

KEY TO THE FAMILIES OF FISHES IN WEST VIRGINIA

- 1a. Mouth without jaws; pectoral and pelvic fins absent; a single medial nostril opening; 7 gill openings on each side of head PETROMYZONTIDAE, p. 21
- 1b. Mouth with jaws; pectoral fins always present; pelvic fins usually present; 2 nostril openings; 1 gill opening on each side of head 2
- 2a. Caudal fin strongly heterocercal (vertebral column extending up and into upper caudal fin lobe almost to tip of tail); mouth entirely behind front of eye 3

Heterocercal tail (*Scaphirhynchus platyrhynchus*)

- 2b. Caudal fin homocercal (vertebral column not entering upper lobe of caudal fin) or abbreviate-heterocercal (vertebral column extending up into caudal fin, but terminating before entering upper lobe); mouth at least partially in front of eye 4

Homocercal tail (*Lepomis macrochirus*)

- 3a. Snout long and paddle-shaped; 2 small barbels on underside of snout; both without plates POLYODONTIDAE, p. 33
- 3b. Snout short and conical or shovel-shaped; 4 large barbels on underside of snout; body with several rows of bony plates ACIPENSERIDAE, p. 29
- 4a. Snout beak-like, with nostrils at tip; numerous teeth LEPISTOSTEIDAE, p. 35
- 4b. Snout not beak-like 5
- 5a. Dorsal fin single, much longer than 1/2 of body length 6
- 5b. Dorsal fin single or double, but when single much less than 1/2 of body length 7
- 6a. Pectoral and pelvic fins present; dorsal, caudal, and anal fins not continuous as one; body chin (gular) plate present; body not serpentine in shape AMIIDAE, p. 39
- 6b. Pectoral fins present, but pelvic fins absent; dorsal, caudal, and anal fins continuous; chin plate absent; body serpentine ANGUILLIDAE, p. 43
- 7a. Adipose fin present 8
- 7b. Adipose fin absent 10
- 8a. Four pairs of large barbels surrounding mouth; pectoral fins each with large, strong spine at origin ICTALURIDAE, p. 203
- 8b. Barbels absent; pectoral fins lacking anterior spine 9
- 9a. Dorsal and anal fins with 1 or 2 small spines; lateral-line scales fewer than 70; mouth small, not extending to front of eye PERCOPSIDAE, p. 242
- 9b. Dorsal and anal fins soft-rayed and without spines; lateral-line scales more than 100; mouth large, extending far behind front of eye SALMONIDAE, p. 234
- 10a. Dorsal fin single and with 1 or no stout spines 11
- 10b. Dorsal fin double or, if single, with more than 4 spines 18
- 11a. Dorsal fin with 1 stout spine CYPRINIDAE (in part), p. 52
- 11b. Dorsal fin without stout spine 12
- 12a. Head and cheeks at least partially scaled 13
- 12b. Head and cheeks without scales 15
- 13a. Scales small, more than 95 in lateral line; caudal fin forked; snout with a duck-like appearance ESOCIDAE, p. 225
- 13b. Scales large, fewer than 50 in lateral-line series; caudal fin straight to rounded, snout not duck-like in appearance 14

- 14a. Mouth terminal; frenum present; mouth not protractile; lateral line present
 UMBRIDAE (expected), p. 232



Terminal mouth.



Frenum present.

- 14b. Mouth superior; frenum absent; mouth protractile; lateral line absent
 FUNDULIDAE, p. 244



Superior mouth.



Frenum absent.

- 15a. Axillary process present at base of pelvic fin; gill membranes free from isthmus and extending well forward to throat area below eye; anal-fin rays 17 or more 16
 15b. No axillary process at base of pelvic fin; gill membranes joined at isthmus well posterior to throat area below eye; anal-fin rays fewer than 16 17
 16a. Dorsal-fin base far posterior to pelvic-fin base; lateral line well developed; mid-line of belly without strong, spiny scutes HIODONTIDAE, p. 40
 16b. Dorsal-fin base above or only slightly behind pelvic-fin base; lateral line absent; mid-line of belly with strong, spiny scutes forming a keel CLUPEIDAE, p. 45
 17a. Dorsal-fin rays 8; dorsal-fin origin either above or posterior to pelvic-fin origin
 CYPRINIDAE (in part), p. 52
 17b. Dorsal-fin rays 9 or more; dorsal fin with origin anterior to or above pelvic-fin origin, with 24-32 dorsal-fin rays when above CATOSTOMIDAE, p. 171
 18a. Body scaleless and tapering posteriorly; head large, broad and depressed; 4 or fewer pelvic-fin rays COTTIDAE, p. 249
 18b. Body with scales; head not depressed; 5 or more pelvic-fin rays 19
 19a. Anal fin long, with 1 spine and 20-25 rays; 2 short dorsal fins, each situated above long anal fin
 ATHERINIDAE, p. 247
 19b. Anal fin short, with 1 or more spines and fewer than 15 rays; single dorsal fin or double, but anterior dorsal-fin origin well in advance of anal-fin origin when double 20
 20a. Anal-fin spines 1 or 2 21
 20b. Anal-fin spines 3 or more 22
 21a. Lateral line extending onto caudal fin; second anal-fin spine long and stout; second dorsal fin with more than 23 rays SCIAENIDAE, p. 343
 21b. Lateral line not extending onto caudal fin; second anal-fin spine slender when present and about equal in size to first; second dorsal fin with fewer than 23 rays PERCIDAE, p. 288
 22a. Sharp spine near back of opercle; spinous and soft dorsal fins completely separated or only slightly connected; well developed pseudobranchiae exposed on inner surface of opercle
 PERCICHTHYIDAE, p. 255
 22b. No spine or opercle; spinous and soft dorsal fin connected by membrane, even though deep notch may occur; pseudobranchiae concealed on inner surface of opercle
 CENTRARCHIDAE, p. 259

FAMILY PETROMYZONTIDAE

The lampreys represent one of the most primitive extant families of vertebrates. The family is a member of the superclass Agnatha or jawless fishes. Members of the family occur in the higher latitudes of both the Northern and Southern hemispheres and are either anadromous or confined to freshwater (Nelson 1976, Smith 1985). All lampreys metamorphose from the

larval, or ammocoete, form to the adult form in freshwater (Berra 1981). The adults of some species are parasitic; these lampreys feed on the body fluids of other fishes. The nonparasitic forms reproduce but do not feed after metamorphosis. There are five lamprey species known from West Virginia distributed among two genera, *Ichthyomyzon* and *Lampetra*.

GLOSSARY

Definitions adapted from:

Cooper, E.L. 1983. *Fishes of Pennsylvania*. Penn State University Press, University Park, Pennsylvania.
 Eddy, S. 1957. *How to know the freshwater fishes*. William C. Brown Co. Publishers.
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Lincoln, R.J., G.A. Boxshall, P.F. Clark. 1982. *A dictionary of ecology, evolution and systematics*. Cambridge University Press.
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- Adipose fin.** A small, fleshy fin without rays or spines, located posterior to the dorsal fin (see Fig. 6).
Ammocoete. The immature growth stage of lampreys, lacking adult dentition and functional eyes.
Anadromous. Migrating from the ocean to spawn in fresh water.
Anal fin. A medial, ventral fin posterior to the anus.
Anterior. The front end, or toward the front.
Axillary gland. Any of the lymph nodes of the pectoral girdle.
Axillary process. Elongated, membranous segment at the base of the pelvic or pectoral fin.
Barbel. Elongated, tapered extension of tissue, usually found about the mouth or head (see Fig. 5).
Bicuspid. A tooth with two cusps on a single base.
Brackish. Water of salinity between fresh water and sea water.
Branchiostegal ray. A series of slender bones below the opercle that support the gill.
Catadromous. Migrating from fresh water to spawn in the ocean.
Caudal fin. The posterior fin, composed of soft rays and rudimentary rays on each side of the fin (see Figs. 5-7).
Caudal peduncle. Posterior part of body from anal-fin base to end of hypural plate (see Figs. 5-7).
 many larger invertebrates and vertebrates.
Crepuscular. Active during twilight hours.
Ctenoid scale. Scale with a serrated posterior margin.
Cycloid scale. Scale with a smooth posterior margin.
Depressed (body shape). Flattened dorso-ventrally.
Dermopalatine bones. Bones on the palatine that developed from the skin lining.
Dorsal. Pertaining to an organism's back; above (see Fig. 6).
Dorsal fin. The medial fin that extends along the back of the fish, composed of spines and rays.
Dorsum. The back.
Ectopterygoids. One of four pairs of dermal bones that line the roof of the mouth and comprise the palatal complex.
Elvers. Juvenile eels after transformation from leptocephalus larvae.
Emarginate. Having a slight indentation.
Endemic. Restricted in range (to a particular drainage, lake, etc.)
Ethmoid pocket. Expansion of the forward part of the braincase that terminates in a rostrum.
Extirpated. Locally extinct.
Falcate. Having a concave outer margin.
Free adipose fin. An adipose fin that is not attached to the dorsal surface of the body posteriorly.

Frenum. A fleshy connection at midline of snout limiting extension of premaxillaries from snout.



Fusiform. Spindle shaped; tapering at both ends.

Ganoid scale. A thick, bony scale with an outer layer of enamel-like ganoine.

Gastrolith. A stone or pebble in the stomach, presumably used to grind up food.

Genital papilla. Protuberance near the anus which includes the genital opening.

Gill rakers. Bony projections on anterior margin of gill arch (see Fig. 7).

Gular plate. Bony plate on the throat.

Heterocercal. Pertaining to asymmetrical caudal fin.



Homocercal. Pertaining to symmetrical caudal fin.



Hypural plate. A combination of vertebral elements that terminates the urostyle and supports the caudal-fin rays.

Inferior mouth. Mouth opening posterior to and below snout.



Infraoral teeth. Cusps present on a ridge located posterior to the oral opening in lampreys.

Intercalar contacts. Ligaments that interconnect the ossicles of the Weberian apparatus.

Interorbital. Between the eyes.

Isthmus. Lower part of the head between the gill openings.

Keel. A sharp median ridge.

Lachrymal. Bone between the orbit and the maxillary.

Lateral. Refers to sides or toward the sides of the body.

Lateral line. Pored scales along sides connected to sensory canal (see Fig. 6).

Lateral-line canal. Sensory canal along the body.

Lentic. Slow, calm; relating to still waters as in lakes, ponds and swamps.

Leptocephali. Flat, leaf-like larval stages of eels.

Limnetic. Relating to the pelagic (open-water) area of fresh water.

Lotic. Pertaining to fast-running water habitats, such as rivers and streams.

Maxillary. Posterior, lateral bones of upper jaw of most bony fishes (see Fig. 6).

Medial. Central; towards the center of the body.

Monotypic. Used to describe a genus or family that contains only one species.

Myomere. Lateral muscle.

Neuromasts. Sense organs of the lateral-line system.

Nomenclatorial. Pertaining to scientific names assembled for nomenclatural rather than taxonomic purposes.

Occipital. The back part of the head.

Ocellus. Eye-like spot.

Opercular flap. Backward extension of gill cover.

Opercle. Gill cover made of a series of flat bones (see Fig. 7).

Opisthocoelous vertebra. A vertebra that is posteriorly concave and anteriorly flat.

Palatines. Paired bones in anterior roof of the mouth, lateral to the single medial vomer.

Panmictic. Pertaining to a randomly interbreeding population.

Papillae. Small, fleshy projections.

Papillomas. Tumors.

Papillose. Covered with small papillae.

Parasphenoid. A bone at the base of the skull.

Pectoral fin. The anterior pair of fins located lateral to the shoulder girdle and behind the opercle (see Figs. 5-7).

Pellucid. Translucent.

Pelvic fin. Fins typically located anterior to the anus; abdominal if the fin is located near the anus, thoracic if located near or under the pectorals.

Pharyngeal tooth. A tooth developed on the rigid region of the pharynx.



Plicae. Small folds of skin.

Plicate. With wrinkle-like folds.

Pored scales. Scales innervated by the lateral-line system.

Posterior. Behind or towards the hind end of the body (see Fig. 6).

Postorbitals. Bones located behind the eye.

Premaxillary teeth. Teeth located on the bone anterior to the maxillary.

Preoperculomandibular pores. Pores extending along the rear edge of preopercle and onto the mandible.

Pro-otics. Bones located in front of the eye.

Pseudobranchia. Gill-like secretory structures on the inner sides of the opercula.

Pyloric caeca. Blind pouches branching off from posterior portion of the stomach.

Radii. Thin lines radiating from the center of a scale.

Reticulation. A network of corrugations.

Rictus. Junction of the premaxillary and maxillary.



Rotatorians. A multicellular zooplankton.

Scute. Modified scale.

Serrae. Sawlike notches along an edge.

Sibling species. One of two or more closely related species that are morphologically indistinguishable but are reproductively isolated.

Slab-sided. Having a narrow ribcage.

Subopercle. Bone located posterior to the operculum.

Suborbitals. Bones located below the eye.

Supraethmoid. Cartilage/bone present in the upper portion of the olfactory region.

Supraoral teeth. Cusps located on the connective tissue immediately anterior to the oral opening of lampreys.

Swim bladder. Gas-filled sac in upper part of body cavity.

Syntopic. Pertaining to populations or species that occupy the same macrohabitat, are observable in close proximity, and could thus interbreed.

Symplesiomorphic. The common possession of an ancestral (plesiomorphic) character.

Synapomorphic. The common possession of a derived (apomorphic), homologous character.

Teleost. A bony, as opposed to cartilaginous, fish.

Terete. Cylindrical and tapering.

Terminal. Located at the end of a structure.



terminal mouth

Unicuspid. A tooth with a single cusp on its base.

Urohyal. The last vertebral segment, often modified.

Ventral. Referring to the underside or belly (see Fig. 6).

Vertebral centra. Cylinders found below the neural arch in the vertebrae; functionally replace the notochord.

Vomer. Single, medial bone in the roof of the mouth.