

KEY TO GULF OF MAINE FISHES

Key A

1. Mouth soft with no bony jaws; form eel-like; no pectoral fins..... 2
Mouth has bony jaws; pectoral fins present if form is eel-like..... 3
2. Two separate fins on back; no barbels on snout..... Lamprey, p. 18
Only one fin on back; barbels on snout..... Hag, p. 16
3. Bones of head fused in a tubular snout, with mouth at tip..... Key B, p. 12
No tubular snout..... 4
4. One or both jaws greatly prolonged as a bony sword or bill..... Key C, p. 12
Neither jaw greatly prolonged..... 5
5. Five or more pairs of large gill openings (on sides of neck in sharks; on lower surface
in skates)..... 6
Only one external gill opening, large or small, on each side..... 7
6. General form cylindrical..... Sharks, key, p. 23
General form flat and disklike, with long whiplike tail..... Skates and rays, key, p. 57
7. Body abruptly square-cut close behind the very high dorsal and anal fins. Sunfish, p. 301
Body with distinct tail..... 8
8. Large sucking plate or disk, either on the top of the head or on the chest..... 9
No sucking disk or plate..... 11
9. Sucking plate on top of head..... Remora family key, p. 349
Sucking disk on chest..... 10
10. General form like a tadpole; anal fin originates about as far back as the tip of the
pectoral..... Sea snail family key, p. 340
General form not like a tadpole, but high arched with longitudinal ridges; anal fin
originates far behind tip of pectoral..... Lumpfish family key, p. 334
11. Tail like a shark, i. e., with upper lobe much longer than lower..... Sturgeon, p. 75
Tail nearly symmetrical..... 12
12. Whole head and body clothed in continuous armor of bony plates.. Alligator fish, p. 333
If bony plates are present they do not form a continuous armor over head and body... 13
13. No clear separation between anal and caudal fins, which together form one contin-
uous fin (anal portion may be either long or short)..... Key D, p. 12
Anal and caudal fins separated by a deep notch if not by a space 14
14. There is a fleshy (adipose) fin with neither spines nor rays behind the rayed dorsal
fin..... Key E, p. 13
A fleshy flap⁵ in front of dorsal fin..... Tilefish, p. 352
All dorsal fins supported by rays or spines, which can be felt if not seen; without fleshy
lobes or adipose fins either in front of or behind them 15
15. Head fringed with fleshy tags or flaps; much broader than body..... 16
Head not fringed with fleshy flaps..... 18
16. Lower jaw projects far beyond upper, exposing very large conical teeth even when
mouth is closed; two long isolated spines on top of head in front of eyes.. Goosefish, p. 524
Lower jaw does not project noticeably beyond upper; teeth small; no long isolated
spines in front of eyes..... 17
17. First (spiny) dorsal fin longer than second (soft rayed); neither is fleshy.. Sea raven, p. 330
First (spiny) dorsal fin much shorter than second (soft rayed); both thick and
fleshy..... Toadfish, p. 357

⁵ Although this flap suggests the adipose fin of a salmon in appearance, it is not actually an analogous structure, but simply a lobe of skin.

Key A—Continued

18. Fishes which lie flat on one side, with both eyes on the other side, the upper side dark, the lower pale..... Flatfish tribe key, p. 472
 Not lying flat on one side..... 19
19. Only one well-developed dorsal fin (this, however, may be preceded by isolated spines or rays)..... 20
 Two or more separate and well-developed dorsal fins..... Key F, p. 13
20. Top of snout with several barbels or beards... Rocklings (cod family in part) key, p. 385
 No barbels or beard on top of snout..... 21
21. Jaws with very large canine tusks which project even when the mouth is closed.....
 Wolfish family key, p. 370
 No large canine tusks..... 22
22. Dorsal fin soft-rayed, except that there may be a short spine at its forward margin...
 Key G, p. 14
 At least forward one-third of dorsal fin, if not whole length, spiny..... Key H, p. 15

Key B

Fishes with tubular snouts (from No. 3, p. 11).

1. Head horselike; trunk deep, narrowing abruptly to slender, prehensile tail; no caudal fin..... Sea horse, p. 177
 Head roughly cylindrical; body very slender with no distinction into trunk and tail portions; caudal fin present..... 2
2. Snout no longer than dorsal fin; no ventral fin; caudal fin rounded..... Pipefish, p. 175
 Snout more than six times as long as dorsal fin; ventral fins present; caudal fin forked..... Trumpetfish, p. 173

Key C

Fishes with bills or swords (from No. 4, p. 11).

1. Both jaws elongated..... 4
 Only one jaw elongated..... 2
2. Upper jaw elongated as a sword..... 3
 Lower jaw elongated..... Halfbeak, p. 163
3. Sword sharp-edged; first dorsal fin shorter than the sword forward of eye; no ventral fins..... Swordfish, p. 221
 Sword round-edged; dorsal fin nearly twice as long as sword..... Spearfish,⁶ p. 227
4. Caudal fin well developed..... 5
 No caudal fin; tip of tail is whiplike..... Snipe eel, p. 88
5. Several finlets behind dorsal and anal fins..... Needlefish, p. 164
 No finlets behind dorsal and anal fins..... Silver gar, p. 161

Key D

Fishes with well-developed fins, snouts of ordinary form, only one gill opening on each side, and the anal fin continuous with the caudal around the tip of the tail (from No. 13, p. 11.)

1. Only one dorsal fin..... 2
 Two separate dorsal fins, the first much higher than the second but shorter..... 6
2. Body band-shaped, the tail tapering to a whiplike tip..... Cutlasfish, p. 220
 Body thick, eel-like; vertical fins continue around tip of tail in a broad band..... 3
3. Dorsal fin spiny from end to end..... 4
 Dorsal fin soft rayed, at least for almost all its length..... 5

⁶ The sailfish would also come under this heading should one ever be taken in the Gulf of Maine. The distinctions between it and the spearfish are given under the account of the latter on page 228.

Key D—Continued

4. Mouth large and strongly oblique; no ventral fins..... Wrymouth, p. 368
 Mouth small and horizontal; small ventral fins..... Rock eel, p. 359
5. Without ventral fins..... Eel family key, p. 78
 Small but distinct ventral fins, situated forward of the pectorals..... 6
6. Ventrals are situated behind the gill opening..... Eelpout family key, p. 376
 Ventrals situated on the chin, well in front of the gill openings, and reduced to forked,
 barbel-like structures..... Cusk eel, p. 384
7. Ventral fins situated below point of origin of pectorals; eye very large.....
 Grenadier family key, p. 467
 Ventral fins situated behind tip of pectorals; eyes very small..... Chimæra, p. 73

Key E

Bony fishes with two kinds of dorsal fins, i. e., one in front supported by rays, with a fleshy (adipose) fin behind it.¹ (From No. 14, p. 11.)

1. Rayed dorsal fin much longer than head, and spiny..... Lancetfish, p. 155
 Rayed dorsal fin shorter than head, and soft-rayed..... 2
2. Jaws armed with long projecting saber-like fangs..... Viperfish, p. 153
 Teeth small..... 3
3. Noticeable series of phosphorescent organs along each side..... 4
 No phosphorescent organs..... 6
4. Mouth gapes back beyond eye..... Lanternfish family, p. 149
 Mouth does not gape back as far as eye..... Pearlsides, p. 151
6. Tail deeply forked; nose pointed..... Smelt family key, p. 140
 Tail nearly square or only slightly forked; nose rounded..... Salmon family key, p. 126

Key F

Bony fishes with snouts of ordinary form, symmetrical tails, bodies not entirely encased in bony plate, caudal fins distinct from anal, and two or more well-developed dorsal fins, all of them supported by rays or spines (from No. 19, p. 12).

1. All fins soft rayed; no spines..... Cod and silver hake families key, p. 385
 First dorsal fin spiny; second soft-rayed..... 2
2. One or more small finlets between second dorsal and anal fins and the caudal..... 3
 No such finlets..... 4
3. More than 3 each dorsal and anal finlets..... Mackerel family, p. 188
 Two dorsal and two anal finlets..... Escolar, p. 220
 Only one dorsal and one anal finlet..... Mackerel scad (pompano family in part), p. 232
4. Sides of head bony, with sharp spines or horns; head very broad..... 5
 Sides of head have no spines or horns; head not noticeably broad..... 6
5. Three lower rays of each pectoral fin separate from others, in the form of fleshy
 feelers; outline of tip of snout, as seen from above, concave; mouth small.....
 Sea robin family key, p. 345
 Lower rays of pectorals not separate from others; outline of tip of snout convex,
 not concave; mouth very large..... Sculpin family key, p. 314
6. First spine of first dorsal fin very much stouter than others and can be locked erect by
 the second; no ventrals; skin very hard..... Triggerfish, p. 293
 First dorsal spine not stouter than others; ventral fins well developed; skin soft..... 7
7. Ventrals more than twice as long as pectorals; caudal very small..... John Dory, p. 291
 Ventrals no longer than pectorals; caudal fin large..... 8
8. Space between two dorsal fins is as long as the first dorsal; ventrals are situated be-
 hind the middle of the pectorals..... 9
 Little or no free space between the two dorsal fins; ventrals in front of middle of
 pectorals..... 10

¹ The tilefish (pp. 11 and 352) has a fleshy flap, simulating an adipose fin, on the back in front of the rayed dorsal fin.

Key F—Continued

9. Eyes large; mouth large and very oblique..... Silverside family key, p. 178
 Eyes small; mouth very small and longitudinal..... Mullet, p. 182
10. Caudal peduncle extremely slender; caudal fin deeply forked.....
 Pompano family (in part) key, p. 229
 Caudal peduncle moderately deep; caudal fin at most moderately forked..... 11
11. First (spiny) dorsal fin much lower than second (soft rayed) dorsal..... Bluefish, p. 237
 First dorsal as high as second, or higher..... 12
12. Second dorsal fin not much longer than anal..... Sea-bass family (in part) key, p. 251
 Second (soft rayed) dorsal about twice as long as anal fin... Weakfish family key, p. 269

Key G

Bony fishes with snouts of ordinary form, symmetrical tails, bodies not clad in bony plates, caudal fin distinct from the anal, neither canine tusks nor barbels on the top of the snout, and only one dorsal fin which is soft-rayed except that it may commence with one short spine (from No. 22, p. 12). There is no adipose fin or flap either in front of the dorsal fin or behind it.

1. Tail deeply forked..... 2
 Tail square or rounded..... 12
2. The whole of anal fin is behind the dorsal..... Herring tribe key, p. 90
 Part or all of anal fin in front of rear margin of dorsal..... 3
3. Mouth gapes back beyond eye..... 4
 Mouth does not gape beyond eye..... 6
4. Series of phosphorescent spots on each side..... 5
 No phosphorescent spots or organs..... Anchovy, p. 124
5. Eye very large..... Lanternfish family, p. 149
 Eye very small..... Cyclothone, p. 153
6. Eel-like in form..... Launce, p. 183
 Not eel-like in form..... 7
7. Large ventral fins..... 8
 Ventral fins wanting or very minute..... 10
8. Front portion of dorsal fin very high; body very deep..... Opah, p. 242
 Dorsal fin not very high, tapers slightly from front to rear; general form slender, only about one-fifth as deep as long..... Pilotfish, p. 229
10. First dorsal rays very elongate with tiny ventral fins; deep and compressed in form..... Lookdown (adult), p. 236
 First dorsal ray not elongate..... 11
11. Dorsal profile of head convex; forward portion of dorsal fin at least three times as high as rear part, narrowing abruptly; no ventral fins..... Butterfish family key, p. 245
 Dorsal profile of head concave; dorsal fin tapers only slightly from front to rear; minute ventral fins..... Moonfish, p. 235
12. Dorsal fin preceded by one or more stout, isolated spines, with or without triangular fin membranes..... 13
 No isolated spines in front of dorsal fin..... 15
13. Only one stout dorsal spine, situated over the eye; body very deep.....
 Filefish family key, p. 294
 Several dorsal spines, all far behind the eye..... 14
14. Ventrals large, of ordinary form; caudal peduncle stout..... Barrelfish, p. 243
 Each ventral consists of one very large stout spine, with or without a small fin membrane and one or two short weak rays; caudal peduncle very slender
 Stickleback family key, p. 166

Key G—Continued

15. No ventral fins, fishes capable of inflating themselves with air.....
 ----- Puffer and porcupine-fish families key, p. 297
 Ventral fins present; can not inflate themselves with air..... 16
16. Dorsal fin runs whole length of back, from nape to base of caudal, which it joins;
 barbel on chin; form eel-like..... Cusk (cod family in part), p. 462
 Dorsal fin occupies only one-third or less of back behind nape, leaving open space
 as long as fin between it and base of caudal; no barbel on chin; form not eel-
 like..... Mummichog family key, p. 155

Key H

Fishes as in Key G, except that at least the forward one-third of the dorsal fin is spiny (from No. 22, p. 12). There is no adipose fin behind the rayed dorsal, nor fleshy flap in front of it.

1. Rear part of dorsal fin soft rayed..... 2
 Whole length of dorsal fin spiny..... 7
2. Sides of head bony, with knobs or spines..... 3
 No knobs or spines on sides of head..... 4
3. Sides of head with conical spines; spiny portion of dorsal fin at least as long as soft
 part; body laterally compressed..... Rockfish family, p. 304
 Sides of head with low rounded knobs; spiny portion of dorsal fin considerably shorter
 than soft part; body tadpole-shaped.. Deep-sea sculpin (sculpin family in part), p. 329
4. Ventral fins much longer than pectorals; eye very large..... Big-eye, p. 261
 Ventral fins no larger than pectorals; eye not very large..... 5
5. Pectorals pointed; body much compressed..... Sea bream family key, p. 263
 Pectorals rounded; body not much compressed..... 6
6. Rear (soft) portion of dorsal fin nearly as long as anterior (spiny) part; anal much
 higher than long..... Sea bass (sea bass family in part), p. 251
 Rear (soft) portion of dorsal fin less than half as long as spiny part; anal much longer
 than high..... Cunner family key, p. 280
7. Mouth strongly oblique; no ventral fins..... Wrymouth, p. 368
 Mouth not strongly oblique; ventral fins present (very small in one species).....
 ----- Blenny family key, p. 359

THE LAMPREYS. CLASS MARSIPOBRANCHII

Except for *Amphioxus* and its allies, the lampreys are the most primitive of vertebrates, their skeletons being cartilaginous and their skulls hardly differentiated from the vertebral column. They have no true jaws, no ribs, no shoulder or pelvic girdles, and no paired fins. They are eel-like in appearance, but are easily distinguishable from the true eels and, indeed, from most of the true fishes by the peculiar jawless sucking mouth situated at the tip of the snout, and from all Gulf of Maine eels by the absence of pectoral fins.

THE HAGFISHES AND LAMPREYS. FAMILIES MYXINIDÆ AND PETROMYZONIDÆ

These two groups are easily distinguished by the fact that the hags have but one gill opening on each side, one continuous fin on the back, and several barbels on the snout, whereas in the true lampreys there are seven gill openings on each side, the fin on the back is separated into dorsal and caudal portions, and there are no barbels on the snout.