



Science Unit: *The Journey of the Pacific Salmon*

Lesson 7: *Salmon Anatomy*

School Year: 2010/2011

Developed for: Thunderbird Elementary School, Vancouver School District

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Grade level: Presented to grade 5/6; appropriate for grades 2 – 7 with age appropriate modifications

Duration of lesson: 1 hour 20 min

Notes: Classes participating in Fisheries and Oceans Canada's *Salmonids in the Classroom* Program can obtain frozen salmon for dissection by contacting their local DFO Education Coordinator. The Current Coordinator for Vancouver is Bev Bowler. <http://www.salmonidsintheclassroom.ca/index.html>

This lesson is based on the activity *Dissecting a Salmon* created as part of the *Salmonids in the Classroom* Program
http://www.salmonidsintheclassroom.ca/pdf/11-02-18_SIC_Dissection.pdf
an additional salmon dissection lesson can be found in the Scientist in Residence Program Unit Pacific Salmon and Mountain Pine Beetle
(<http://scientistinresidence.ca/science-lesson-plans/pacific-salmon-and-mountain-pine-beetle/> Lesson 1 – Fish Anatomy).

Objectives

1. To explore and learn about the anatomy of an adult salmon.

Background Information

Prior to conducting this lesson the person doing the dissection should be well versed in the parts of the salmon. If a formal dissection has never been conducted it may help to dissect a fish on your own prior to doing the demonstration in front of the class. This will ensure that you are able to appropriately expose/remove and identify the different features. Note that the salmon provided by the Department of Fisheries and Oceans are collected at the spawning grounds and thus not food safe.

Vocabulary

Dissection To take something apart into smaller pieces in order to better understand it.
Operculum: Flap that covers and protects the gills. Also known as a gill cover.
Lateral line: A specialized sense organ possessed by fish that detects changes in water velocity and acceleration (currents), water pressure and vibrations in the surrounding water.

Materials

- Whole salmon (thawed)
- scalpel or small knife
- dissecting probe
- tweezers
- tray for dissection
- small trays or plates to pass around to the students
- straw
- magnifying glasses
- spoons
- latex gloves, paper towels, cloth, cleaning spray etc. for tidying up.
- worksheets and pencils
- cup of water (in a clear container)



In the Classroom

Introductory Discussion

1. Today is going to be our second science lesson on salmon. Back in October we went to the Capilano Hatchery and saw some coho salmon migrating. Today we are going to study an adult coho salmon in more detail by doing a dissection. Can anyone tell me what dissection means? (write on board)
2. What makes a salmon a salmon? Or better yet, what makes a fish a fish? (Brainstorm on board)
 - Cold blooded (always at the same temperature as the water it lives in)
 - Breathes with gills
 - Has fins
 - Flexible backbone
3. Before starting the dissection discuss animal ethics and the need to treat living (or formerly living) specimens with respect. Discuss proper behavior:
 - Not making a big fuss, yelling or saying “yuck!! gross!!” etc.
 - Treating all parts of the animal with respect.
 - Respecting their classmates, particularly those less comfortable with the activity.
 - Mention that the fish will smell and that if anyone feels uncomfortable with the smell or what they are seeing that they are welcome to move to the back of the classroom or simply close their eyes and put their head down for awhile.
4. Discuss and review worksheets. Have students refer to the worksheet diagram during the dissection.
5. Teachers or Scientists looking for detailed dissection instructions should consult the lesson *Dissecting a Salmon* which is available online as part of the *Salmonids in the Classroom Program*. It contains sufficient details to guide anyone, even those completely unfamiliar with fish anatomy, through a detailed dissection. It also contains additional information on fish anatomy. The questions below are simply meant to guide the process and ensuing discussion and are most appropriate for someone familiar with fish anatomy.
Dissecting a Salmon: http://www.salmonidsintheclassroom.ca/pdf/11-02-18_SIC_Dissection.pdf
6. Who has ever touched a fish before? (hands up) What is the first thing you notice when you touch a fish? (it's slimy)
7. What is the slime for? (escape predators, slide over rocks, protection from fungus and bacteria, move more easily through the water – aerodynamics)
8. What covers the fish's body under the slime? (scales) What are they for? (protection) Use the tweezers to remove a few scales and pass them around with magnifying glasses. Discuss how scales can be used to age a fish and how lost scales are replaced. Some facts about scales: Scales grow with the fish & have growth rings like trees, they are arranged differently for each species, and they don't develop until the fry stage.
9. What shape is a fish? Why?
10. How many fins can you see on the fish? (8) Some paired, some single (pectoral, pelvic, dorsal, adipose, pelvic, caudal)



SCIENTIST IN RESIDENCE PROGRAM

11. What do the fins do? – help the fish swim, remain stable, balance, steer, propulsion (caudal only)
Fish swims by flexing its body, not with fins; sub-carangiform motion
12. Remove the pelvic fins. Pass the pelvic fins around and have the students describe them. (bone fan with skin stretched between them)
13. Compare fins to hands and flippers
14. What is this for? (lateral line) The lateral line is a specialized sense organ possessed by fish (and other aquatic organisms and some amphibians) that detects changes in water velocity and acceleration (currents), water pressure and vibrations in the surrounding water. In some species the lateral line also senses changes in electromagnetic fields and some studies suggest magnetic fields.
15. Demonstration activity to show how the lateral line functions: Have students blow on their hands and then interrupt the stream of air with a finger, can they feel the difference? Can also try this in a tub of water. Tell them to try it in the bathtub at home. Try blowing at different speeds or from different angles
16. How do fish breathe? Show me. Water passes over the surface of the gills. This can occur through the mouth (ram ventilation). How do gills work? Have students compare gills to lungs. (water passes over them and O₂ is extracted and CO₂ excreted)
17. Why do you think fish open and close their mouth rapidly when they are exercising hard? (increase water flow over the gills to increase oxygen delivery)
18. Gills also play a vital role in controlling the salt and water balance of the salmon (osmoregulation). We are going to learn about that in Lesson 4.
19. What is the purpose of this part of the fish? (operculum) – to protect the gills. Why? From what? What is this part called? Gill cover or operculum.
20. Remove the operculum and gills and pass them around
21. What color are the gills? Why? What do they look like? (branched) Why? (increase surface area).
22. Remove and pass around the gill rakers and explain their function.
23. Now we are going to start looking at the internal anatomy of the fish. What do you think we are going to see? What organs does a fish have? (Brainstorm on board – use the list throughout the dissection and check off the parts you find)
24. How will we know if our fish is male or female? – what would we see in each case?
25. Cut open the fish. Remove the gonads and pass them around. Discuss both the type of gonads present as well as what would be found in a fish of the opposite sex.
26. Why does one salmon have so many eggs?
27. What is the largest organ inside a fish's body? Hint, it is also the largest organ in our bodies (the liver)
28. Describe the liver. (pass it around) What is the liver for? (cleans the blood, converts energy stores into usable energy, detoxification)
29. Point out the gall bladder and bile – what are they for? Discuss their functions.
30. Where would you expect to find the heart? Point out the location and then open the pericardium to remove the heart.
31. Does it look like you expected? What does the heart do? Describe the heart and its functions. The heart can be cut open to show the inner chambers.



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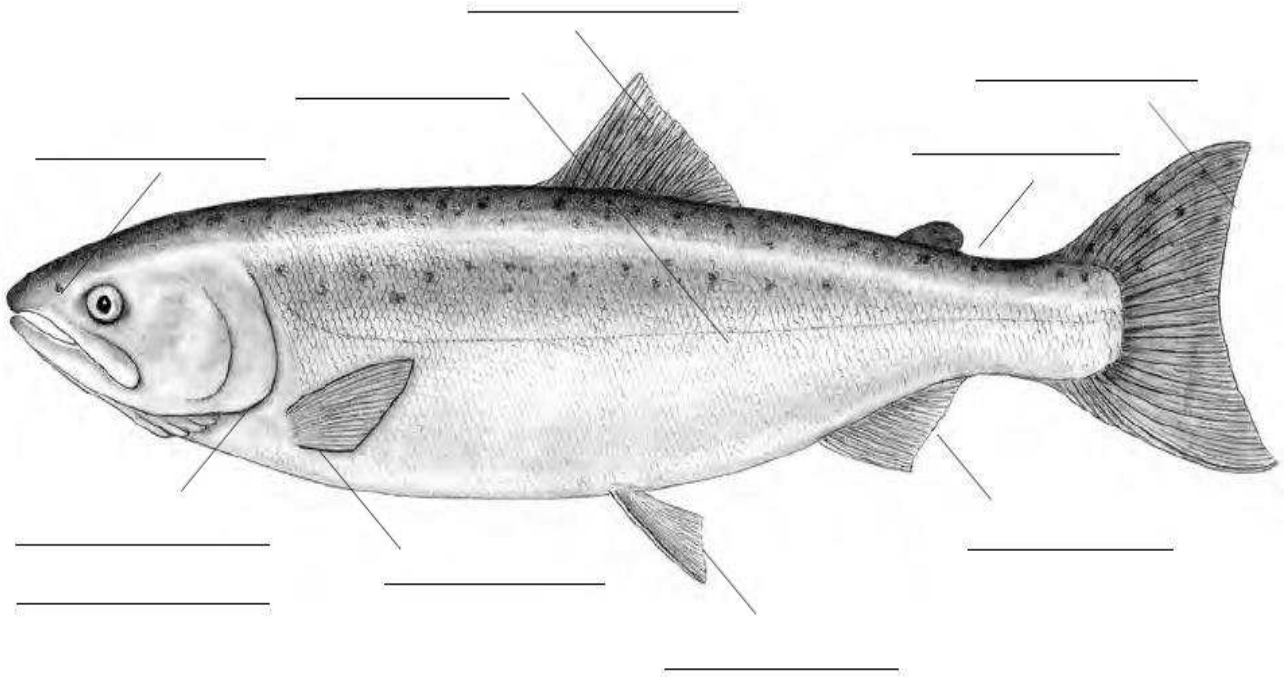
32. Now let's talk about the digestive system. When we eat something where does it go? Have students describe the process of digestion.
33. So let's see where a fish's food goes – insert the straw into the mouth and feed the end down to the stomach. Make sure the students can see that the straw is inside.
34. Explain the parts of the digestive system (comparing with a human). Ask students what they think each part is. Point out the spleen as well.
35. How do fish float? Does a piece of fish float? (put a chunk of muscle in a cup of water, it will sink)
36. Fish have a special organ called a swim bladder that helps them control their buoyancy in the water. Show its location internally and then detach the swim bladder and inflate it with a straw. Twist the ends together so it can be floated in the water.
37. So why do dead fish float? Why do they float upside down? (location of swim bladder)
38. The next organ on our list is the kidney. What does the kidney do? – cleans the blood, produces urine, regulates the salt and water balance of the fish. Very important in smolting which we are going to talk about in another lesson.
39. Remove the kidney with a spoon.
40. The last organ on our list is the brain. We will look at that in a few minutes but first let's talk about the five senses. What are they? (smell, sight, touch, taste, hearing)
41. How do fish see? Do they see like us? Hold up your one hand like this, a little to the side. Now close the eye on the same side. Can you still see your hand? If I had my hand over here and the fish had no eye on this side could it see me? Remove the eye and pass it around.
42. How do fish smell? – show nostrils. Explain how the nose is not continuous with the mouth/ears like in humans. Nostrils are simply small dents that contain scent organs. What would fish use their sense of smell for? (finding food, avoiding predators or pollution, finding their natal stream)
43. Do fish have ears? (no) Can fish hear? How?
44. Let's think about how we hear – sound goes into our outer ear and then into our inner ear where it causes our eardrum to vibrate which our brain turns into sound. In fish sound waves travel through the body to the inner ear but there is no outer ear. Fish can also detect sound via the lateral line as it can detect sound vibrations in water.
45. Do fish have taste buds? Yes.
46. How do fish feel touch? They have nerves in their skin just like we do, also the lateral line assists with this function.
47. Now let's look at the last organ on our list, the brain. Have students guess how large the brain will be.
48. Carefully remove the brain and pass it around. Discuss the difference in relative size when compared with a human brain. Students will likely be surprised with the small size of the brain.
49. Have students help with the clean up process as appropriate.

Name: _____

Date: _____

LESSON 7: Salmon Anatomy

Label the parts of the salmon



The purpose of the slime layer is to help the salmon:

Describe the salmon's shape. Why do you think a salmon is shaped this way?

Name: _____

Date: _____

How do fins help the salmon swim?

What is the lateral line used for?

Salmon use gills to: _____

Was our fish male or female? How did you know?

What is the most interesting thing you learned about salmon today?
