen), 10.b (13 specimens), 11.b (4 specimens), 13 (1 specimen), 14 (1 specimen), 15 (1 specimen).

One of our specimens reached 50 cm in length and 13 mm in width. This species is very contractile. In an extended state the head tapers and is not easily distinguished from the rest of the body. The color on both sides is pale greyish-brown. Cantell (1975) was the first to note that eyes are present.

Mature animals were collected in April.

Cerebratulus roseus (Delle Chiaje, 1841)

Reference and synonym list : Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations ; 10.b (9 specimens), 14 (1 specimen), 17 (1 specimen), 18 (1 specimen).

Although previous authors have stated that eyes are absent from this species, we found a specimen with one big eye on each side of the head (Fig. 3). Histological study of these eyes demonstrated pigment cells and visual cells. The species is 40 cm long and 6 mm wide and possesses a thin caudal cirrus 6 mm long. The body of *Cerebratulus roseus* is pink in color. The yellowish head is sharply pointed and bears long cephalic slits. The cerebral ganglia appear reddish through the body wall.

Mature animals were collected in February, March and April.

Lineus bilineatus (Renier, 1804)

Reference and synonym lists : Friedrich 1936, Brunberg 1964, Cantell 1975, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 10.a (5 specimens).

The coloration of this species is very characteristic and is sufficient for identification. All specimens possess two medio-dorsal longitudinal light bands placed very close together. The body wall color is typically chocolate. One of our specimens reached 40 cm in length.

Lineus lacteus (Rathke, 1843)

Reference and synonym list : Gibson 1982.

Occurrence on N and NW Spanish Atlantic coasts. Stations : 3.a (65 specimens), 4.a (38 specimens).

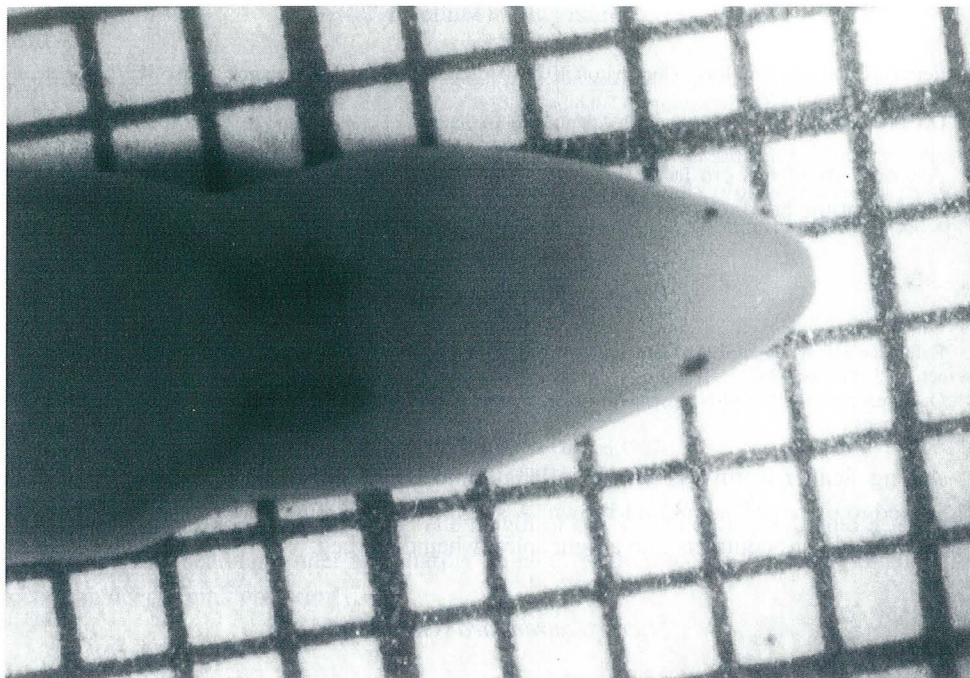


Fig. 3 : *Cerebratulus roseus* head. Note the exceptional presence of two eyes.

Lineus lacteus reaches a length of 25 cm but is only 1.5 mm wide. The head bears 8-12 eyes on each side. The mouth is located far behind the cerebral ganglia in contrast to the other *Lineus*. The color is whitish with the cerebral ganglia zone colored red by hemoglobin.

The animals were often observed to be gregarious.

Mature animals were collected in April.

Lineus longissimus (Gunnerus, 1770)

Reference and synonym list : Cantell 1976.

Occurrence on N and NW Spanish Atlantic coasts. Stations : 2 (6 specimens), 4.a (66 specimens), 8.b.2 (28 specimens), 9.b (7 specimens), 11.b (4 specimens).

Lineus longissimus is several meters long (2-3 m) with a breadth of 2-3 mm. The color of the worm is brownish-green with light and dark longitudinal stripes. There are 10-15 black eyes on each side of the head. The tip of the head is white, slightly bilobed. In young specimens found in the *Sabellaria alveolata* reefs, the light and dark longitudinal stripes were not present ; the color was a homogeneous dark olive green.

Lineus ruber (Müller, 1774)

Reference and synonym lists : Gontcharoff 1951 ; Moretto, Vernet and Gontcharoff 1975, 1976 ; Moretto and Vernet 1985 ; Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 7.a (4 specimens), 8.a (2 specimens).

A worm about 6-8 cm long, 1.5 mm wide. Long soft nemertean, 3-4 eyes in a row on either side of the head. Color brick-red.

Lineus sanguineus (Rathke, 1799)

Reference and synonym lists : Gontcharoff 1951 ; Moretto, Vernet and Gontcharoff 1975, 1976 ; Moretto and Vernet 1985 ; Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 3.a (15 specimens), 7.a (9 specimens), 8.a (16 specimens).

A long slender worm : 15-20 cm in length and 1 mm in breadth. The color varies from blood red to olive green and mid-brown. A single row of 6-8 eyes on each side of the head. *Lineus sanguineus* contracts into a tight spiral when disturbed.

Micrura aurantiaca (Grube, 1855)

Reference and synonym lists : Friedrich 1936, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 8.b.2 (1 specimen).

Our specimen is 17 cm long and 2 mm wide. The head lacks eyes. At the posterior end the cirrus is indistinct. The color of the dorsal side is reddish-orange, with a somewhat paler tone on the ventral side. On the head a white patch separates an anterior dorsal cephalic spot of reddish-orange pigmentation.

Micrura fasciolata Ehrenberg, 1831

Reference and synonym lists : Friedrich 1936, Brunberg 1964, Cantell 1975, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 16 (1 specimen).

Our specimen is 15 mm long and 0.7 mm wide. The head tapers anteriorly and bears only a single pair of distinct eyes. The color of the worm is yellowish-brown with 13 white transverse bars. The ventral side is much paler. A pale caudal cirrus is present.

Micrura lactea (Hubrecht, 1879)

Reference and synonym list : Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 17 (1 specimen).

Our specimen is 25 mm long and 0.8 mm wide. The head is extended, has a round tip, and lacks eyes. The color is typically milk-white. A pale caudal cirrus is present.

Micrura purpurea (Dalyell, 1855)

References and synonym lists : Friedrich 1936, Cantell 1975, Gibson 1982.
Occurrence on the N and NW Spanish Atlantic coasts. Station : 8.b.2 (1 specimen).

Our specimen is 5 cm long and 0.8 mm wide. The head is rectangular, blunt anteriorly and lacks eyes. The color is brown to brownish-purple. The head color is anteriorly marked by a transverse band of bright yellow or yellowish-white which is characteristic of the species. The caudal cirrus is pale brown in color.

Family Valenciniidae
Valencinia longirostris Quatrefages, 1846

References and synonym lists : Friedrich 1936, Corrêa 1956, Gibson 1982.
Occurrence on the N and NW Spanish Atlantic coasts. Station : 14 (1 specimen)

This species has a cylindrical body. The length of our specimen is 8 cm, and it is 2 mm in diameter. The head is slender and sharply pointed, white in color. The body is pale pink becoming deeper pink posteriorly.

Class ENOPLA
Order HOPLONEMERTEA
Suborder Monostilifera
Family Amphiporidae
Amphiporus lactifloreus (Johnston, 1827-28)

Reference and synonym lists : Mc Intosh 1873-74, Joubin 1894, Berg 1972, Gibson 1982.
Occurrence on the N and NW Spanish Atlantic coasts. Stations : 8.a (1 specimen), 9.a (1 specimen).

Adult *Amphiporus lactifloreus* often reach a length of 30 mm and a breadth of 1.5 mm. The body is round. The first of our specimens is greenish, the second whitish to dirty grey. The brain is visible in the neck region as two orange-colored bodies. Numerous eyes. Strong stylet.

Family Emplectonematidae
Emplectonema echinoderma (Marion, 1873)

Reference and synonym list : Gibson 1982.
Occurrence on the N and NW Spanish Atlantic coasts. Station : 7.b (2 specimens).

Our specimens are 6 cm long and 2.5 mm wide. The head is distinct and round, bearing 12 eyes on each side. The body wall color is whitish-grey. Strong stylet. *Emplectonema echinoderma* is easily identified by spicules present in the epidermis.

Emplectonema gracile (Johnston, 1837)

References and synonym lists : McIntosh 1873-74, Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Stations : 8.b.1 (1 specimen), 11.a (3 specimens).

The *Emplectonema gracile* we have collected are 8 cm long and 1.5 mm wide. The head is broader than the rest of the body and bears 20 small eyes arranged in 3 groups on each side. The dorsal color is a dull greyish-green, the under surface is greyish-white. The reddish color of the ganglia is easily observed.

Family Prosorhochmidae

Prosorhochmus claparedii Keferstein, 1862

Reference and synonym list : Gibson and Moore 1985.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 3.a (1 specimen), 6 (1 specimen).

One specimen was collected in the mantle cavity of *Patella intermedia*. It is a small slender flattened species, 35 mm long and 0.5 mm wide. Head bilobed wider than succeeding portion of the body. Four eyes situated in front the cerebral ganglia. Color pale brown.

The specimen collected on Galicia shores in late August was in reproductive period and in a few days give birth to three juvenile worms.

Family Tetrastemmatidae

Tetrastemma longissimum Bürger, 1895

Reference and synonym list : Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station. 11.b (5 specimens).

Length of longest specimen reaching 16 mm, width about 1 mm. Head distinctly set off from the body, bearing a pigmented dark brown spot between and behind the two anterior eyes. The body wall color is greenish-yellow.

Tetrastemma melanocephalum (Johnston, 1837)

Reference and synonym list : Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 8.b.2 (1 specimen).

Tetrastemma melanocephalum attained a length of 15 mm and a width of 0.5 mm. Head wider than body. A large patch of black pigment is situated between the four dark brown eyes. The body is a light yellowish-green color.

Suborder Polystilifera
Tribe Reptantia
Family Paradrepanophoridae
Paradrepanophorus crassus (Quatrefages, 1846)

Reference and synonym list : Gibson 1982.

Occurrence on the N and NW Spanish Atlantic coasts. Station : 8.b.2 (1 specimen).

The species is shaped like a leech. Both the head and tail are bluntly pointed. Strongly contracted the specimen attained a length of 7 cm, and 5 mm in width. The numerous eyes are arranged in four dark longitudinal stripes. The color is dorsally a dark orange, white on the ventral side.

The worm was found in a tube secreted by itself beneath boulders.

CONCLUDING REMARKS

The monographs by Mc Intosh (1873-74), Joubin (1894) and Bürger (1895) have been fundamental for the identification of European nemerteans. Additional species have been described since that time and there have been a number of taxonomic changes. Much of this information was incorporated in the comprehensive works of Gontcharoff (1955) and Gibson (1982).

Our survey of the nemerteans of the North and Northwest coasts of Spain show a close biogeographic relationship with those recorded from the British Isles and the coasts of Brittany.

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