

1 Osteichthyes

Bony Fishes

2 Describe general fish morphology; relate fins to movement.

▲ *fins may be supported by bone or cartilage*

▲ *dorsal fin-may be 2 sep or 1 connected with or without rays-balance*

▲ *Ray is any fin support-soft or bony*

3 Fish Fins

4 Fins and Movement

▲ *pectoral fin-forward or caudal-direction-brakes*

▲ *Searobins crawl flying fish glide*

▲ *pelvic fin-stop*

▲ *Male skates claspers*

▲ *Gobies suction cup cling rocks*

▲ *Absent on fish that swim in tight places*

▲ *anal fin-balance*

▲ *caudal fin-mvmt*

5 Caudal fin shapes

▲ *Homocercal*

▲ *Lunate-fast swim*

▲ *Forked-fast swim*

▲ *concave*

▲ *Straight-drum slow but strong swim*

▲ *Convex*

▲ *Rounded-flounder slow but strong swim*

6 Caudal Fin Shapes

7 Caudal fin shape?

8 Caudal Fin Shape?

9 Caudal Fin Shape?

10 Caudal Fin Shape?

11 Some Examples of Adaptations

▲ *for tuna other fast fish use exclusively caudal fin for propulsion, caudal peduncle is strengthened by keels*

- ▲ *transfers mechanical energy more efficiently*
- ▲ *depression for other fins and eyes-everything sort of retracts to make more streamline*
- ▲ *mod fast fishes use pect fins; wrasses simply beat pectoral fins in addition to caudal fin*

12 Continuous fins

13 Describe scale types and determine the age of fish.

- ▲ *Cycloid – round or circular; most fishes w smooth fins herring salmon carp*
- ▲ *Ctenoid-rectangular may have bristles or lobes; many fin fishes*
- ▲ *Ganoid-diamond shaped thick; outer layer hard inorganic salts high skin sheen*
- ▲ *Placoid-may be diamond shaped; has a hook shape; sharks and trigger or file fishes*

14 Placoid Scales

15 Cycloid Scales

16 Ctenoid Scales

17 Ganoid Scales

18 Age from annuli

19 Scales and aging

- ▲ *tell age of fish by counting rings just like tree rings-called annulus*
- ▲ *number of scales always the same-just increase in size*
- ▲ *grow from pockets in the skin and overlap-firm fibrous connective tissue*
- ▲ *covered by transparent soft epidermis*
- ▲ *arranged in diagonal rows according to muscles beneath them*
- ▲ *no scales when hatch from egg*
- ▲ *some like catfish naked throughout life*

20 Explain the functions of the mucus layer that cover fish.

- ▲ *seeps between the scales*
- ▲ *makes fish slippery*
- ▲ *lubricant to glide through water*
- ▲ *protects from attack by fungus, bacteria, and parasitic protozoa*
- ▲ *regulates mvmt of water into and out of body cells-keeps them from dehydrating or expanding*

21 Explain fish coloration.

- ▲ *color is not on scale-it is in skin*
- ▲ *some fish can change color*
- ▲ *chromatophores-sac-like cells shaped like stars scattered through skin*

- ▲ *contains colored pigments*
- ▲ *withdraw-contract almost no show*
- ▲ *expand-color shows*
- ▲ *iridiphores-contains crystals that reflect light-iridescent, called structural colors*

22 **Triggers of Changes of Color**

- ▲ *changing coloration enables fishes to adapt quickly to surroundings*
- ▲ *higher water temp O2 deficiencies, or behavior factors for coloration*
- ▲ *fear aggression can cause color change*
- ▲ *some w reproductive season*

23 **Countershading in fish**

- ▲ *dorsal side is darker than ventral like rays*
- ▲ *Dark on top to avoid predation by birds*
- ▲ *Light on bottom to look like sky to avoid predation by other fishes below them or to avoid being seen by prey*
- ▲ *some scientists think it's like a tan-how would you determine if that hypoth is valid?*

24 **Countershading**

25 **Stripes, bars, and ocellations!**

- ▲ *cryptic coloration*
- ▲ *distruptive coloration*
- ▲ *Bars, stripes, and spots: how relate to habitat or lifestyle?*
- ▲ *Bars-grasses*
- ▲ *stripes-some grasses*
- ▲ *spots-bottom*

26 **Bars and Stripes:killifish**

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- 34 **Body shape for fast swimmers**
▲ *char fish form fusiform*
▲ *fishes that stand quietly and then rapidly attack prey have arrow shaped bodies like pike and gar*
- 35 **Body Shape for Slow Swimmers**
▲ *standing water fish-like carp-flattened on sides, char of all poor and slow swimmer*
▲
▲ *bottom dwellers flattened, if move fast-eel-shaped*
▲ *not mobile have balloon shape-puffers*
▲ *or needle like-pipefish*
▲ *some deep sea flattened side great height and narrow width*
▲ *slow swim sunfish*
▲ *nibblers butterfly and squaretails*
- 36 **Swimming Styles**
▲ *crangiform: side to side, fast strong mvmt predators of open water*
▲ *ostraciform: keep bodies rigid while vibrating tail not fast-camouflage and spines for protection*
▲ *anguilliform: snakelike typical of elongated fishes fish w small fins eels*
- 37 **Ostraciform Swimmers**
▲ *some fish use fins other than caudal fin for swimming*
▲ *need precise maneuvers that usually feed on stationary food*
▲ *burrfish row with pectoral fins*
▲ *triggerfish undulate the dorsal and anal fins*
▲ *seahorses vibrate the dorsal and pectoral fins*
- 38 **Other uses of fins**
▲ *fins also used for communication, aggressive behavior, and reproduction*
- 39 **Examples of Swimming Speeds**
▲ *velocity carp 12 km/hr*
▲ *pike 25 km/hr*
▲ *trout 35 km/hr*
▲ *tuna 22 km/hr*
▲ *sharks 36.5 km/hr*
▲ *swordfish 90 km/hr*
- 40 **Explain relationship between body shape and lifestyle.**

41 **Barbel**

42 Explain the relationship between swimming style, body shape, and zonation.

- ▲ *pelagic: speed to capture prey escape predation*
- ▲ *constant swimming at high speeds or rapid accelerations*
- ▲ *fusiform bodies compressed if schooling fish*
- ▲ *forked or lunate tails*
- ▲ *carangiform*
- ▲ *mouths in middle of head*
- ▲ *plankton feeders may have upturned mouth for straining*

43 **Living in highly structured areas**

- ▲ *underwater structures: wrecks, rocks, pilings*
- ▲ *food (attached to structures) and place to hide from predators*
- ▲ *ability to maneuver around obstacles more important than being fast*
- ▲ *compressed body shape*
- ▲ *ostraciform style or with fins other than tail*
- ▲ *mouths in middle of head and are grazers*

44 **Benthic living**

- ▲ *depressed if rest on bottom*
- ▲ *shape and coloration for camouflage for protection and to capture food*
- ▲ *fish has downturned mouth, it feeds off the bottom*
- ▲ *fish has upturned mouth, feeds on animals swimming above it*
- ▲ *drum have compressed body shape bottom feeding fish*

45 **Bony fish feeding habits**

- ▲ *Diverse feeding have protrusible jaws*
- ▲ *most are carnivores*
- ▲ *capture prey from any location*
- ▲ *some actively pursue prey others bait and wait*

46 Explain relationship between food source and location of mouth and type of teeth.

- ▲ *not chewing*
- ▲ *gulps food whole*
- ▲ *chief function is get a grip*
- ▲ *teeth located in mouth and throat*
- ▲ *jaw teeth*
- ▲ *small vomerine teeth in roof of mouth*
- ▲ *jaw teeth in anchored in bone and lost easily and replaced same*
- ▲ *herbivorous fishes often have teeth scrape algae off rocks and coral*

47 **Examples of fish teeth**

- ▲ *lampreys have rasping teeth on their tongue*

- ▲ *minnow and sucker fishes pharyngeal teeth in throat aid crushing plant food and other coarse items of diet*
- ▲ *parrot fish front teeth fused form beak*
- ▲ *conical or millstone-like teeth for crushing shelled animals*
- ▲ *knife like or dagger like teeth carnivores gar, cutlass, and piranha*

48 Planktonic feeders

- ▲ *some herbivores-menhaden, herrings, anchovies, etc*
- ▲ *filter plankton w gill rakers*
- ▲ *strain food swimming w lg mouth open*
- ▲ *most plankton feeders among bony fish are small*
- ▲ *plankton feeders usually school*
- ▲ *most abundant fishes in ocean*
- ▲ *account for lg share of world's fish*

49 Specialized feeding behaviors

- ▲ *unique feeding habits*
- ▲ *pipefishes sea horses suck in minute organisms through tubular snouts*
- ▲ *blood sucking lamprey rasp hole feed on blood*
- ▲ *angler fish simulated rod and bait lure small fishes into mouth*
- ▲ *archerfish of se asia shot insects off overhanging leaf and eat them*

50 Describe fish sense organs.

- ▲ *normal digestion*
- ▲ *stomach, esophagus, intestine, pyloric caecae (digestive enzymes), pancreas, liver-bile2-chambered heart*
- ▲ *arteries, capillaries, veins*
- ▲ *blood over gills gets chilled*
- ▲ *warmer body, faster swimmer (higher metabolism)*

51 Describe the relationship between type intestine and type food ingested.

- ▲ *carnivorous fish have straight intestines*
- ▲ *fish eating have to digest matter (plants) coiled*

52 Explain how some fish maintain body temperature greater than that of the water.

- ▲ *rete mirabile*
- ▲ *blood vessels countercurrent*
- ▲ *network of vessels w blood in adjacent vessels going in opposite directions*
- ▲ *blood from warm visceral mass passes next to blood from gills*
- ▲ *blood entering is warmed by blood leaving*
- ▲ *if in cold water, red muscle mass (muscles that produce heat) are located deep w/n body*

▲ *Viscera and digestive system warm*

▲ *if in warm tropical waters, red muscle mass on lateral surface dissipate excess heat*

53 Osmoregulation

54 Vocabulary

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bycatch

Ray

Homocoercal

lunate

heterocoercal

fusiform

vestibular organ

lateral line

operculum

ctenoid

ganoid

cycloid

placoid

2

annuli

chromatophores

iridiophore

cryptic/disruptive coloration

countershading

crangiform

ostraciform

anguilliform

rete mirabile

catadromous

anadromous

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