

# A FIELD GUIDE TO THE SHARKS OF BRITISH COASTAL WATERS

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## ABSTRACT

An illustrated key is provided for the field and laboratory identification of the 21 species of shark found in coastal waters surrounding the British Isles. Brief details of the biology and general natural history of each species are presented. Suggestions are made for further reading.

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## INTRODUCTION

Since their first appearance in the world's oceans some 400 million years ago (Schaeffer, 1967) sharks (Class Chondrichthyes, super-order Selachii) have come to occupy a wide range of habitats. As a result, species within the group display many morphological or behavioural adaptations to their environment.

At present, there are approximately 350 living species of shark known, worldwide, but there is considerable uncertainty over the precise figure. For example, at least one new species has been named in comparatively recent times (e.g. Taylor *et al.*, 1983). A major study of the taxonomy of sharks (Compagno, 1984, 1985) has resolved many of the problems. Identification guides which deal solely with sharks have been prepared for many parts of the world including South Africa (Bass *et al.*, 1973, 1975*a-d*, 1976), the eastern USA (Casey, 1964) and the eastern Pacific (Kato *et al.*, 1967). No comparable publication exists for British sharks. This AIDGAP key is intended to supplement a larger work (Vas, in press) by providing a quick and portable field guide containing general information which should be of use to anglers, students and scientists alike. Further information is given in more detailed works such as those mentioned above or, for example, Bigelow and Schroeder (1948), Gilbert (1967), Springer (1979), Cadenat and Blache (1981), and Ellis (1983).

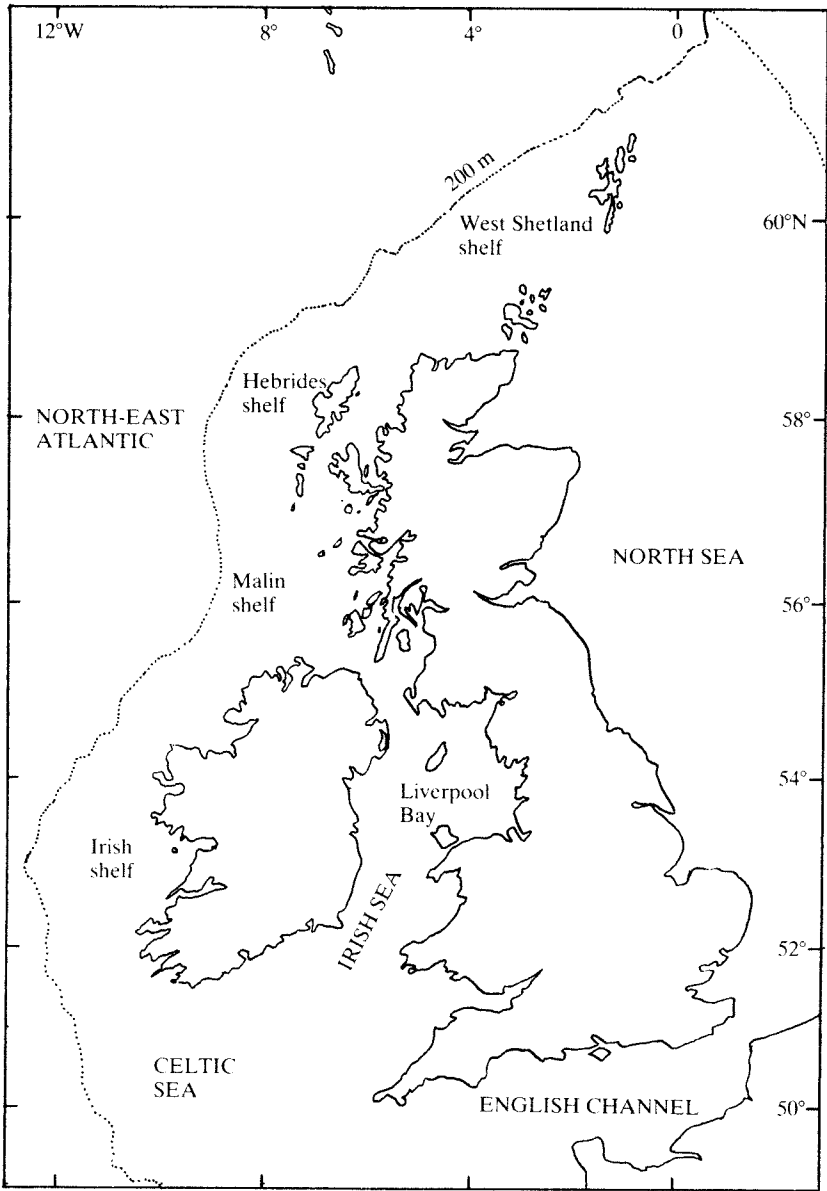


FIG. 1  
The Study Area

#### *Study area and the scope of this guide*

The area covered by this guide includes the shallow (< 200 m) shelf seas surrounding the British Isles (Fig. 1). Twenty-one shark species, known to occur in these waters, are included (Table 1). Some fifteen additional species (Appendix 1), found in deeper waters over the continental slope to the west, are not included; they typically occur at depths greater than 500 m (Gordon and Duncan, 1985) and are, therefore, unlikely to be found over the continental shelf. Furthermore, the identity of some of these sharks has not been determined. For example, catsharks of the genus *Apristurus* are frequently taken in trawls

Table 1. *The taxonomic relationships of the 21 species of shark recorded from the coastal waters of Britain and Ireland (after Compagno, 1984, 1985) status: R = resident, V = vagrant, S = seasonal*

|  |                               |   |
|--|-------------------------------|---|
| Class CHONDRICHTHYES                                     |                               |   |
| Sub-Class Holocephali (Chimaeras)                        |                               |   |
| Sub-Class ELASMOBRANCHII                                 |                               |   |
| Super-Order Batoidea (Skate and Rays)                    |                               |   |
| Super-Order SELACHII (Sharks)                            |                               |   |
| Order HEXANCHIFORMES                                     |                               |   |
| Family Chlamydoselachidae                                |                               |   |
| <i>Chlamydoselachus anguineus</i> (Garman, 1884)         | frilled shark                 | V |
| Family Hexanchidae                                       |                               |   |
| <i>Heptanchias perlo</i> (Bonnaterre, 1788)              | seven gilled shark            | V |
| <i>Hexanchus griseus</i> (Bonnaterre, 1788)              | cow shark, 6-gill shark       | R |
| Order SQUALIFORMES                                       |                               |   |
| Family Echinorhinidae                                    |                               |   |
| <i>Echinorhinus brucus</i> (Bonnaterre, 1788)            | bramble shark                 | V |
| Family Squalidae   |                               |   |
| <i>Dalatias licha</i> (Bonnaterre, 1788)                 | kitefin shark, darkie charlie | R |
| <i>Etmopterus spinax</i> (Linnaeus, 1758)                | velvet belly                  | R |
| <i>Somniosus microcephalus</i> (Bloch & Schneider, 1801) | Greenland shark               | R |
| <i>Squalus acanthias</i> (Linnaeus, 1758)                | spurdog, piked dogfish        | R |
| Order SQUATINIFORMES                                     |                               |   |
| Family Squatinidae                                       |                               |   |
| <i>Squatina squatina</i> (Linnaeus, 1758)                | angel shark, monkfish         | R |
| Order LAMNIFORMES  |                               |   |
| Family Alopiidae   |                               |   |
| <i>Alopius vulpinus</i> (Bonnaterre, 1788)               | thresher shark, fox shark     | R |
| Family Cetorhinidae                                      |                               |   |
| <i>Cetorhinus maximus</i> (Gunnerus, 1765)               | basking shark                 | R |
| Family Lamnidae  |                               |   |
| <i>Isurus oxyrinchus</i> (Rafinesque-Schmaltz, 1810)     | shortfin mako shark           | V |
| <i>Lamna nasus</i> (Bonnaterre, 1788)                    | porbeagle shark               | R |
| Order CARCHARHINIFORMES                                  |                               |   |
| Family Scyliorhinidae                                    |                               |   |
| <i>Galeus melastomus</i> (Rafinesque-Schmaltz, 1810)     | black-mouthed dogfish         | R |
| <i>Scyliorhinus stellaris</i> (Linnaeus, 1758)           | lesser spotted dogfish        | R |
| <i>Scyliorhinus canicula</i> (Linnaeus, 1758)            | nurse hound, bull huss        | R |
| Family Triakidae   |                               |   |
| <i>Galeorhinus galeus</i> (Linnaeus, 1758)               | tope, sweet William           | R |
| <i>Mustelus mustelus</i> (Linnaeus, 1758)                | smooth hound                  | R |
| <i>Mustelus asterias</i> (Cloquet, 1819)                 | starry smooth hound           | R |
| Family Carcharhinidae                                    |                               |   |
| <i>Prionace glauca</i> (Linnaeus, 1758)                  | blue shark                    | S |
| Family Sphyrnidae  |                               |   |
| <i>Sphyrna zygaena</i> (Linnaeus, 1758)                  | smooth hammerhead shark       | V |

in the Rockall Trough but it is not yet clear how many species are represented (J. Gordon, Dunstaffnage Marine Laboratory, personal communication); the taxonomy of the genus is currently under review. The great white shark, *Carcharodon carcharias*, and the tiger shark, *Galeocerdo cuvieri*, are not included since there is no conclusive evidence that either occurs in British coastal waters.

#### *Status and classification of sharks of British and Irish coastal waters*

The sharks covered in this guide can be divided broadly into three groups on the basis of their relative occurrence off the British Isles:—

- (1) Residents (R). Specimens of these species can be found off the British coast

at all times of the year, even though some individuals may undertake large-scale migrations.

- (2) Seasonals (S). These species occur off the British coast for part of the year only as a result of seasonal migrations from other areas.
- (3) Vagrants (V). These species occur rarely or infrequently off the British coast, usually as isolated specimens, with their main distribution ranges being outside British waters.

Of the species covered in this guide, 15 are considered residents, 1 seasonal and 5 vagrants (Table 1).

### *The shark hazard*

Popular works frequently refer to the danger that sharks present to humans. The scale of this problem has, however, been greatly exaggerated and, in fact, humans pose a greater threat to sharks than vice versa. The decline of the basking shark fishery at Achill in Ireland (Parker and Stott, 1965) and the blue shark fishery in Cornwall (Vas, 1990) attest to this.

Sharks are timid creatures and can rarely be approached by divers. However, all sharks should be treated with respect and caution, even small specimens. A shark's skin is covered by numerous placoid scales (also known as dermal denticles) and is particularly abrasive, being akin to very coarse sandpaper; it can easily remove human skin if mishandled. The teeth of many species are, quite literally razor-sharp and can inflict a serious wound. Caution must therefore be employed when handling sharks, both dead and alive.

### *Typical shark features*

Members of some other marine groups may be confused with sharks. These include some of the bony fishes (teleosts) such as cod and mackerel; marine mammals (cetaceans), including whales, dolphins and porpoises; and the skates and rays (super-order Batoidea), close relatives of the sharks. The latter have a dorso-ventrally flattened body, pectoral fins expanded into "wings" (which are fused to the side of the head) and gill slits situated below (ventrally) the body. Table 2 will help to separate these groups.

Table 2. *A description of the key similarities and differences between sharks and members of some other groups with which they might sometimes be confused*

| Sharks   | Skates and Rays  | Bony fish                                       | Dolphins and Porpoise                       |
|--|--|---|---|
| 5-7 gill slits on lateral surfaces of the head         | 5 gill slits on ventral surface of the head            | no gill slits                                   | no gills<br>blowhole on top of the head     |
| no operculum   | no operculum   | gills covered by an operculum                   | no operculum                                |
| skin very rough covered with placoid scales            | skin very rough covered with placoid scales            | skin usually smooth covered with cycloid scales | skin very smooth<br>some hairs<br>no scales |
| cold-blooded   | cold-blooded   | cold-blooded                                    | warm-blooded                                |
| skeleton of cartilage partly calcified<br>no true bone | skeleton of cartilage partly calcified<br>no true bone | skeleton of true bone fully calcified           | skeleton of true bone fully calcified       |

The 350 or so known species of shark differ widely in both body form and size. The smallest shark, *Squaliolus laticaudus*, is less than 15 cm in length when fully mature. The length of the largest shark, aptly known as the whale shark, *Rhincodon typus*, is recorded as 13.7 m (Compagno, 1984).

Body form ranges from the eel-like frilled shark, *Chlamydoselachus anguineus*, to the flattened ray-like angel sharks, *Squatina* spp. With such immense variation, it is obviously difficult to talk about a "typical" shark. However, there are a number of features common to all (see also Table 2):

- (1) A cartilaginous skeleton, some parts of which are only partly calcified. The jaws and vertebral centra (the backbone) are, however, heavily calcified. There is no true bone in the body.
- (2) Five to seven gill slits are present, with no operculum. The gill slits are located on the side (lateral) surfaces of the head.
- (3) Internally, there is no swim bladder.
- (4) The caudal (tail) fin is asymmetric, the upper lobe being longer than the lower lobe (except in the angel sharks, *Squatina* spp.). However, the degree of asymmetry varies considerably.
- (5) The surface of the skin is extremely rough, being covered with numerous placoid scales. These backwardly pointing spines are similar in structure to the teeth and make the skin very abrasive.
- (6) One or two dorsal fins, with or without spines, along their anterior margins.
- (7) Fertilisation is internal in sharks. Males possess a pair of specialised pelvic appendages known as claspers for this purpose (Fig. 2e). One, or both, of these appendages are inserted into the cloaca of the female during copulation. The transfer of spermatozoa is enhanced using sea water previously collected in the siphon sacs of the male which lie just under the surface skin of the pelvic fins.

Although the processes of copulation and fertilisation are similar in most sharks, the subsequent development of the fertilised egg and embryo differs between species. Basically, there are three modes of reproduction in sharks.

- (a) Oviparity. Species which lay eggs are said to be oviparous, the embryo developing externally from the mother. The fertilised egg is encapsulated in a horny casing laid by the female in weeds or crevices in rocks. Such eggs are often washed up on beaches and are commonly referred to as "mermaids' purses".
- (b) Aplacental viviparity. These species give birth to live young. The embryos develop within the uterus of the female, receiving their nourishment from a large yolk sac until birth. There is no placental connection within the mother at any time.
- (c) Placental viviparity. These species also give birth to live young. The embryos develop within the uterus of the mother but once the yolk is exhausted, the young receive their nourishment via a direct placental connection with the parent until birth.

Of the three modes of reproduction, oviparity represents the most primitive condition and placental viviparity the most advanced. Aplacental viviparity is the most common.

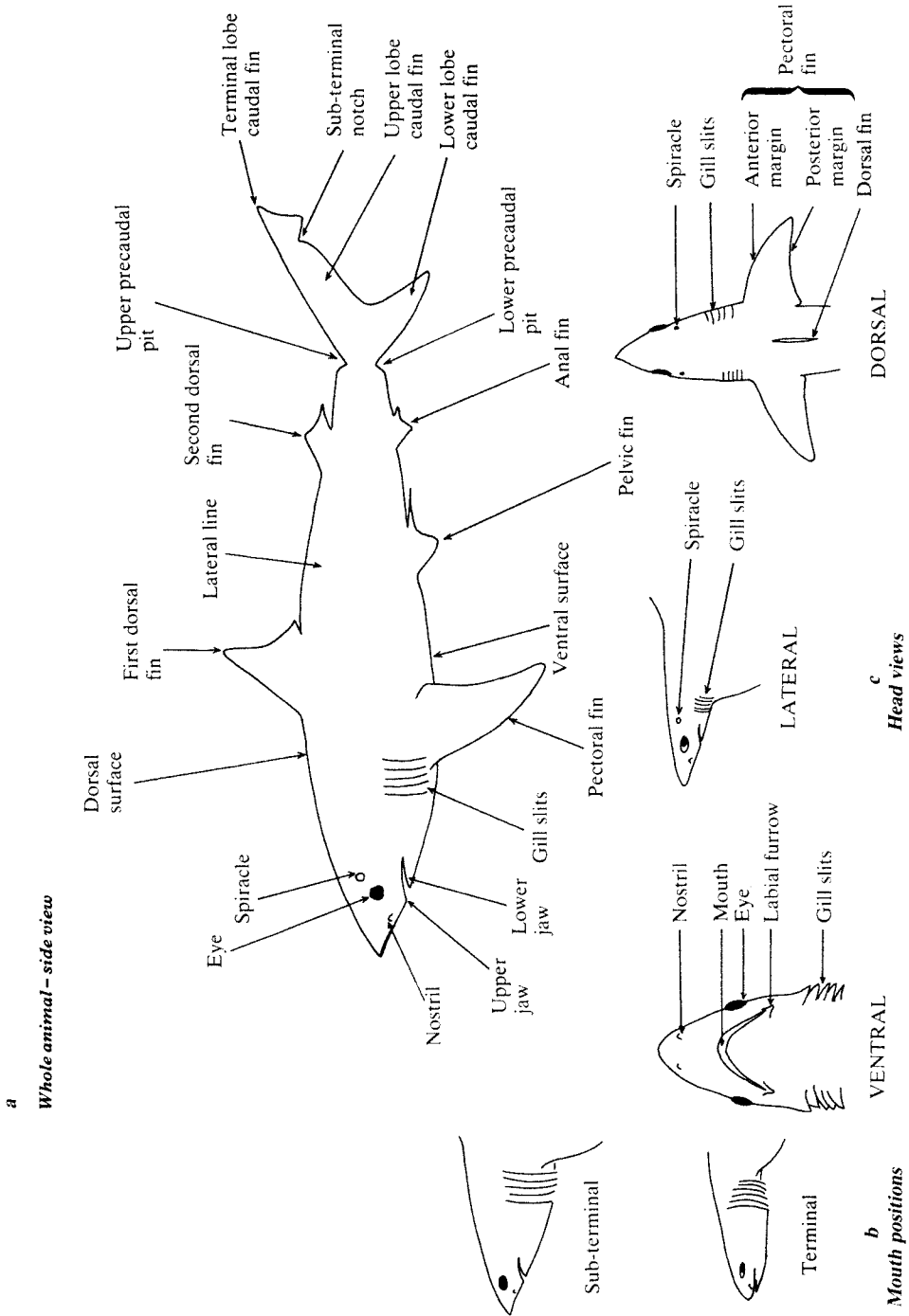


FIG. 2

Principal external features of sharks, whole animal mouth positions and head views (these drawings do not represent any particular species, but include a composite of features used in the key).

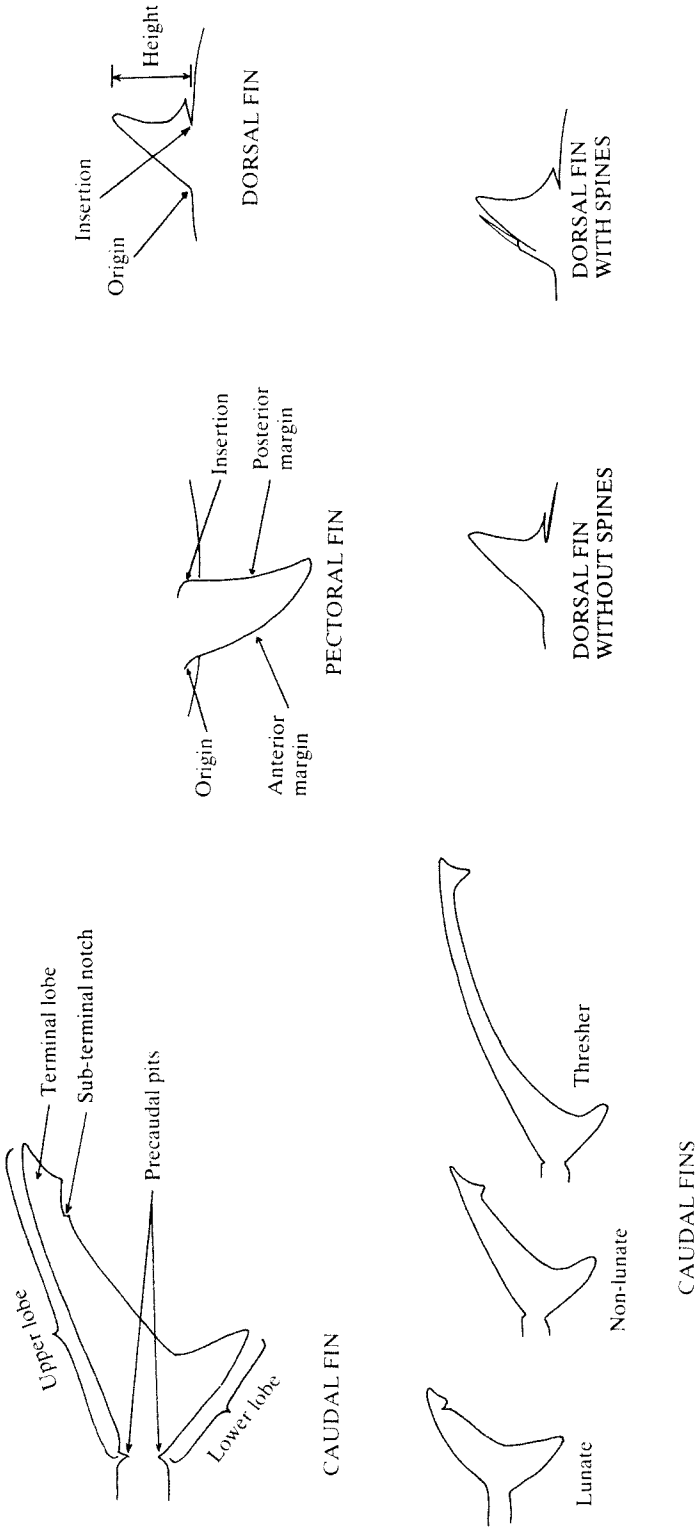


FIG. 2 (continued)  
Principal external features of sharks: (d) fin descriptions (these drawings do not represent any particular species, but include a composite of features used in the key).

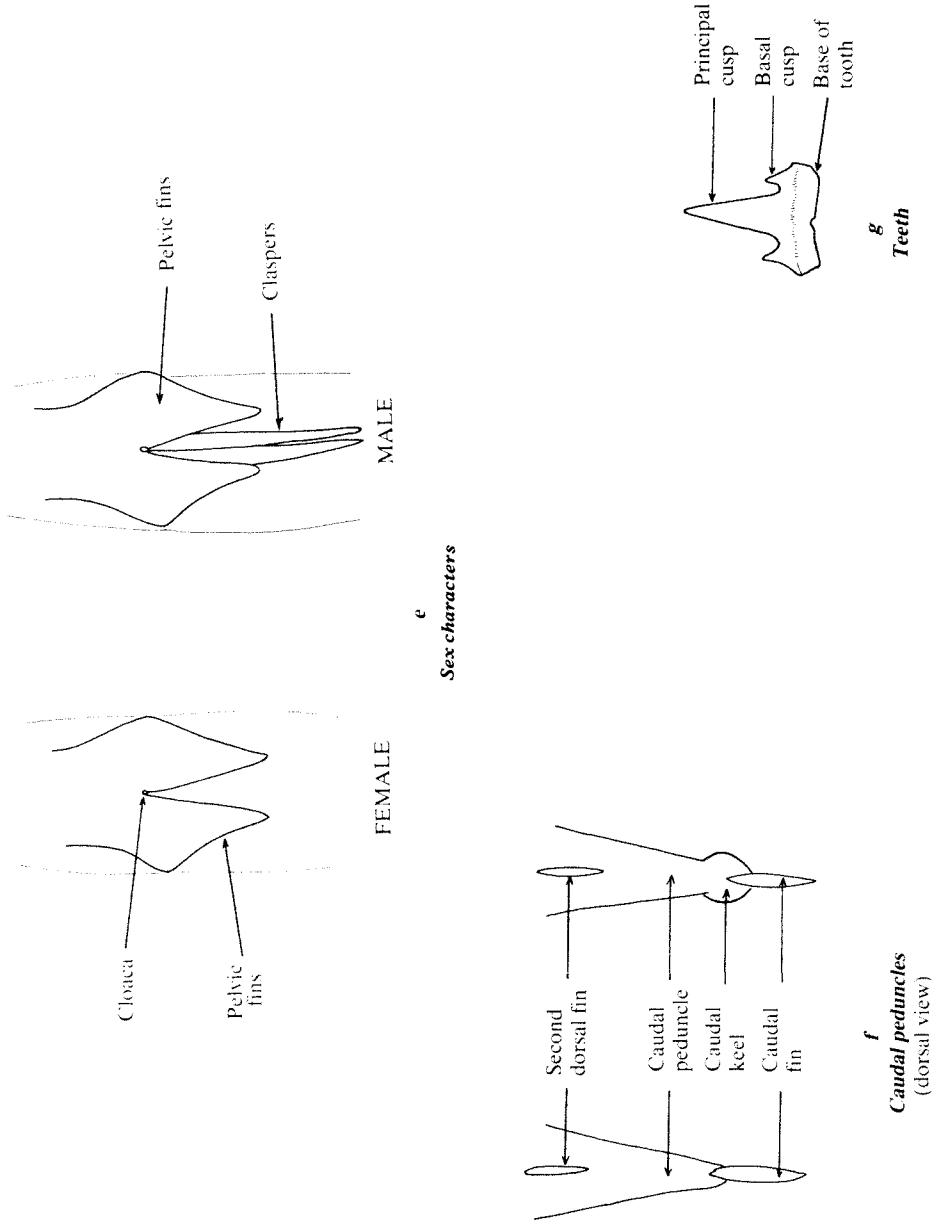


FIG. 2 (concluded)  
Principal external features of sharks: sexual characters, caudal peduncles and teeth (these drawings do not represent any particular species, but include a composite of features used in the key).



KEY TO THE IDENTIFICATION OF SHARKS

The following key consists of a series of paired and contrasting statements which describe one or more features of a shark. At the end of each statement, either the specimen is named or directions are given to a later couplet. To use the key, begin with the first couplet, select the statement which best describes the specimen under examination, then follow the directions given. Repeat this procedure until the species is named. Finally, consult the confirmatory notes on page 681 and the relevant species account (page 667 onwards). Illustrations are provided throughout the key to aid in the identification process.

All terms used in the key are shown in Figure 2 and are explained in the glossary (page 685). Fortunately, young sharks vary little from the adult, except in size, and should key out without any difficulty.

- 1 6 or 7 gill slits; one dorsal fin . . . . . 2
- 5 gill slits; two dorsal fins . . . . . 4
  
- 2 7 gill slits . . . . . ***Heptanchias perlo*** (p. 668)
- 6 gill slits . . . . . 3

- 3 First gill slits continuous under throat (Fig. 3a); mouth terminal, lying at the front end of the snout (Fig. 3b); teeth in upper and lower jaw are similar (Fig. 3c); body elongated and slender . . . . .  
***Chlamydoselachus anguineus*** (p. 667)



Fig. 3a.

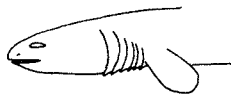


Fig. 3b.

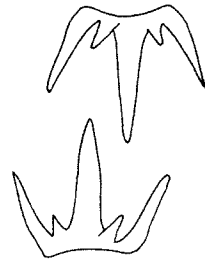


Fig. 3c.

- First gill slits not continuous under throat (Fig. 3d); mouth sub-terminal, lying behind and below the front end of the snout (Fig. 3e); teeth in upper and lower jaws are dissimilar (Fig. 3f); body not elongated and slender . . . . .  
***Hexanchus griseus*** (p. 668)

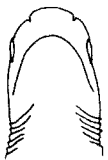


Fig. 3d.

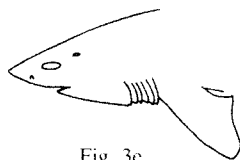


Fig. 3e.

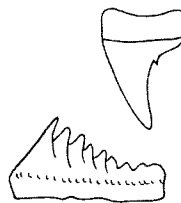


Fig. 3f.

4 Anal fin present (Fig. 4a) . . . . . 5

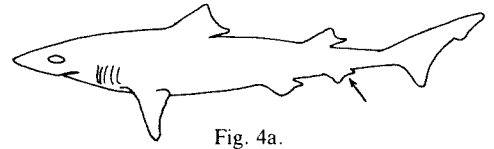


Fig. 4a.

— Anal fin absent (Fig. 4b) . . . . . 16



Fig. 4b.

5 Caudal fin is lunate, with lower lobe equal in length to two-thirds of the length of the upper lobe (Fig. 5a). 6



Fig. 5a.

— Caudal fin is not lunate, the length of the lower lobe being less than two-thirds of the length of the upper lobe (Fig. 5b) . . . . . 8

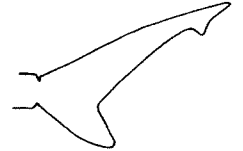


Fig. 5b.

6 Teeth small and not readily visible; gill slits very large, the first extending onto the dorsal (upper) body surface (Fig. 6a). . . . . *Cetorhinus maximus* (p. 674)

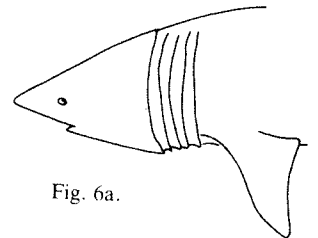


Fig. 6a.

— Teeth large and highly visible; first gill slit not extending to the dorsal (upper) body surface (Fig. 6b) . . . 7

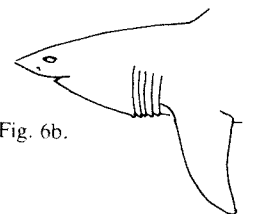


Fig. 6b.

- 7 Secondary caudal keel present (Fig. 7a); teeth lanceolate (long and slender) with secondary basal cusps (Fig. 7b) . . . . . **Lamna nasus** (p. 675)

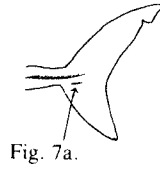


Fig. 7b.

- Single lateral caudal keel present (Fig. 7c); teeth lanceolate (long and slender) with no basal cusps (Fig. 7d) . . . . . **Isurus oxyrinchus** (p. 674)



Fig. 7c.



Fig. 7d.

- 8 Upper lobe of the caudal fin greatly extended, equal in length to the rest of the body (Fig. 8a) . . . . . **Alopias vulpinus** (p. 673)

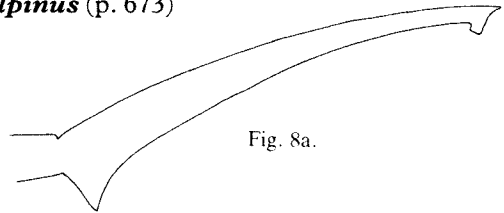


Fig. 8a.

- Upper lobe of the caudal fin not greatly extended, length smaller than the rest of the body (Fig. 8b) . . . 9

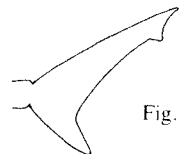
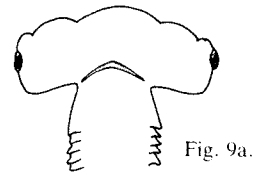
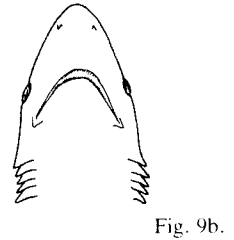


Fig. 8b.

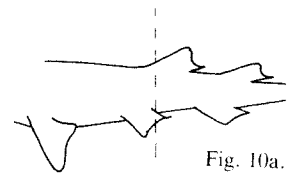
- 9 Head compressed from top to bottom (dorso-ventrally) and drawn out into two lateral lobes (Fig. 9a) . . . . . *Sphyrna zygaena* (p. 680)



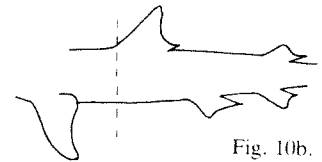
- Head not compressed and not drawn out into two lateral lobes (Fig. 9b) . . . . . 10



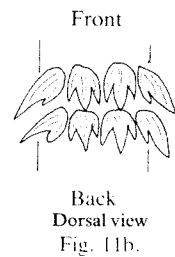
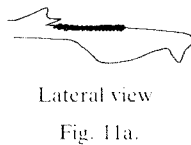
- 10 Origin (at the base of the front edge) of first dorsal fin lies behind the origin of the pelvic fins (Fig. 10a) . 11



- Origin of first dorsal fin lies in front of the origin of the pelvic fins (Fig. 10b). . . . . 13



- 11 Inside of the mouth black; ridge of modified dermal denticles (forming a crest) present along the dorsal (upper) margin of the upper lobe of the caudal fin (Fig. 11a,b) . . . . . *Galeus melastomus* (p. 676)



- Inside of the mouth not black; upper lobe of caudal fin without a crest . . . . . 12

- 12 Origin of the 2nd dorsal fin situated vertically above the rear margin of the anal fin (Fig. 12a); nasal flaps continuous with each other and with the mouth (Fig. 12b); body size to 80 cm; dorsal surface covered with small spots . . . . . **Scyliorhinus canicula** (p. 676)



Fig. 12b.



Fig. 12a.

- Origin of the 2nd dorsal fin situated above and to the front of the rear margin of the anal fin (Fig. 12c); nasal flaps are separate from, and not continuous with, the mouth (Fig. 12d); body size to 162 cm. Dorsal body surface covered with large and small spots . . . . . **Scyliorhinus stellaris** (p. 677)



Fig. 12d.

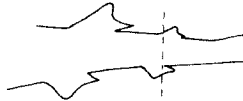


Fig. 12c.

- 13 Dorsal fins approximately equal in size (Fig. 13a); teeth flattened and plate-like with more than one functional row . . . . . 14

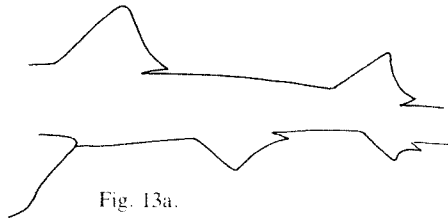


Fig. 13a.

- First dorsal fin much larger than second (Fig. 13b); teeth not flattened and plate-like with usually only one functional row . . . . . 15

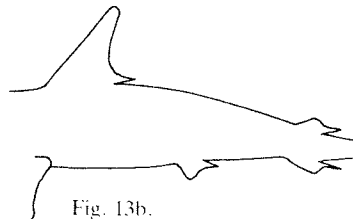


Fig. 13b.

14 Dorsal and lateral (side) body surfaces grey to brown in colour with white spots; origin of the first dorsal fin above and in front of the rear margin of the pectoral fins (Fig. 14a) . . . . . *Mustelus asterias* (p. 679)

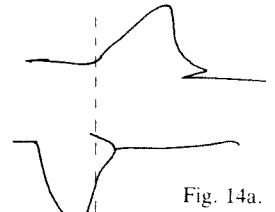


Fig. 14a.

— Dorsal and lateral body surfaces grey to brown in colour without white spots; origin of the first dorsal fin above and behind the rear margin of the pectoral fins (Fig. 14b) . . . . . *Mustelus mustelus* (p. 678)

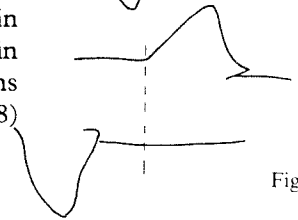


Fig. 14b.

15 Precaudal pits present (Fig. 15a). . . . . *Prionace glauca* (p. 680)

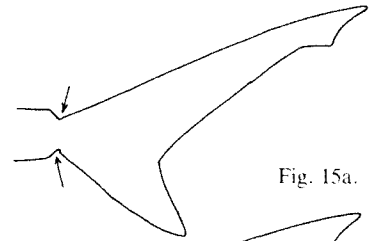


Fig. 15a.

— Precaudal pits absent (Fig. 15b) . . . . . *Galeorhinus galeus* (p. 678)

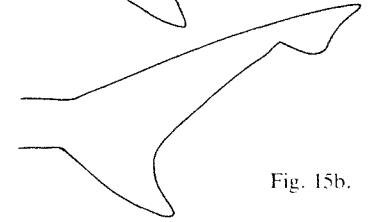


Fig. 15b.

16 Body rounded and not flattened; pectoral fins not expanded outwards and forwards (Fig. 16a) . . . . 17

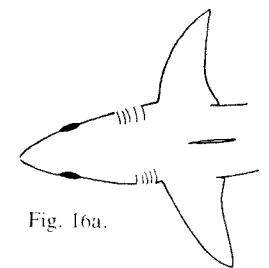


Fig. 16a.

— Body compressed from top to bottom; pectoral fins greatly expanded outwards and forwards (Fig. 16b) . . . . . *Squatina squatina* (p. 672)

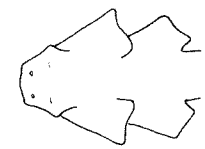


Fig. 16b.

17 Dorsal fins without spines (Fig. 17a) . . . . . 18



Fig. 17a.

— Dorsal fins with spines (Fig. 17b) . . . . . 20



Fig. 17b.

18 Body covered irregularly with large denticles (known as brambles); origin of the first dorsal fin situated above and behind the origin of the pelvic fins (Fig. 18a) . . .

**Echinorhinus brucus** (p. 669)

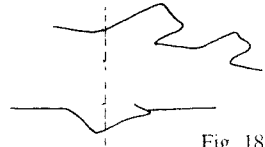


Fig. 18a.

— Body not covered with irregularly spaced or large denticles; origin of the first dorsal fin situated above and in front of the origin of the pelvic fins (Fig. 18b) . . . 19

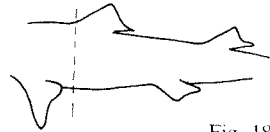


Fig. 18b.

19 Teeth in lower jaw upright and serrated (Fig. 19a); lips are fleshy; body size to 180 cm . . . . .

**Dalatias licha** (p. 670)



Fig. 19a.

— Teeth in lower jaw recurved and not serrated (Fig. 19b); lips are not fleshy; body size to 640 cm . . . . .

**Somniosus microcephalus** (p. 671)



Fig. 19b.

20 Second dorsal fin smaller than the first (Fig. 20a); body with white spots on dorsal and lateral body surfaces . . .

**Squalus acanthias** (p. 672)

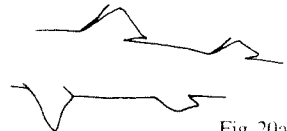


Fig. 20a.

— Second dorsal fin larger than the first (Fig. 20b); body without white spots on dorsal and lateral surfaces . . .

**Etmopterus spinax** (p. 670)



Fig. 20b.

Table 3. A summary of the key characteristics of the sharks found in British coastal waters

|                                   | Number of |   |   | Presence of        |                    |                       |                         | Form of    |        |
|-----------------------------------|-----------|---|---|--------------------|--------------------|-----------------------|-------------------------|------------|--------|
|                                   | 5         | 6 | 7 | Anal fin<br>+<br>- | Spiracle<br>+<br>- | Caudal keel<br>+<br>- | Precaud. pits<br>+<br>- | Caudal fin |        |
|                                   |           |   |   |                    |                    |                       |                         | Lun        | Non-Lu |
| <i>Chlamydoselachus anguineus</i> | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Heptranchias perlo</i>         | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Hexanchus griseus</i>          | •         | • |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Echinorhinus brucus</i>        |           | • |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Dalatias licha</i>             | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Etmopterus spinax</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Somniosus microcephalus</i>    | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Squalus acanthias</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Squatina squatina</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Alopias vulpinus</i>           | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Cetorhinus maximus</i>         | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Isurus oxyrinchus</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Lamna nasus</i>                | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Galeus melastomus</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Scylliorhinus canicula</i>     | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Scylliorhinus stellaris</i>    | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Galeorhinus galeus</i>         | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Mustelus mustelus</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Mustelus asterias</i>          | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Prionace glauca</i>            | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |
| <i>Sphyrna zygaena</i>            | •         |   |   | •                  | •                  | •                     | •                       | •          | •      |



SPECIES ACCOUNTS

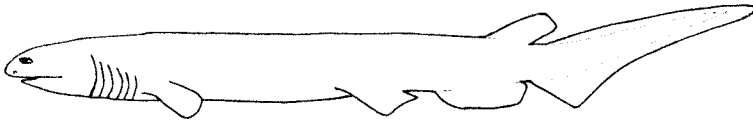
This section provides further details on the identification of each species, and is intended to supplement the key. For each species, brief details on the size, distribution, and feeding habits and reproductive behaviour are presented. Only key references are cited. Long lists of prey items have been omitted; principal items are listed by major groups only.

Table 3 summarises the key features of each species and could be used as a lateral key if needed.

The species are presented in the taxonomic order given in Table 1 (for consistency), rather than the order in which they are keyed out in the previous section. The scale bars represent 50 cm.

***Chlamydoselachus anguineus* (Garman, 1884)**

- Common name: Frilled shark (Fig. 21).  
Key features: Six gill slits, the first of which is continuous under the throat. Body elongated and eel-like body. The teeth are similar in both jaws and each have five cusps.  
Colour: Brown to dark grey, with little or no counter shading.  
Maximum reported length: 196 cm.  
Distribution: Occurs frequently in the north-east Atlantic. This species is found all along the western continental shelf, from Rockall to Portugal. Usually found at depths of > 200 m.  
Feeding habits: The feeding habits of this species are not well documented, but it is reputed to prey on benthic teleosts and elasmobranchs.  
Reproduction: Aplacentally viviparous. Litter sizes are reported to vary from 8–12 pups, with the length at birth being between 39–60 cm.  
References: Gudger (1940); Gudger and Smith (1933).



————— Fig. 21

***Heptanchias perlo*** (Bonnaterre, 1788)

- Common names: Seven-gilled shark, sharp-nose seven-gilled shark (Fig. 22).  
 Key features: Seven gill slits.  
 Colour: The dorsal surface is brown to grey, the ventral surface somewhat lighter.  
 Maximum reported length: 137 cm.  
 Distribution: Only two specimens have been taken in British waters, one off the south coast of Ireland, the other off the south coast of Cornwall.  
 Feeding habits: An active predator, feeding on small teleosts and mid-water cephalopods.  
 Reproduction: Aplacentally viviparous. Litter sizes are reported to vary from 9–20, the pups at birth being between 27–30 cm.  
 References: Cappetta *et al.* (1985); Bass *et al.* (1975*d*).

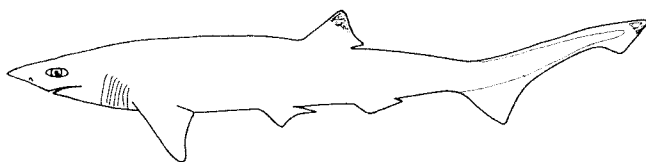


Fig. 22.

***Hexanchus griseus*** (Bonnaterre, 1788)

- Common names: Six-gilled shark, cow shark (Fig. 23).  
 Key features: Six gill slits, but the first is not continuous under the throat. The teeth in the upper jaw are different from those in the lower jaw. The central teeth in the upper jaw have a single large, recurved cusp (lateral teeth have two or more cusps). Those in the lower jaw are comb-like.  
 Colour: Grey to brown dorsally, becoming lighter on the ventral surface.  
 Maximum reported length: 482 cm (specimens recorded off the British Isles are most commonly between 150–220 cm).  
 Distribution: This species is typically found in moderate to deep waters (200–1000 m), occasionally straying into shallower areas. It is usually recorded from the west of Ireland and Scotland, and from the outer reaches of the Celtic Sea. The species may occur very rarely in the North Sea.  
 Feeding habits: Primarily piscivorous, feeding on both teleosts and elasmobranchs. Crustaceans may also be taken. At least one individual has been observed to prey on seals.  
 Reproduction: Aplacentally viviparous. Litter sizes vary from 22–108, the pups at birth being between 60–74 cm.  
 References: Ebert (1986); Springer and Waller (1969).



Fig. 23.

***Echinorhinus brucus*** (Bonnaterre, 1788)

Common name: Bramble shark (Fig. 24).

Key features: Large, irregularly spaced thorny denticles which cover the surface of the skin; hence the shark's common name.

Colour: Brown to dark grey dorsally, with several dark spots on the lateral body surfaces. The ventral surface is slightly paler than the dorsal surface, though not white.

Maximum reported length: 275 cm.

Distribution: Specimens are rarely encountered in shallow water, preferring to inhabit depths of 400–900 m. Recorded captures from British waters have come from the south-west (Devon and Cornwall) and a few from the North Sea (Yorkshire).

Feeding habits: Primarily piscivorous, feeding on small teleosts, elasmobranchs and, to a lesser extent, on crustaceans.

Reproduction: Aplacentally viviparous. Litter sizes vary from 15–24, the size at birth being approximately 40 cm.

References: Rappe (1984).

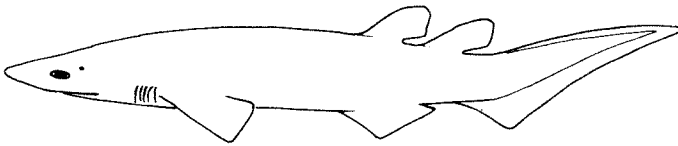
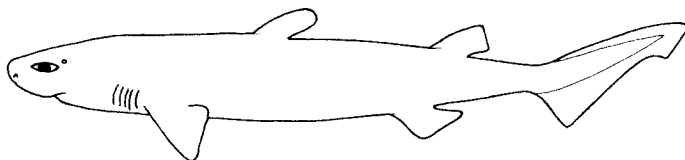


Fig. 24.

***Dalatias licha*** (Bonnaterre, 1788)

- Common name: Darkie charlie (Fig. 25).
- Key features: The lack of well developed dorsal spines distinguishes this species from *Squalus acanthias* and *Etmopterus spinax*. The thick fleshy lips and the upright serrated teeth in the lower jaw can be used to separate this species from *Somniosus microcephalus*.
- Colour: The dorsal and ventral surfaces are both brown to dark-grey or black in colour, with no countershading present.
- Maximum reported length: 185 cm.
- Distribution: This species is most often encountered off the western coasts of Ireland and Scotland. Occasional specimens may be taken in the northern part of the North Sea. A single specimen was recently taken much further south, off the coast of Holland.
- Feeding habits: This species feeds on a mixture of teleosts, decapod crustaceans and cephalopods.
- Reproduction: Aplacentally viviparous. Litter size is between 7–16, the size at birth being approximately 30 cm.
- References: Matallanas (1982); Gordon & Duncan (1985).



— Fig. 25.

***Etmopterus spinax*** (Linnaeus, 1785)

- Common name: Velvet belly (Fig. 26).
- Key features: The iridescent tissues present on the lateral body surfaces give this shark its common name. The presence of predorsal spines distinguishes this species from *Somniosus microcephalus* and *Dalatias licha*. The second dorsal fin is larger than the first and there are no white spots on the lateral body surfaces, thus distinguishing this species from *Squalus acanthias*.
- Colour: Both dorsal and ventral surfaces are dark grey or brown in colour. Lighter patches of skin containing photophores (see Glossary, p. 685) are present along the whole length of the lateral body surfaces.
- Maximum reported length: 60 cm.
- Distribution: *E. spinax* occurs all along the western continental shelf from Iceland to Portugal. Specimens may occasionally be taken from deep waters to the north-east of Scotland, and at depths of 200 m in the north-eastern North Sea in August.

- Feeding habits: Juvenile and sub-adult specimens prey primarily on euphausiid shrimps and, to a lesser extent, on teleosts. Adults prey on a diet of cephalopods and teleosts.
- Reproduction: Aplacentally viviparous. Litter size varies between 6–20 pups, the size at birth being between 12–13 cm.
- References: Mauchline and Gordon (1983).

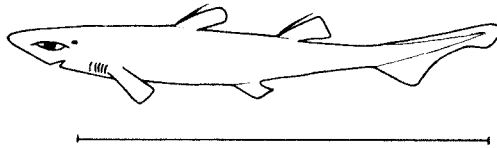


Fig 26.

***Somniosus microcephalus*** (Bloch and Schneider, 1801)

- Common name: Greenland shark (Fig. 27).
- Key features: This is the largest of the squaloid sharks in British waters. Adults may be identified by their size alone. The two dorsal fins are without spines, serving to distinguish this species from both *Etmopterus spinax* and *Squalus acanthias*. The teeth in the lower jaw are recurved and unserrated, distinguishing this species from *Dalatias licha*.
- Colour: Dark brown to grey dorsally. Little or no counter-shading is present, the ventral surface being only slightly paler than the dorsal surface.
- Maximum reported length: 640 cm.
- Distribution: This is a “cold-water” species which has been recorded off the north-west coast of Scotland and in the northern part of the North Sea; it occurs rarely in the North Sea off England.
- Feeding habits: Primarily piscivorous, feeding on both teleosts and elasmobranchs. The species may also take seals when available.
- Reproduction: Aplacentally viviparous. Little is known about the reproductive behaviour of this species. Litter size is thought to be about 10 pups, the size at birth being between 37–40 cm.
- References: Fange and Bergstrom (1981); Koefoed (1957).

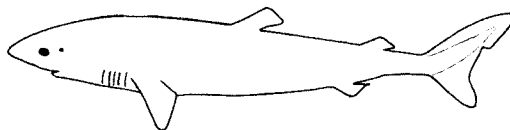


Fig.27.

***Squalus acanthias*** (Linnaeus, 1758)

- Common names:** Spurdog, piked dogfish, spiny dogfish, common dogfish (Fig. 28).
- Key features:** Both dorsal fins of this shark bear well developed spines on their anterior margins. The first dorsal fin is larger than the second, distinguishing this species from *Etmopterus spinax* (where the reverse is true). Also, the general body form of *S. acanthias* is rounded in cross-section, unlike that of *E. spinax* which is slightly dorso-ventrally compressed.
- Colour:** The dorsal and lateral body surfaces are dark-grey or black. White spots are usually present on the upper lateral body surfaces. The ventral surface is white.
- Maximum reported length:** 130 cm.
- Distribution:** This is one of the two most common sharks in British coastal waters, the other being *Scyliorhinus canicula*. It can be found off all parts of the British coast at all times of the year.
- Feeding habits:** Primarily piscivorous, feeding on a variety of teleosts, but will also prey secondarily on crustaceans and cephalopods. The species may hunt in packs, a behaviour known as "shoaling".
- Reproduction:** Aplacentally viviparous. Litter size varies between 1–20 pups, the size at birth being between 19–33 cm.
- References:** Holden (1966, 1968).

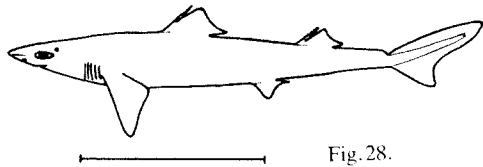


Fig. 28.

***Squatina squatina*** (Linnaeus, 1758)

- Common names:** Monkfish, angel shark (Fig. 29).
- Key features:** The body of this shark is dorso-ventrally compressed, the pectoral fins being greatly expanded and drawn forwards and is generally ray-like in appearance. The gill slits are laterally situated and the mouth is terminally situated.
- Colour:** The dorsal surface is usually light- to sandy-brown and is speckled with numerous darker small spots. The ventral surface is white.
- Maximum reported length:** 180 cm.
- Distribution:** This species is found in shallow waters (<100 m) off the British coast throughout the year, usually close to the bottom. The species is common off the west coasts of Scotland, Ireland, England and Wales. It is rare in the North Sea.
- Feeding habits:** Primarily piscivorous, feeding on bottom living teleosts such as dabs, but will also take molluscs and crustaceans.
- Reproduction:** Aplacentally viviparous. Litter size varies between 9–20 pups, the size at birth being between 24–33 cm.
- References:** Capape (1974); Wegnez (1976).

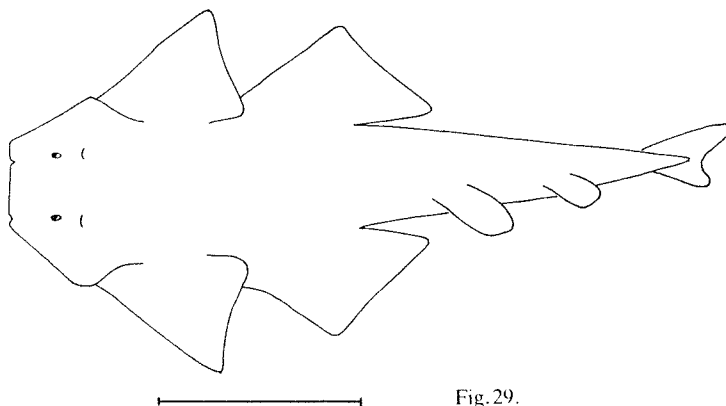


Fig. 29.

***Alopias vulpinus*** (Bonnaterre, 1788)

- Common names:** Thresher shark, fox shark (Fig. 30).
- Key features:** The caudal fin of this species is distinctive, and gives rise to the common name "thresher shark". The upper lobe is greatly elongated, being equal in length to the rest of the body.
- Colour:** Brown to dark grey above, becoming paler ventrally.
- Maximum reported length:** 600 cm.
- Distribution:** This species occurs frequently off the south Cornish coast, and as far east as the Isle of Wight. Occasional specimens are known from the Pembroke coast. Thresher sharks are less frequently encountered in the North Sea and only very rarely in Scottish waters.
- Feeding habits:** This species feeds on small schooling pelagic fish such as mackerel, possibly using its long tail to stun or kill its prey and also to herd the prey together prior to feeding.
- Reproduction:** Aplacentally viviparous. Litter size varies between 2–6 pups, the size at birth being between 114–150 cm.
- References:** Cailliet and Bedford (1983); Munoz-Chapuli (1985).

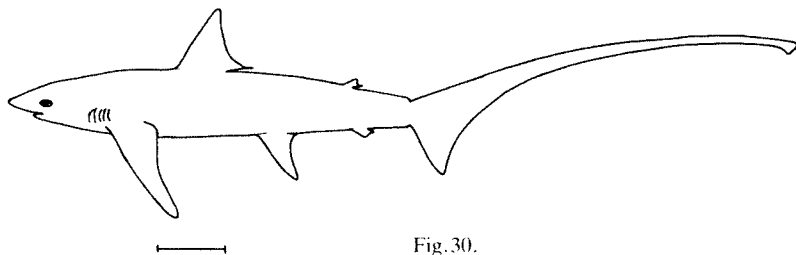


Fig. 30.

***Cetorhinus maximus*** (Gunnerus, 1765)

- Common name:** Basking shark (Fig. 31).
- Key features:** Adults of this species are unmistakable because of their large body size (> 700 cm). The five gill slits are all extremely large, the first extending to the dorsal body surface. This species may be distinguished from the mackerel sharks (Family Lamnidae) by the presence of numerous small teeth.
- Colour:** Uniform brown to dark-grey, with no counter shading.
- Maximum reported length:** Adults frequently reach lengths in excess of 700 cm and may reach 900 cm.
- Distribution:** Found off all coasts of the British Isles, most commonly during the summer months in areas rich in plankton.
- Feeding habits:** This species is a planktivorous filter feeder.
- Reproduction:** Aplacentally viviparous. Litter size is unknown but the size at birth is estimated to be between 114–150 cm.
- References:** Matthews (1950); Matthews and Parker (1950); Kunzlick (1988).

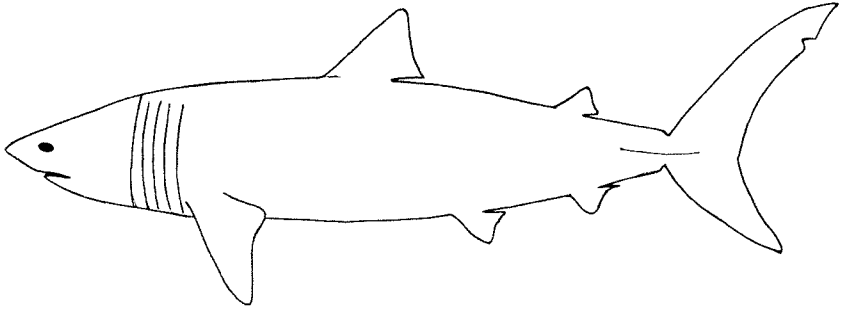


Fig. 31.

***Isurus oxyrinchus*** (Rafinesque-Schmaltz, 1810)

- Common names:** Shortfin mako, mako shark (Fig. 32).
- Key features:** The teeth of this species are lanceolate, but without secondary basal cusps. There is no secondary caudal keel on the caudal peduncle. The body is more slender than that of *Lamna nasus*, and the snout is more pointed.
- Colour:** The dorsal surface is a vivid cobalt blue. The ventral surface is white.
- Maximum reported length:** 396 cm.
- Distribution:** Found occasionally off the south-west coast of Cornwall and the south of Ireland. It will probably be encountered only in very warm years (and then only in the summer months).
- Feeding habits:** Piscivorous, feeding on both teleosts and elasmobranchs. This species is also known to take very large prey such as swordfish.
- Reproduction:** Aplacentally viviparous. Litter size varies between 4–18 pups, the size at birth being between 58–70 cm.
- References:** Pratt and Casey (1983); Stillwell and Kohler (1982).



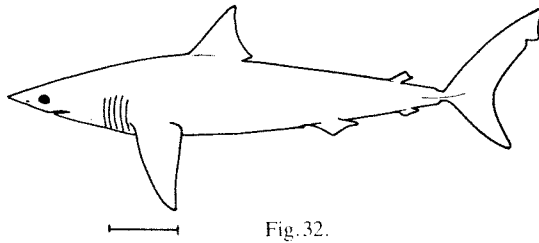


Fig. 32.

***Lamna nasus*** (Bonnaterre, 1788)

Common names: Porbeagle shark, mackerel shark (Fig. 33).

Key features: The teeth of this species are lanceolate, consisting of a large single cusp, with a smaller basal cusp on either side. There are two lateral caudal keels on each side of the caudal peduncle, the lower one smaller than the upper, and both extending onto the forward margin of the caudal fin.

Colour: The dorsal surface varies from blue through dark grey, while the ventral surface is much lighter, usually white.

Maximum reported length: 300 cm (specimens encountered off the British Isles are typically in the range 160–200 cm).

Distribution: This species is generally present throughout the year off all coasts.

Feeding habits: Eats teleosts mainly, but also squids. The lack of serrations on the teeth of the species suggests that the prey may be consumed whole.

Reproduction: Aplacentally viviparous. Litter size usually between 4–18 pups, the size at birth being between 60–75 cm.

References: Aasen (1963); Gauld (1989).

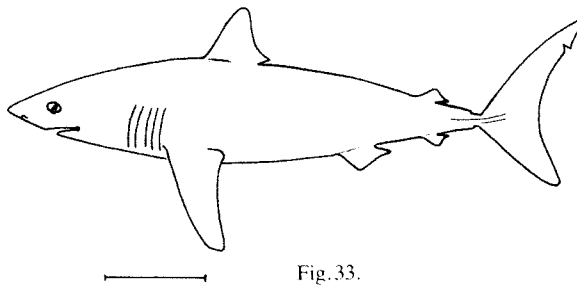
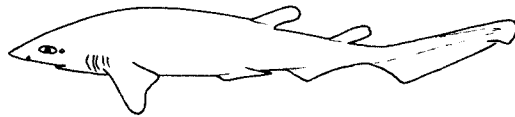


Fig. 33.

***Galeus melastomus*** (Rafinesque-Schmaltz, 1810)

- Common name: Black-mouthed dogfish (Fig. 34).
- Key features: This species may be distinguished from *Scyliorhinus canicula* and *S. stellaris* by the fact that the inside of the mouth is black. The upper margin of the caudal peduncle and upper lobe of the caudal fin bear a crest of modified and enlarged denticles. This feature is only found in sharks of the genus *Galeus*. The body is highly flexible.
- Colour: The dorsal and ventral surfaces are both grey to dark brown. The dorsal surface is covered by a series of darker, round patches, the number varying with age. In juveniles there are seven to eight, whilst in adults, there may be as many as 19.
- Maximum reported length: 80 cm (most specimens are 65–75 cm when fully grown).
- Distribution: This species is usually found in deep waters (400 m) to the west of Scotland and Ireland, but will often stray into shallower waters including Norwegian fjords and Scottish sea lochs. It is unlikely to be encountered in the North Sea.
- Feeding habits: Feeds on a mixed diet of teleosts and crustaceans (euphausiid shrimps, amphipods and isopods)—of particular importance is the Norway lobster.
- Reproduction: Oviparous. Eggs are laid by the females in the spring and summer. Each egg is approximately  $7 \times 2$  cm in size and the females can lay up to 13 eggs per season.
- References: Mattson (1981); Springer (1979); Mauchline and Gordon (1983).



————— Fig. 34.

***Scyliorhinus canicula*** (Linnaeus, 1758)

- Common names: Lesser spotted dogfish, sandy dog (Fig. 35).
- Key features: The nasal flaps of this species are confluent with the upper lip and are almost joined at the midline. This feature, and its generally smaller body size, serve to distinguish this species from *S. stellaris*.
- Colour: The dorsal surface is usually light brown and covered with darker spots. However, the background colour can vary, being much darker in some specimens. The ventral surface is paler than the dorsal surface.
- Maximum reported length: 80 cm.
- Distribution: Common in shallow waters off all parts of the British coast, but least so off the east coast of Scotland.
- Feeding habits: Preys on a mixed diet of benthic invertebrates, including crustaceans and polychaete worms. It will also prey on small

gadoid (cod) and pleuronectiform (flatfish) teleosts, and rarely on cephalopods.

**Reproduction:** Oviparous. Females lay up to 10 eggs per month during the breeding season (November–July). Eggs are laid two at a time every 5–6 days. The eggs measure approximately  $2 \times 4.5$  cm in size. The young are approximately 10 cm in length at hatching.

**References:** Lyle (1983); Springer (1979); Mellinger (1983).

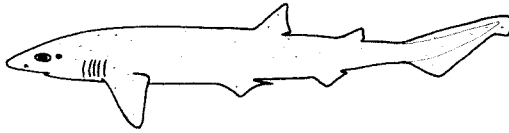


Fig. 35.

***Scyliorhinus stellaris*** (Linnaeus, 1758)

**Common names:** Bull huss, nurse hound, large-spotted dogfish (Fig. 36).

**Key features:** This species has nasal flaps which are clearly discrete at the midline and are not confluent with the upper lip.

**Colour:** The dorsal surface is pale to dark brown and covered by a series of darker, round spots. The ventral surface is much paler, usually white.

**Maximum reported length:** 162 cm; adults are usually much longer than 100 cm.

**Distribution:** Occurs mainly in the English Channel, Irish Sea (including the western part of Liverpool Bay). It occasionally occurs off the west of Scotland and is less common in the North Sea than in other areas.

**Feeding habits:** Feeds on a varied diet of molluscs, crustaceans, and teleosts. Cephalopods are a more important dietary item to larger specimens. The species occasionally preys upon the smaller shark species *S. canicula*.

**Reproduction:** Oviparous. The reproductive behaviour of this species is not well known. However, it is known to lay 1–2 eggs at a time, each approximately  $10 \times 3$  cm in size, several times during the breeding season. Egg cases can be found in coastal waters between March and September. The length at hatching is about 16 cm.

**References:** Springer (1979); Ford (1921).

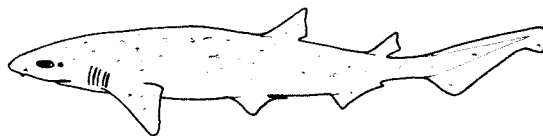


Fig. 36.

***Galeorhinus galeus*** (Linnaeus, 1758)

- Common names: Tope, soupfin shark, sweet William (Fig. 37).
- Key features: This species may be distinguished from *Prionace glauca* by the lack of precaudal pits. The first dorsal fin originates further forward than the rear margin of the pectoral fins and there is no inter-dorsal ridge. The first dorsal fin is much larger than the second, thereby distinguishing this species from *Mustelus* spp.
- Colour: The dorsal surface is usually dark grey, the ventral surface white.
- Maximum reported length: 175 cm (most specimens encountered are somewhat less than this, the largest being 140–150 cm).
- Distribution: This species may be found off all coasts of the British Isles, from Scotland as far south as the English Channel, throughout the year. Specimens may be found closer inshore during the summer months.
- Feeding habits: Preys upon a wide variety of teleosts and, to a lesser extent, on crustaceans.
- Reproduction: Placentally viviparous. Litter size varies between 6–52 pups, the average being 35–40. Size at birth is between 30–35 cm.
- References: Wegnez (1976); Olsen (1984).

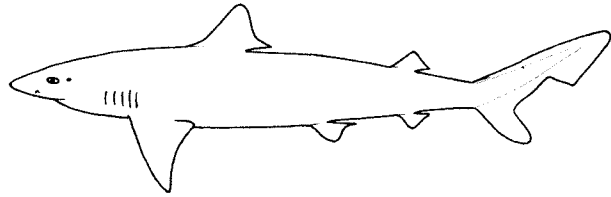


Fig. 37.

***Mustelus mustelus*** (Linnaeus, 1758)

- Common name: Smoothhound (Fig. 38).
- Key features: This species, like *M. asterias*, has two dorsal fins which are approximately equal in size; it may be distinguished from the carcharhinid sharks and *Galeorhinus galeus* by this feature. The teeth of this species are flattened and plate-like and are adapted for crushing prey. It is similar in appearance to *M. asterias*, but can be distinguished by the fact that the origin of the first dorsal fin is above and behind the rear margin of the pectoral fins.
- Colour: Grey to pale brown dorsally, shading to off-white below. There are no white spots on the lateral body surfaces.
- Maximum reported length: 160 cm (most specimens being 120–135 cm when fully mature).
- Distribution: This species is less common off the British coast than *M. asterias*. It is generally found in shallow water, though occasionally may be found as deep as 350 m. The species has been recorded from the English Channel and Irish Sea (including Liverpool Bay), but it is rarely encountered in the North Sea.
- Feeding habits: Preys on a mixed diet of benthic invertebrates, primarily crustaceans. Small teleosts and polychaete worms may also be taken.

- Reproduction: Placentally viviparous. Litter size varies from 5–28 but is usually less than 15. Length at birth is in the range 30–39 cm.
- References: Azouz and Capape (1971); Francis (1981).

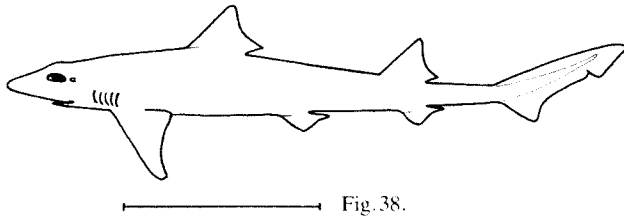


Fig. 38.

***Mustelus asterias*** (Cloquet, 1819)

- Common names: Starry smoothhound, stellate smoothhound (Fig. 39).
- Key features: There are two dorsal fins of approximately equal size, the first originating above and in front of the rear margin of the pectoral fins. This, plus the presence of numerous white spots on the lateral body surfaces, distinguishes this species from *M. mustelus*.
- Colour: The dorsal surface is pale brown to grey in colour and there are numerous white spots on the upper lateral body surfaces (above the lateral line). The ventral surface is white.
- Maximum reported length: 150 cm (most specimens being in the range 120–130 cm when fully grown).
- Distribution: The species is common off all parts of the British Isles (with the possible exception of west Scotland).
- Feeding habits: Preys primarily on bottom-living (benthic) invertebrates such as crustaceans. The plate-like teeth of this species are an adaptation for crushing such prey.
- Reproduction: Aplacentally viviparous. Litter size varies from 6–30 but is most commonly in the range 7–15. Average length at birth is 30 cm.
- References: Quignard and Capape (1972); Francis (1981).

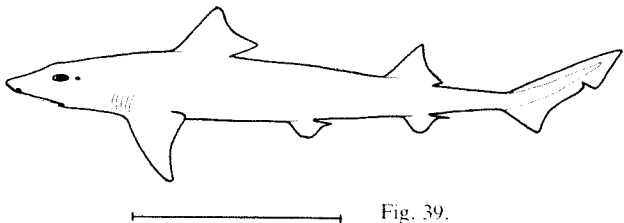


Fig. 39.

***Prionace glauca*** (Linnaeus, 1758)

- Common names: Blue shark, great blue shark (Fig. 40).
- Key features: The long falcate pectoral fins, long snout and slender body serve to distinguish this species from *Galeorhinus galeus*. There is no inter-dorsal ridge between the 1st and 2nd dorsal fins and the first dorsal fin originates above and behind the rear margin of the pectoral fins. The presence of precaudal pits also distinguishes this species from *G. galeus*.
- Colour: The dorsal surface is cobalt blue, the ventral surface snow white.
- Maximum reported length: 383 cm. Growth studies suggest that it may reach 400 cm, but the largest specimens encountered off the British Isles are approximately 200–230 cm.
- Distribution: The species is found off the south coasts of Devon and Cornwall and the south and west coasts of Ireland, between the months of May and September.
- Feeding habits: The main prey of this species are small open-water teleosts and a variety of cephalopods.
- Reproduction: Placentally viviparous. Litter sizes vary from 4 to 135, the length at birth being 35–44 cm. In very large litters, the length at birth may be slightly smaller.
- References: Pratt (1979); Stevens (1976).

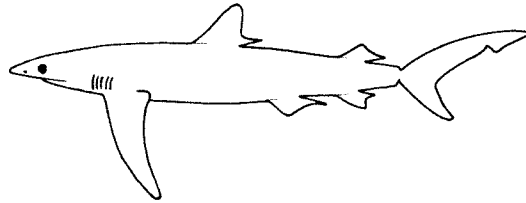


Fig. 40.

***Sphyrna zygaena*** (Linnaeus, 1758)

- Common names: Smooth, hammerhead, common hammerhead shark (Fig. 41).
- Key features: The hammerhead can be distinguished from all other sharks in British waters by the shape of the head. The head is drawn out into two lateral lobes which form the typical hammer shape which gives the species its name.
- Colour: The dorsal surface can vary from brown to grey. The ventral surface is paler, though not necessarily pure white.
- Maximum reported length: 400 cm.
- Distribution: This species is a rare visitor to British waters, most records dating from the 19th century. This shark has been recorded from the south coasts of Devon and Cornwall and from the coasts of south-west Wales.
- Feeding habits: Small specimens (< 300 cm) prey on a mixed diet of teleosts and cephalopods. Larger specimens (> 300 cm) feed almost exclusively on teleosts and are known to prey on other species of shark.

Reproduction: Placentally viviparous. Litter sizes range from 20–37, the length at birth being 50–60 cm.  
References: Gilbert (1967).

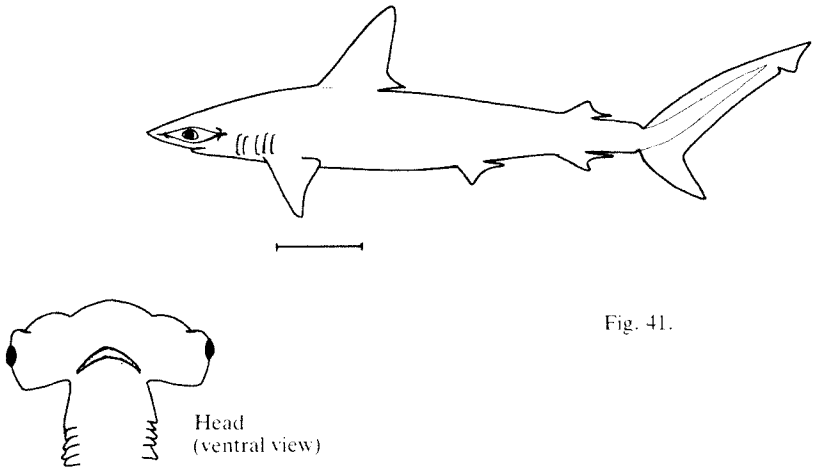


Fig. 41.

*Confirmatory notes*

The 21 species of shark included in the key represent 12 families in 5 orders (Table 1). The oldest and most primitive of the orders is the Hexanchiformes, commonly known as cow sharks and frilled sharks. These species are characterised by having either six or seven gill slits (on each side) and a single dorsal fin. All other groups of sharks covered here have five gill slits and two dorsal fins.

The spurdogs (also known as dogfish sharks, but not to be confused with dogfish of the family Scyliorhinidae—see below), order Squaliformes, are characterised by the lack of an anal fin. The angel sharks, order Squatiniformes, are represented in British waters by a single species which also lacks an anal fin but has a characteristic flattened ray-like body form. The presence of laterally situated gill slits distinguishes this species from the skates and rays (superorder Batoidea) which have ventrally located gill slits.

The largest of the five orders, Carcharhiniformes, sometimes referred to as the ground sharks, are represented in British waters by 4 families (see Table 1). The hammerhead sharks, family Sphyrnidae, are easily recognised by the shape of their head which is expanded into two lateral lobes. The dogfishes (also known as catsharks), family Scyliorhinidae, are represented by three species which may be distinguished from other carcharhiniform sharks by the position of the first dorsal fin (situated above and behind the origin of the pelvic fins). The two remaining carcharhiniform families, the smoothhounds, family Triakidae, and the requiem sharks, family Carcharhinidae, are very similar in appearance, but the former may be distinguished by the absence of precaudal pits and presence of large spiracles, oval eyes and long labial furrows.

The remaining order, Lamniformes, includes the mackerel sharks, family Isuridae, and their relatives. This order is represented in British waters by three families. Sharks of the families Cetorhinidae and Lamnidae are the only ones in British waters to have lunate caudal fins. They may be distinguished from each other by the relative sizes and number of their teeth. The mackerel sharks, family Lamnidae, are tertiary predators and have fewer, larger teeth, whereas the basking shark, family Cetorhinidae, which is a filter feeder, has a large number of very small teeth. The remaining family, Alopiidae, includes the thresher

sharks which are easily recognisable because of the greatly elongated upper lobe of the caudal fin.

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#### GLOSSARY

- ANTERIOR: Forward to or in front of. With regard to fins, the anterior margin is the leading edge.
- ANAL FIN: An unpaired fin located in the vicinity of the anus on the underside of a fish. Not present in all sharks.
- CAUDAL FIN: Tail fin. In sharks, this is the primary source of propulsion.
- CAUDAL KEEL: Flattened lateral expansions located on the caudal peduncle in several species of shark. They may extend onto the anterior margin of the caudal fin.
- CAUDAL PEDUNCLE: The part of the body which extends from the rear margin of the rear dorsal fin and anal fin to the front of the caudal fin.
- CEPHALOPODS: A group of molluscs, including octopuses, squid and cuttlefish, which usually lack external shells and have either 8 or 10 arms/tentacles.

**CETACEANS:** A group of marine mammals which includes dolphins, porpoises and whales.

**CHONDRICHTHYES:** The taxonomic group (class) which includes all fish-like vertebrates which have cartilaginous skeletons including sharks, rays and chimaeras (rat tails).

**CLASPERS:** Specialised pelvic appendages found on male sharks which are involved in reproduction.

**COLD-BLOODED:** A condition known technically as poikilothermy. The body temperature of cold-blooded animals is determined by the environmental temperature. Cold-blooded animals are incapable of maintaining a body temperature above that of the environment.

**DORSAL:** Upper, as in upper body surface.

**DORSAL FINS:** Unpaired fins located on the upper body surface. There may be either one or two in sharks.

**ELASMOBRANCHS:** Sharks, skate and rays.

**FALCATE:** Sickle-shaped.

**GADOIDS:** A group of bony fishes which include well known species such as the cod and haddock, and their close relatives.

**GILL SLITS:** Openings located on the lateral surfaces of the head of sharks which allow the discharge of water from the gills. There may be 5–7 depending on species.

**LANCEOLATE:** Shaped like the head of a lance. Teeth which are lanceolate are elongated, wider at the base than the tip, and taper significantly from base to tip.

**LATERAL LINE:** A horizontal line of openings located in a “canal” along either side of fishes, containing sensory cells allowing the fish to detect vibrations in the surrounding water.

**LUNATE:** Crescent-shaped.

**NASAL FLAPS:** Structures situated around the nostrils which control the passage of water into and out of the nostrils. Derived from flaps of skin.

**OPERCULUM:** A bony plate which covers the gills of bony fishes. It is not present in sharks.

**PECTORAL FINS:** Symmetrical paired fins located on the lower lateral surfaces of sharks, just behind the head.

**PELVIC FINS:** Paired fins located on the ventral abdominal surface of sharks, posterior to the pectoral fins and anterior to both the anal and caudal fins.

**PHOTOPHORES:** Small light organs which, by means of a chemical reaction, are capable of producing a flash of light. These light organs may be used by the sharks for either attracting prey or communication.

**PINNIPIDS:** A group of marine mammals which includes both seals and sea lions.

**PISCIVOROUS:** Fish eating.

**PLACOID SCALES:** Also known as **DERMAL DENTICLES**. These are small tooth-like scales which are found only in cartilaginous fishes.

**PLANKTIVOROUS:** Feeding on plankton.

**PRECAUDAL PITS:** These are depressions at the base of the upper and/or lower lobes of the caudal fin, located on the rear part of the caudal peduncle.

**POSTERIOR:** Behind or to the rear of. With regard to fins, the posterior margin is the rear edge.

**RECURVED:** Curved or bent backwards.

**SPIRACLES:** These are small openings on the upper lateral surfaces of the head in some sharks, situated posteriorly to the eyes and anteriorly to the gill slits. They are the remnants of a 6th gill slit but have no respiratory function in sharks.

**SUB-TERMINAL NOTCH:** An indentation towards the apex of the rear margin of the upper lobe of the caudal fin.

**SWIM BLADDER:** This is a sac which is present in the body cavity of teleosts. By either filling or emptying the sac of air, these fishes are able to adjust their buoyancy. Swim bladders are absent in all sharks.

**TELEOSTS:** Bony fishes, i.e. those fishes with skeletons made of true bone.

**VENTRAL:** Lower or below. The ventral surface of the body is the lower or abdominal body surface, i.e. that side opposite the vertebral column.

**WARM-BLOODED:** Known technically as homeothermy. Body temperature of warm-blooded animals is not regulated by environmental temperature. Warm-blooded animals are capable of maintaining a body temperature higher than that of their environment.

## APPENDIX

An annotated list of sharks species recorded from deeper waters off the edge of the continental shelf to the west of the British Isles. Details of the occurrence of these species are given by Gordon and Duncan (1985). Further information on distribution and general biology will be published shortly (Vas, in press).

|  |                         |
|--|-------------------------|
| <i>Apristurus</i> spp.                                   | catsharks*              |
| <i>Centroscyllum fabricii</i> (Reinhardt, 1825)          | black dogfish           |
| <i>Centroscymnus coelolepis</i> (Bocage & Capello, 1864) | Portuguese dogfish      |
| <i>Centroscymnus crepidater</i> (Bocage & Capello, 1864) | longnose velvet dogfish |
| <i>Centrophorus granulosus</i> (Bloch & Schneider, 1801) | gulper shark            |
| <i>Centrophorus squamosus</i> (Bonnaterre 1788)          | leafscale gulper shark  |
| <i>Deania calcea</i> (Lowe, 1839)                        | birdbeak dogfish        |
| <i>Etmopterus princeps</i> (Collett, 1904)               | great lantern shark     |
| <i>Galeus murinus</i> (Collett, 1904)                    | mouse dogfish           |
| <i>Oxynotus centrina</i> (Linnaeus, 1758)                | humatin                 |
| <i>Oxynotus paradoxus</i> (Frade, 1929)                  | sailfin rough shark     |
| <i>Scymnodon ringens</i> (Bocage & Capello, 1864)        | knifetooth dogfish      |

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\*At least 4 (of the 27) species of *Apristurus* (Compagno, 1985) are thought to occur to the west of the British Isles.