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THE CARP

A Manual Stressing Observation

Robert Boles, Robert Harris, Gary Workman, and Randy Huston

The primary purpose of this issue of The Kansas School Naturalist is to encourage the student to make careful and accurate observations, and then to make decisions based on these observations.

Even though terminology is important in the study of fish anatomy, the student will not be expected to memorize terms. The terms used will become familiar to him as he follows the step-by-step directions in which these terms are introduced and defined. In this “learning by doing” approach the student will make observations, measurements, counts, calculations, and determine ratios.

Materials needed to carry out all of the procedures called for have been kept to a minimum, and include the following:

- fresh or preserved carp
- live carp in an aquarium (if possible)
- metric rule
- hand lens or dissecting scope

The first exercises are very simple. Following exercises become more difficult. The student should read the directions (or the teacher may read and explain them to younger students), make the necessary observation and/or operation, and decide which of the choices presented provide the best or most accurate answer. Answers should be placed on an answer sheet, so that other students may use the manual if they wish to do the exercises.
Example:
Observe your carp carefully and decide which of the drawings shows the correct number of fins that may be seen from a side or lateral view. Place the letter indicating your choice in the proper blank on the answer sheet.

Example

Keep in mind that no one likes to be considered a failure because he makes a mistake. In case a student makes an incorrect observation or calculation, permit him to redo the exercise and discover where he was in error. The key to the correct answers will be found at the back of the manual.

ANSWER SHEET

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EXERCISE 1

General Body Outline
Each fish species has a characteristic body outline. Five fish outlines are sketched above, one of which resembles the body outline of the carp more than do the other four. Compare your specimen to the sketches, and choose the one that best matches its body outline. Indicate your answer on the answer sheet.

EXERCISE 2

The Caudal Fin
The caudal or tail fin is used steering. Which of the drawings above best shows the shape of the caudal fin of a carp?

EXERCISE 3

The Dorsal Fin
The single, or unpaired, fin on the midline of the back or top side is the dorsal fin. It is used mainly as a stabilizer to keep the fish upright in the water. Choose the sketch that best shows the shape and location of this fin.
EXERCISE 4

The Anal Fin

The anal fin is the unpaired fin located along the median line on the ventral (bottom) side of the fish's body. It is used to help maintain balance and in changing directions in the water. Study your specimen carefully, and then choose the sketch which best shows the shape and location of this fin.
EXERCISE 5

Pectoral Fins
These are the paired fins along the side of the fish, located just behind the head, that correspond to your arms. They are used for balancing and steering the fish through the water. Compare the sketches with your specimen, and choose the one that best matches the shape and location of the carp's pectoral fins.

EXERCISE 6

Pelvic Fins
The paired fins back of the pectoral fins are called the pelvic fins, and correspond to your legs. They are used mainly for stabilizers. Choose the drawing which best shows the location and shape of these fins on the carp.
EXERCISE 7

The Anal Opening

Food enters the fish's mouth, passes along the stomach and intestines, and the undigestible material then leaves through an opening called the anus. Compare the position of the anal opening of your specimen with that shown by the five sketches above. Then choose the one that most nearly shows the proper location of the anal opening of the carp.

EXERCISE 8

Mouth Shape

The shape of the mouth may not only be used to help identify some fish, but it also helps to give the observer an idea of the feeding habits of the species. Compare the sketches with your specimen, and then decide which one most closely resembles the mouth shape of the carp.
**EXERCISE 9**

**Barbels**

Barbels are smooth, flexible "whiskers" which are used as sensory organs (that is, they assist the fish in knowing what is going on in the water about it). Choose the drawing which best shows the number, and location, of the barbels on your specimen.

**EXERCISE 10**

**Lip Structure**

The lips of some fishes are covered with tiny little bumps, called papillae. Others may have small grooves, called plicae. Turn your fish "bottom-side-up," and decide which of the sketches best portrays the type of mouth and lips the carp has.
**EXERCISE 11**

**Nares Location**

The nares, or nostrils, of a fish are U-shaped tubes, which are richly supplied with nerve endings to allow the fish to detect dissolved odors and gases in the water. Which sketch most nearly fits the actual shape and location of the nares of your specimen?

![Sketches of fish heads]

- **A**
- **B**
- **C**
- **D**
- **E**

**EXERCISE 12**

**Opercle Shape**

The opercle is the large bony plate that protects the tender gill filaments which the fish uses for securing oxygen from the water. Choose the sketch which best shows the shape of the opercle of the carp.

![Sketches of opercle shapes]

- **A**
- **B**
- **C**
- **D**
- **E**

**EXERCISE 13**

**Isthmus Shape**

The isthmus is the fleshy area extending forward on the throat between the gills on the bottom, or ventral, side of the fish. In some fishes the gill membranes are free from the isthmus, while in other species they are attached to the isthmus. Compare the arrangement shown by the carp with the five drawings above, and select the one which most closely resembles the condition of your specimen.

![Sketches of isthmus shapes]

- **A**
- **B**
- **C**
- **D**
- **E**
**EXERCISE 14**

**Lateral Line**

Most fishes have a special row of scales, richly supplied with nerve endings, which help them to know what is going on in the water about them. This row of scales may be seen running along each side of your fish. The special row of scales is known as the lateral line, and the scales are called lateral-line scales. Compare your specimen with the five sketches above, and select the one which most closely illustrates the location and length of its lateral line.

**EXERCISE 15**

**Lateral-Line Scale Count**

Count the scales of the lateral line along one side of your specimen. Which of the following choices includes the number of scales in the lateral line?

A. 28-29
B. 31-32
C. 33-34
D. 36-37
E. 39-40
EXERCISE 16

Scale Type
Fishes have several types of scales. Remove a scale from your specimen and compare it with the sketches above. Which of the sketches most closely resembles the type of scale found on the carp?

EXERCISE 17

Dorsal Fin Ray Count
Fin rays are rodlike structures that support the fin membranes. The two types, spines and soft rays, are counted separately. Spines are unbranched and are usually stiff to the sharp tip. Soft rays are usually branched with a flexible tip. If the leading edge is curved, all rays are counted. The last two rays, however, are always counted as one if their bases are much closer together than the bases of the other two rays (remember, we said things would get tougher!). Roman numerals are used for the spine count and Arabic numerals for the soft rays, therefore, a count of VI-7 would be the notation for a fin with six spines and seven soft rays.

Examine the dorsal fin (a) of your specimen carefully. Following the above instructions, which of the following choices best matches the dorsal fin ray count of the carp?

A. II-18
B. I-14
C. I-19
D. III-16
E. I-25

EXERCISE 18

Anal Fin Ray Count
Following the instructions given in Exercise 17, decide which of the following choices best matches the ray count of the anal fin (b) of your specimen. Place your answer on the answer sheet.

A. II-5
B. I-4
C. I-7
D. II-6
E. I-5
EXERCISE 19

Head Length—Standard Length Ratio

Head length is the distance from the tip of the snout to the most posterior part of the opercular membrane (a). Standard length is the distance from the most anterior part of the head to the end of the vertebral column (b). Do not count the rays of the caudal or tail fin. Use either a ruler, or dividers, which may be opened to the length of the head, and then rotated step-wise along the standard length to determine the ratio. Carefully measure your fish, and determine which of the ratios listed below is correct for your specimen.

A. 4-1
B. 3-1
C. 7-1
D. 6-1
E. 8-1

EXERCISE 20

Snout Length—Head Length Ratio

The snout length is measured from the tip of the snout or upper lip to the hard bony rim of the front part of the orbit, or eye socket (a). Carefully measure the snout length of your specimen, and measure the head length (b) as you did in the previous exercise. Which of the following choices best fits the snout length-head length ratio of your specimen?

A. 2-1
B. 4-1
C. 3.5-1
D. 4.5-1
E. 3-1
EXERCISE 21

Dorsal Fin Ray—Anal Fin Ray Length Ratio

Carefully measure the length of the longest bony ray of both the dorsal fin (a) and the anal fin (b). The ratio may be figured by dividing the length of the dorsal fin ray into the length of the anal fin ray. The dorsal fin-anal fin ray ratio for the carp falls into which of the choices given below?

A. 1-.61 to 1-.67  
B. 1-.76 to 1-.82  
C. 1-.85 to 1-.91  
D. 1-.93 to 1-1.05  
E. 1-1.10 to 1-1.17

EXERCISE 22

Scale Count Above the Lateral Line

To count the scales above the lateral line start counting at the origin (front end) of the dorsal or back fin, including the small scales, and counting downward and backward (a). Follow the natural scale row to the lateral line, but do not include the lateral line scale in your counting. Which of the following answers best fits the scale count above the lateral line of your specimen?

A. 4 or 5  
B. 6 or 7  
C. 2 or 3  
D. 8 or 9  
E. 10 or 11
EXERCISE 23

Scale Count Below the Lateral Line

The count for the scale rows below the lateral line is made by counting upward and forward from the origin of the anal fin (b). The lateral line scale should not be included in the count. Which of the following answers best fits the scale count for your specimen?

A. 2 or 3
B. 4 or 5
C. 6 or 7
D. 8 or 9
E. 10 or 11

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EXERCISE 24

Circumferential Scale Count—Body

This measurement represents the number of scale rows included in a line around the body, immediately in front of the dorsal, or back, fin (a). The count starts with the first row of scales above the lateral line, and continues by counting all the scales in a row over the crest of the back and downward to the opposite side to the lateral line. The same method is used to count the scales below the lateral line (b). For example, a count of 16-2-20 would indicate 16 scales above the lateral line, 20 rows below the lateral line, while the 2 represents the lateral line scale on each side. Carefully count the scale rows about your fish. Which of the scale counts listed below most closely matches the count for your specimen?

A. 10-2-20
B. 11-2-22
C. 15-1-17
D. 12-2-18
E. 13-2-15
EXERCISE 25

Circumferential Scale Count—Caudal Peduncle

The caudal peduncle is the part of the fish from the end of the dorsal fin to the caudal or tail fin. The count is taken in the same manner as above, but the count is made at the narrowest part of the caudal peduncle (c). Which of the following choices most nearly matches the count of the scales about the caudal peduncle of your specimen?

A. 8-2-8
B. 7-2-9
C. 8-1-9
D. 6-2-10
E. 8-2-6

ANSWERS TO THE EXERCISES


The Summer Workshop in Conservation (EB 530) for three hours of credit will be conducted again this summer. Teachers and others who might be interested in this course should write or call Dr. Robert Parenti, Division of Biology, EKSC.

Broaden your background in the Biological Sciences. Plan to attend the summer session at EKSC this year.