Федеральное агентство по рыболовству

«Владивостокский морской рыбопромышленный колледж»

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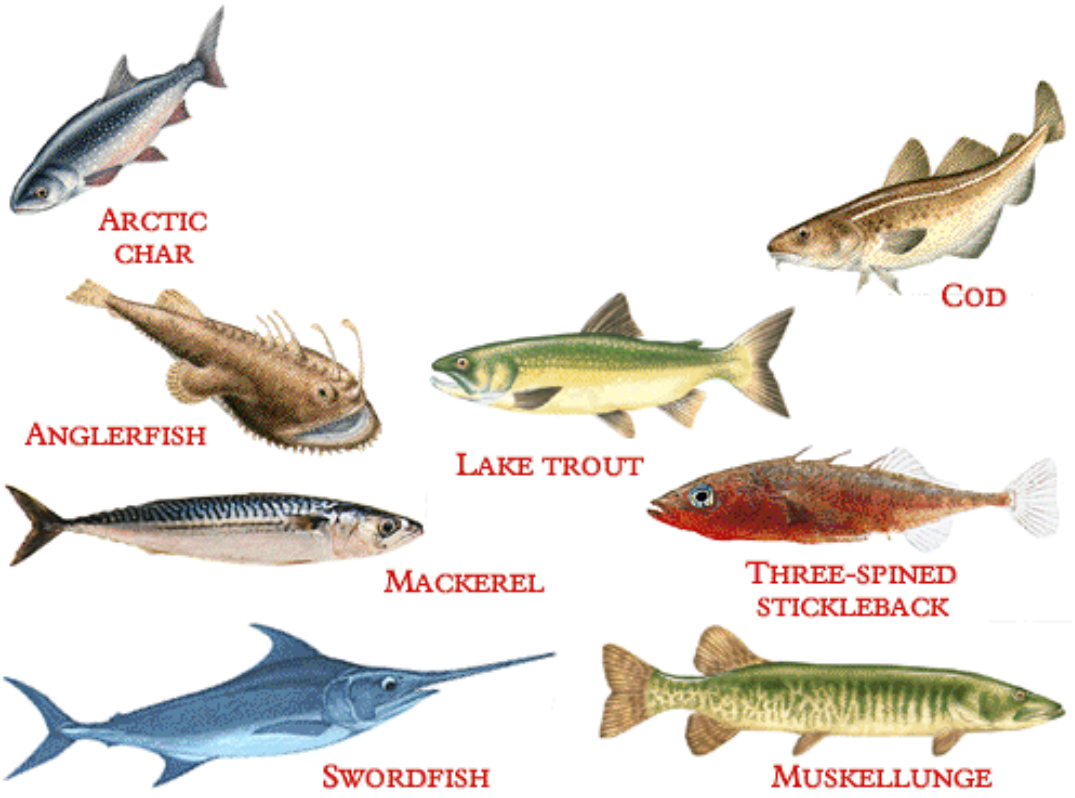
(«ВМРК» ФГБОУ ВПО «Дальрыбвтуз»)

Профессионально ориентированный и деловой английский язык

Методическое пособие для студентов специальности 111401 «Ихтиология и рыбоводство»



Владивосток
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ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Настоящее пособие предназначено для учащихся средних специальных учебных заведений, обучающихся по специальности «Ихтиология и рыбоводство».

Цель пособия – подготовить будущих специалистов к чтению и переводу оригинальной литературы по специальностям, относящимся к добыче и переработке продуктов моря;
ориентировать учащихся на умение пользоваться словарём при работе с текстами по пройденному материалу.

Пособие содержит иллюстрации, тексты для аудиторных занятий, тексты для самостоятельной работы и грамматический справочник.

Каждый текст для аудиторных занятий содержит активный словарь и упражнения на закрепление пройденного материала.

В пособии имеется раздел Supplementary Reading, а также методические указания Reading Support для учащихся по работе с дополнительным материалом.

Последовательность работы над текстами и упражнениями определяет преподаватель в зависимости от уровня подготовки учащихся. Несомненно, пособие рассчитано на обучение учащихся, владеющих английским языком в объёме средней школы.

Авторы

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PART I

Texts, illustrations, words, expressions and exercises

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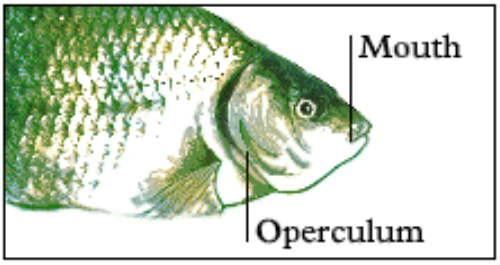
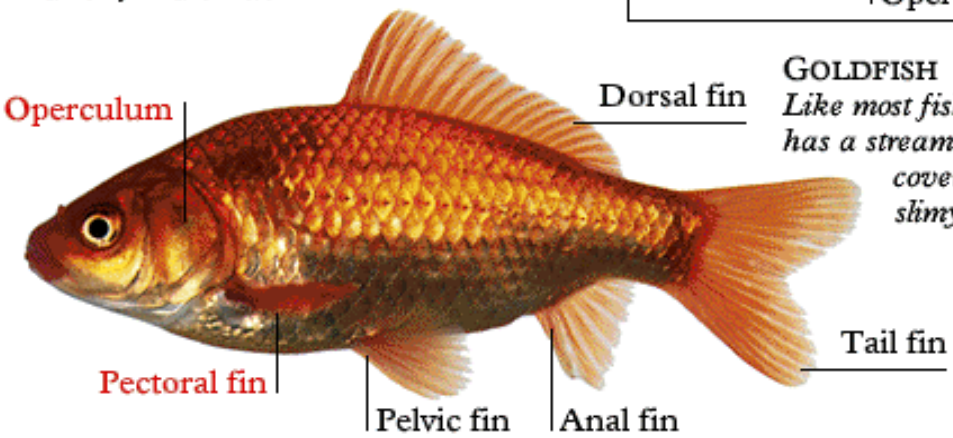
WHAT IS A FISH?

FISH are water-living vertebrates, of which there are some 25,000 different species. These species are divided into three groups: jawless fish; cartilaginous fish, which include sharks and rays; and bony fish, by far the largest group, which include eels, swordfish, and trout.





GOLDFISH
Like most fish, a goldfish has a streamlined body covered with slimy scales.

How many new words do you know?

Vertebrate n - позвоночное животное
jaw n - челюсть
cartilaginous a - хрящевой
ray n - скат, луч
bony a - костный, костистый
by far - намного, гораздо
eel n - угорь
swordfish n - меч-рыба
trout n - (pl. без изменений) форель
operculum n - (pl. - la) жаберная крышка
dorsal fin - дорсальный (спинной плавник)
pectoral fin - грудной плавник
pelvic fin - брюшной плавник
anal fin - анальный плавник
tail fin = caudal fin - хвостовой плавник
to breathe v - дышать ; breath n - дыхание
streamlined a - обтекаемый
to cover v - покрывать
slimy a - скользкий, покрытый слизью

EXERCISES

I. ***Внимательно изучите грамматический материал и проделайте все упражнения.***

The nouns in singular and plural
(существительные в ед. и во мн. числе)

Model: ***singular form (ед. ч.) - plural form (мн.ч.)***

Eye (глаз) - eyes (глаза)
Fin (плавник) - fins (плавники)
Stimulus (раздражитель) stimuli (раздражители)*

*a) Некоторые слова, пришедшие в английский язык из других языков (латинского и греческого) сохраняют форму множественного числа того языка, из которого они заимствованы, например,

phenomenon (явление) - phenomena (явления)
creterium (критерий) - creteria (критерии
medium (среда) - media (среды)
datum (данное) - data (данные)
basis (база) - bases (базы)
thesis (тезис) - theses (тезисы)
axis (ось) - axes (оси)
analysis (анализ) - analyses (анализы)
radius (радиус) - radii (радиусы)
formular (формула) - formulae (формулы)
operculum (жаберн.крышка) - opercula
lamella (пластинка) - lamellae
cerebrum (головн.мозг) - cerebra
retina (сетчатка глаза) - retinae
stimulus (раздражитель - stimuli
equilibrum (равновесие) - equilibria

b) Некоторые существительные имеют одну и ту же форму для единственного и множественного числа, например: a sheep (овца) - sheep (овцы)

a trout (форель) - trout (форели)
a fish (рыба) - fish (рыбы)
a deer (олень) - deer (олени)
a salmon (лосось) - salmon (лососи)
a works (завод) - works (заводы)
a means (средство) - means (средства)
a species (вид) - species (виды)

II. Найдите в тексте “What is a fish” все существительные в ед.ч. и поставьте их во мн.ч. и наоборот.

III. Существительное в роли определения (правило ряда)

а) Часто ряд состоит из трех слов, среднее из которых может быть прилагательным, причастием или герундием. Перевод такого ряда следует начинать с последнего слова и продолжать в строго обратном порядке с правильным переводом среднего слова.

При часто этом вводится предлог, если в сочетании есть прилагательное или причастие, например:

An oxygen free gas - газ, свободный от кислорода
The refrigerant- feeding system – устройство, подающее хладагент
A water-cooled conveyer - конвейер, охлаждаемый водой

Найдите в нашем тексте такое словосочетание и грамотно переведите его на русский язык.

IV. Некоторые способы перевода предлога ***of*** :

1. ***о*** - передает значение предложного падежа, например:
(to speak of somebody – говорить о ком-то)
(to think of something – думать о чем-то);

2 ***.из***, ***среди*** - часто ***of*** так переводится, если стоит в начале предложения, главного или придаточного, например:
Of the five items listed above we have concentrated on the second one.
Из всех пяти пунктов, перечисленных выше, мы сосредоточили свое внимание на втором;

3. ***of*** не переводится, если выражает отношения, передаваемые родительным падежом;

4. словосочетания с предлогом ***of*** типа ***of interest, of importance*** следует переводить словосочетаниями *представляющий интерес, имеющий значение*.

V. Найдите в тексте предложение с предлогом ***of*** ,перепишите и переведите его на русский язык.

VI. Каждое предложение как бы состоит из «головы» HEAD и «хвоста» TAIL. Подобрать «хвосты» из правой колонки к «головам» левой колонки. Написать, прочитать и перевести полученные предложения на русский язык.

HEADS	TAILS
1.Fish are animals…	a).… are divided into 3 groups.
2.There are some…	b).…sharks and rays.
3.The species of fish…	c).…eels, trout and swordfish.
4.Cartilaginous fish include…	d).…living in water and breathing by means of gills.
5.Bony fish include…	e).…25,000 diffferent species of fish.
6.Jawless fish include…	f).…pectoral,dorsal, pelvic, anal,tail fins
7.Every fish has the fins:	g).…lampreys and hagfish

VII. Ответить на вопросы.(УСТНО)

1. What are fish?
2. How many species of fish are there among the vertebrates?
3. These groups are divided into 4 species, aren't they?
4. What are they? And which group is the largest one?
5. What species of some commercial fish do you remember?

Anatomy

In general, fishes are somewhat torpedo-shaped, with bodies that are moderately compressed at the sides .Typically, the fish body carries a number of fins. One or more dorsal fins may be located along the center line of the back. A caudal fin lies at the end of the tail. One or more anal fins are situated on the ventral midline between the vent and the tail.

The body has two pairs of lateral fins: the pectoral fins, which are usually placed on the sides behind the gill openings, and the pelvic fins, which lie on the belly between the head and the vent. Fins are often much modified or absent in accord with the diverse modes of life.

Certain species of swamp eels lack most of the features by which fishes are commonly recognized, including gills, fins, and scales, and may even be primarily terrestrial. About 50 species of bony fishes lack eyes.

Fishes vary greatly in coloring as well, displaying a wide range of hues and patterns. In general the coloration is lighter on the belly than on the back,

but in water the fish appears to be of a uniform shade because the only light comes from above.

Many species have specialized shapes and organs that aid them in hunting and feeding.

Do you know these words & expressions?

in general – вообще
somewhat – немного, слегка
torpedo-shaped – торпедовидный
moderately – умеренно
compress – сжимать, сдавливать
carry – иметь
locate – расположить
along – вдоль, по
lie – лежать; situate – располагать
ventral – брюшной
vent –анальное отверстие
lateral – боковой
place – располагать
behind – позади, за
belly – брюшко
modify – видоизменять
in accord with – в соответствии с
diverse – различный
swamp eel – речной угорь

lack – не иметь
feature – свойство,качество
recognize - узнавать
include - включать
even- даже; vary-отличаться
primary - первичный
terrestrial - сухопутный
greatly=very
as well - также
wide range – широкий спектр
hue –оттенок; pattern- рисунок
coloration - окраска
appear to be- казаться
uniform - постоянный
shade - оттенок
from above - сверху
aid - помогать
hunt-охотиться
feed – кормить(ся)

Exercises

I.Answer the following questions.

1.What can you say about the shape of fish in general?
2.What kinds of fins does the fish body commonly carry?
3.Where are the dorsal fins located?
4.Where are the anal fins situated?
5.Where are the pectoral fins usually placed?
6.Where do the pelvic fins lie?
7.Why are the fins often absent?
8.What kind of fishes lack eyes?
9.Which colors of fish do you know?
10.Is the coloration lighter or darker on the belly than on the back?
11.What aids many species of fish in hunting and feeding?

II.Translate from Russian into English.

Дорсальный плавник, хвостовой плавник, анальный плавник, боковые плавники, грудной плавник, брюшной плавник, жабры, чешуя, голова, брюхо,хвост, рот, жаберные крышки, глаза.

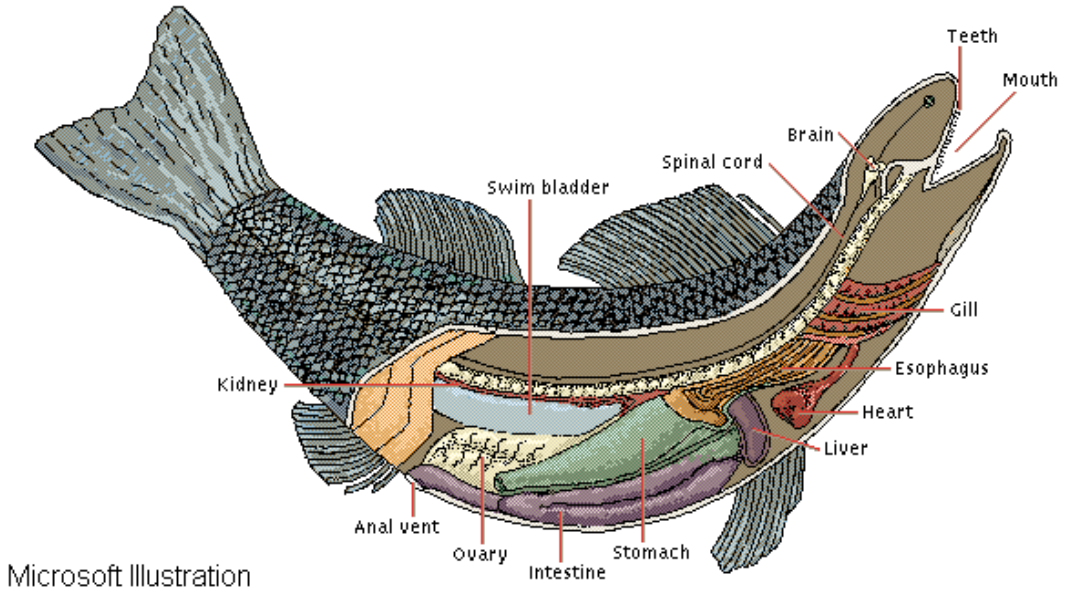
III. Translate from English into Russian

At the sides, a number of fins, along the center of line of the back, at the end of the tail, on the ventral midline, between the vent and the tail, on the sides, behind the gill openings, between the head and the vent, on the belly, from above

IV.Translate from Russian into English

1.Тело рыбы имеет много плавников.
2. Дорсальные плавники могут располагаться вдоль центральной линии спины.
3. Хвостовой плавник находится в конце хвоста.
4. Анальные плавники располагаются на брюшной средней линии между анальным отверстием и хвостом.
5. Тело имеет 2 пары боковых плавников: грудные и брюшные плавники.
6. Плавники часто отсутствуют в зависимости от образа жизни рыбы.
7. Например, угри не имеют плавников и чешуи.
8. Рыбы также очень различаются по окраске.
9. На брюхе окраска светлее, чем на спине.

Generalized Internal Anatomy of a Fish



Read these words and try to learn them by heart

mouth - рот
teeth - зубы
brain - головной мозг
spinal cord - спинной мозг
swim bladder - плавательный пузырь
kidney - почка
anal vent - анальное отверстие
ovary - яичник
intestine - кишечник, кишка
stomach - желудок
liver - печень
heart - сердце
esophagus - пищевод
gills - жабры

Body Structure of Fish

You know these words, don't you?

shape - форма
anterior - передний
skeleton - скелет
to extend - простираться
surface - поверхность
snout - морда,рыло
gill covers - жаберные крышки
to merge - сливаться
stem - стержень
beneath - под
to constitute - составлять
to support - поддерживать, удерживать
framework - остов,каркас, скелет
vertebral column - позвоночный столб, позвоночник, спинной хребет
notochord - стержень,хорда

Most fishes have a symmetrical shape which may be divided into three main parts: head, body and tail. The head is anterior part and extends from the tip of the snout till the end of the gill covers. The body extends from the gill covers to the anal fin and then merges into the tail which is divided into the stem and fin.

The body of fish has several fins: the pectoral fins, the ventral fins, the dorsal and the anal fins. The surface of the body is covered with skin which is the seat of scales. Beneath the skin are the muscles which constitute the flesh of the fish supported on a bony skeleton.

Skeleton consists of bones around which the tissue and organs are grouped. It is the framework of fish. The chief part of the skeleton is the backbone or ventral column. It includes a lot of vertebrae joined together by connective tissue into a long, elastic notochord.

EXERCISES

I. Copy new words to the text "Body Structure of Fish" and learn them by heart.

II. Let's read the above text and try to translate it from English into Russian.

III. Answer the questions:

1.What is the shape of the fish?
2.What three main parts of fish do you know?
3.Give the definition of fish.
4.What is a body?
5.How many fins does the body of fish have?
6.What is the skin of fish covered with?
7.What is beneath the skin?
8.What does skeleton consist on?
9.What is the chief part of skeleton?
10.What does the backbone include?

IV. Retell the text using the following expressions:

A symmetrical shape, head, body and tail, extends from, gill covers, anal fin, the tail is divided, several fins, the surface of the body, beneath the skin, skeleton consists of, the chief part of the skeleton, backbone.

V. Find the English equivalents to the following Russian ones:

Большинство рыб; три основные части; голова, тело и хвост; от жаберных крышек до хвостового плавника; несколько плавников; поверхность тела покрыта чешуёй; скелет состоит из костей; вокруг которых группируются ткани и органы; позвоночник; множество позвонков; соединительная ткань.

VI. Ask all the possible questions to the sentence:

The surface of the body is covered with skin.

VII. Translate from Russian into English:

1.Большинство рыб имеют симметричную форму.
2.Каждая рыба имеет голову, хвост и тело.
3.Голова – это передняя часть рыбы от кончика рыла до жаберных крышек.
4. Хвост подразделяется на стержень и плавник.
5. Тело рыбы имеет несколько плавников: грудные,

брюшные, спинные и хвостовые.

6. Поверхность рыбы покрыта чешуёй.
7. Скелет состоит из костей.
8. Главная часть скелета – это позвоночник.

Skeleton

The scaly integument covering the body of a fish comprises the dermal skeleton. The endoskeleton, or inner bony framework, of most modern fishes consists of a skull, containing jaws equipped with teeth; a vertebral column; ribs; pectoral arch; and a series of interspinal bones that support the fins. In the ancient fishes, represented in modern times by such fishes as the sturgeon, skeletons are largely cartilaginous rather than bony.

Skeleton of a Fish

The skeleton of the fish has the same general structural components as other vertebrates: a skull, spinal column, limbs, and a tail. Fish limbs have developed into fins, which are adapted for swimming and for providing stability while swimming.

Translate the texts “Skeleton” and “Skeleton of a Fish” into Russian, use these words and expressions if you need.

Scaly	- чешуйчатый, рыбий	interspinal	- межостистый
integument	- наружный покров	ancient	- древний
to comprise	- включать, охватывать	sturgeon	- осётр
dermal	- кожный	largely	- в значительной степени
endoskeleton	– внутри скелета	rather than	– скорее,предпочтительнее
inner	- внутренний	the same	- тот же самый

to consist of - состоять из
to contain - содержать
rib - ребро
pectoral arch – плечевой пояс
limb - конечность
to develop - развивать
to adapt - приспосабливать
while – в то время как, когда

Internal Organs

The digestive system of a fish usually consists of a mouth with rows of sharp, crushing, or brushlike teeth; a pharynx; an esophagus; a stomach; and an intestine terminating in an anal vent. The several organs of the alimentary canal are not sharply differentiated in all species. All species, however, have a pancreas and a liver.

The respiratory apparatus of jawed fishes consists of a series of slits, the gill clefts, which open from the pharynx to the gill chambers at either side of the back of the head. These chambers open to the water outside, but can be covered by a series of bones called the gill cover. Inside the gill chamber and in the gill clefts are the gills themselves, which assume the form of thin sheets or filaments through which the blood circulates.

When the fish takes in water and expels it through the gills, dissolved oxygen passes across the thin gill membranes into the blood, and carbon dioxide waste passes out of the blood into the water. A few species, however, such as the lungfish, can also breathe atmospheric air by means of a well-developed lung. Most bony fishes have an organ used in buoyancy control. Called the gas bladder, this precursor of the lung is a chamber that opens off the alimentary canal and fills with oxygen and nitrogen taken from the blood. The chief function of this organ is to adjust the fish to the varying water pressures at different depths so that the animal will have neither positive nor negative buoyancy. Thus the fish may maintain its depth without effort.

The circulatory system in most fishes is simple, consisting of a two-chambered heart that forces blood forward through the gills, then to the head, and from the head back to the rest of the body through a major artery situated beneath the spine. The rate of circulation is slower in fishes than in other vertebrates.

Words to be memorized

digestive system – система органов пищеварения

row- ряд

sharp- острый

crushing – уничтожающий

brushlike-щеткообразный

pharynx- зев,глотк

terminate-заканчиваться

several=some

alimentary canal- пищеварительный тракт

sharply-резко

differentiate-отличать(ся)

pancreas – поджелудочная железа

however – однако

slit – щель

gill clefts – жаберные щели

gill chamber – жаберная камера

outside- наружу

cover- покрывать

call- называться

gill cover- жаберная крышка

inside –внутри

assume- принимать

thin – тонкий

sheet – пластина

filament – нить, волокно

blood – кровь

expel – выталкивать

through – через

dissolve –растворять, разжижать

oxygen – кислород

pass – проходить

across-поперек, через

waste-выделения

carbon dioxide–углекислый газ

by means of - посредством,при помощи

the lungs –легкие

buoyancy-плавучесть

control–управление

precursor-предшественник

adjust–регулировать,приспособлять

depth-глубина

maintain-сохранять,удерживать

effort –усилие

circulation system – система кровообращения

spine-позвоночник;

rate –скорость; slow – медленный

Exercises

I. Answer the following questions

1.What does the digestive sysytem of fish usually consist of?

2.Are the organs of the alimentary canal sharply differentiated in all species?

3.Which internal organs do all species have?

4.What can you tell about the respiratory apparatus of fish?

5.What is the organ used in buoyancy control called?

6.What is the chief function of the gas bladder?

7.The circulatory system in most fishes is simple, isn't it?

II. Find the English equivalents to the following Russian expressions

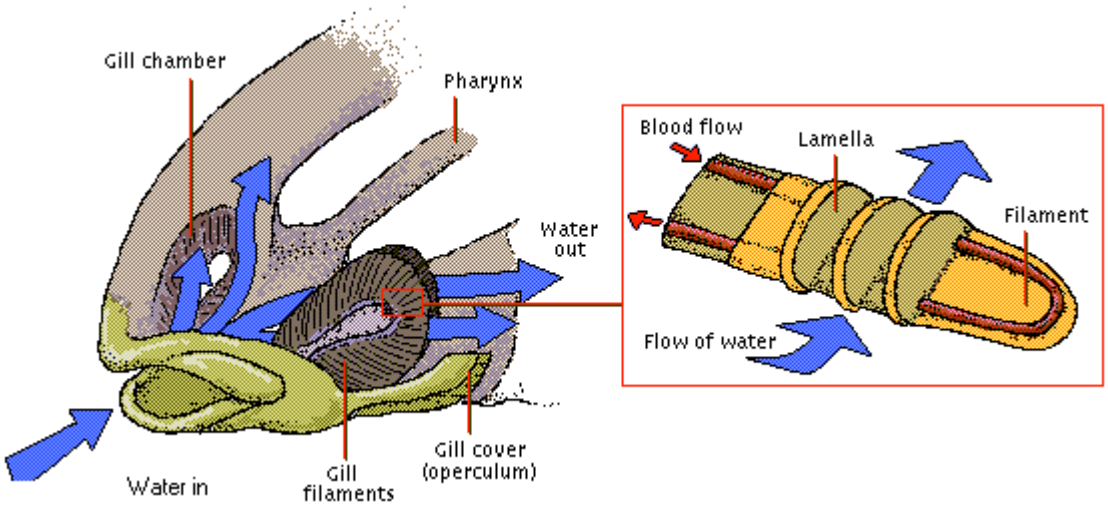
Система органов пищеварения; состоит из; рот; ряд острых зубов; глотка; пищевод; желудок; кишечник; заканчивающийся анальным отверстием; органы пищеварительного тракта; не очень отличаются у всех видов; поджелудочная железа и печень; система органов дыхания; жаберные щели; жаберные камеры; жаберная крышка; жабры; плавучесть; глубина; система кровообращения; состоящая из; двухкамерное сердце.

III. Put all possible questions to the sentence

The rate of circulation is slower in fishes than in the other vertebrates.

IV. Retell the text, use the plan below

I. The digestive system of fish consists of…
II. The respiratory apparatus of consists of…
III. The circulatory system of fish consists of…



Respiration in Fishes

Fish breathe by drinking. A pressurized gulp of water flows from the mouth into a gill chamber on each side of the head. Gills themselves, located in gill clefts within the gill chambers, consist of fleshy, sheetlike filaments transected by extensions called lamellae. As water flows across the gills, the oxygen within them diffuses into blood circulating through vessels in the filaments and lamellae.

Simultaneously, carbon dioxide in the fish's bloodstream diffuses into the water and is carried out of the body. A fish can close the opercula, or flaps of tissue covering the gill openings, to prevent water from escaping.

Translate the text "Respiration in Fishes, use these words if you need.

respiration – дыхание
pressurized –находящийся под давлением, сжатый
gulp – глоток
flow from – вытекать

within – внутри
fleshy – мясистый, ,полный
transect – делать поперечный разрез
extension – растяжение, удлинение
lamella (pl.-lamellae) – пластинка, чешуйка
diffuse – распространять, распылять
vessel – сосуд
simultaneously –одновременно
bloodstream – поток крови
flap of tissue = opercula = gill cover
prevent – препятствовать
escape – уходить, ускользать, просачиваться

Nervous System

The central nervous system of most fishes consists of a spinal cord and a brain that has a large cerebellum, a pair of optic lobes, a small cerebrum, and a medulla oblongata. The form and size of various parts of the brain vary markedly in different species. The eyes have almost spherical lenses with a flattened cornea. The entire lens of the eye is moved toward or away from the retina in order to focus on different objects. The eyes of some cave fishes that live in complete darkness are rudimentary or absent. Fishes smell by means of a pair of double nostrils leading into an olfactory pit. Many fishes detect chemical stimuli through sense organs or tentacles around the mouth or on other parts of the body.

Fishes hear without the aid of external ears. Sound vibrations are transmitted through the bones of the skull to an internal ear containing three semicircular canals. This inner ear acts as an organ of equilibrium as well as an auditory organ. Fishes are also equipped with unique sensory organs called lateral lines. These organs consist of canals that run along the sides of the head and body and connect with the outside surface of the fish through small pores. The chief function of the lateral line is to sense extremely low-frequency vibrations, but in some species it can also detect weak electrical fields.

How many new words do you know?

cerebellum (pl.- cerebella) – мозжечок
optic lobe – глазное яблоко
cerebrum (pl.-cerebra) – головной мозг
medulla oblongata –продолговатый мозг
markedly – заметно, явно

sense - чувство,чувствовать
tentacle – усик, щупальце
external - внешний
internal - внутренний
sound vibration звуковое колебание

lens – хрусталик глаза
flattened cornea – плоская роговица
entire – полный, весь, целый
retina (pl.-retinae) –сетчатка (глаза)
in order to –для того,чтобы

cave – пещерный
complete darkness – полная темнота
rudimentary – зачаточный, рудиментарный

smell – чувствовать запах
double – двойной
nostril – ноздря
olfactory pit – обонятельная ямка
detect – обнаруживать, находить
chemical – химический
stimulus (pl. – stimuli) – раздражитель

transmit - передавать
skull – череп, голова
semicircular - полукружный
act – действовать, работать
equilibrum –(pl.- ia)- равновесие
auditory - слуховой
to equip with –обеспечивать
unique – особенный,уникальный
lateral line –боковая линия
surface - поверхность
pore – пора, отверстие
extremely - очень
frequency -частота
weak -слабый
field – поле, область, сфера

EXERCISES

I. Match the following expressions

1. most fishes	a) спинной мозг
2. spinal cord	b) головной мозг
3. brain	c) большинство рыб
4. medulla oblongata	d) форма и размер
5. form and size	e) заметно отличаются
6. vary markedly	f) продолговатый мозг
7. in order to	g) полная темнота
8. are absent	h) при помощи
9. complete darkness	i) отсутствуют
10.by means of	j) для того, чтобы
11.smell	k) обнаруживать
12.detect	l) через органы чувств
13.containing	m)чувствовать запах
14.through sense organs	n) кости головы
15.sound vibrations	o) содержащие
16.bones of skull	p) звуковые колебания

II. Translate all the Russian words into English

1.The central nervous system (состоит из) a spinal cord and a brain that (имеет) a large cerebellum, (пару глазных яблок), etc.
2. The form and size of various parts of the brain (отличаются) markedly (у разных видов).
3. (Глаза) have (почти) spherical lenses with (плоская роговица).
4.The eyes of (некоторых) cave fishes that (живут) in complete darkness are rudimentary or (отсутствуют).
5. Fishes (чувствуют запах) by means of (пары ноздрей) leading into an olfactory pit.
6. (Многие рыбы) detect (химические) stimuli through sense organs or tentacles around the mouth or on (других частях тела)
7. Fishes (слышат) without the aid of external (ушей).
8. Sound vibrations (передаются) through the bones of the skull to an (внутренне ухо) containing three semicircular canals.
9.The inner ear (действует как) an organ (равновесия) as well as (орган слуха).
10.(Основная функция) of the lateral line is to sense extremely (низкочастотные) vibrations, but in some (видов) it can also detect (слабые электрические поля)

III. Put these nouns in plural form according to the model

Model:	singular form (ед. ч.)	-	plural form (мн.ч.)
	Eye (глаз)	-	eyes (глаза)
	Stimulus (раздражитель)		stimuli (раздражители)*

Lens, retina, nostril, stimulus, sense, organ, tentacle, part, ear, canal, line, equilibrum, side, pore, vibration, field.

* Некоторые слова, пришедшие в английский язык из других языков (латинского и греческого) сохраняют форму множественного числа того языка, из которого они заимствованы, например,

phenomenon (явление)	- phenomena (явления)
creterium (критерий)	- creteria (критерии
medium (среда)	- media (среды)
datum (данное)	- data (данные)
basis (база)	- bases (базы)
thesis (тезис)	- theses (тезисы)
axis (ось)	- axes (оси)
analysis (анализ)	- analyses (анализы)

radius (радиус) - radii (радиусы)
formular (формула) - formulae (формулы)
operculum (жаберн.крышка) - opercula
lamella (пластинка) - lamellae
cerebrum (головн.мозг) - cerebra
retina (сетчатка глаза) - retinae
stimulus (раздражитель - stimuli
equilibrum (равновесие) - equilibria

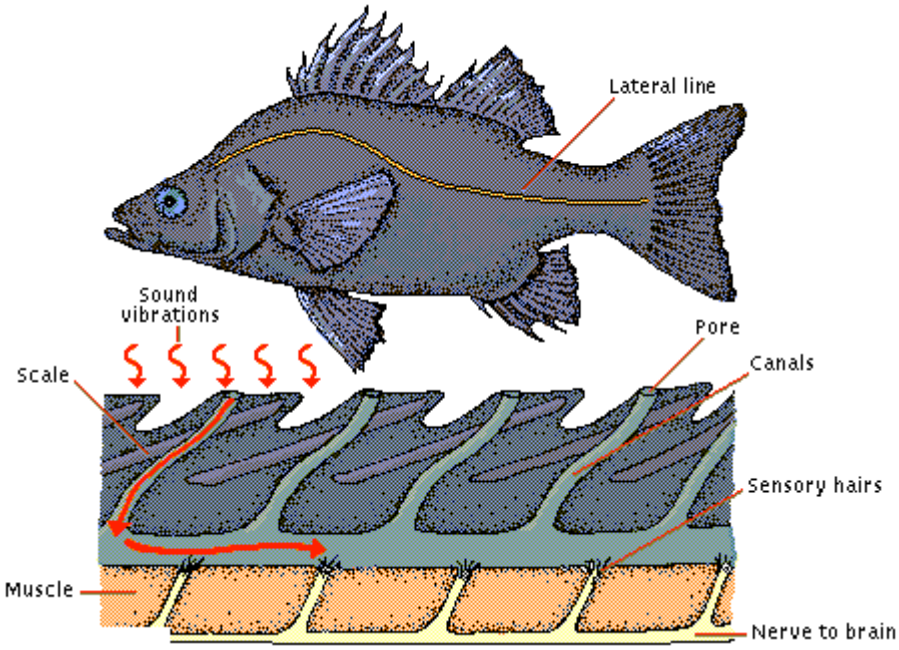
IV. Answer the following questions

1.What does the central nervous system of most fishes consist of?
2. The form and size of various parts of the brain vary markedly in different species, don't they?
3. What can you say about the eyes of some cave fishes?
4. In what way do fishes smell?
5. How do they detect chemical stimuli?
6. Do fishes hear with the aid of external or internal ears?
7. Where are sound vibrations transmitted to?
8. What does the internal ear contain?
9. What are fishes also equipped with?
10.Is the chief function of the lateral line to sense extremely low or high frequency vibrations?
11.Can the lateral line also detect weak electrical fields in some species?

V. Complete the following sentences and retell the text.

1.The central nervous system consists of …
2.The form and size of various parts of brain vary …
3.The eyes have…
4.The eyes of some cave fishes are…
5.Fishes smell by means of…
6.Many fishes detect chemical stimuli through…
7.Fishes hear…
8.Fishes are also equipped with…
9.The chief function of the lateral line is…

GOOD FOR YOU!

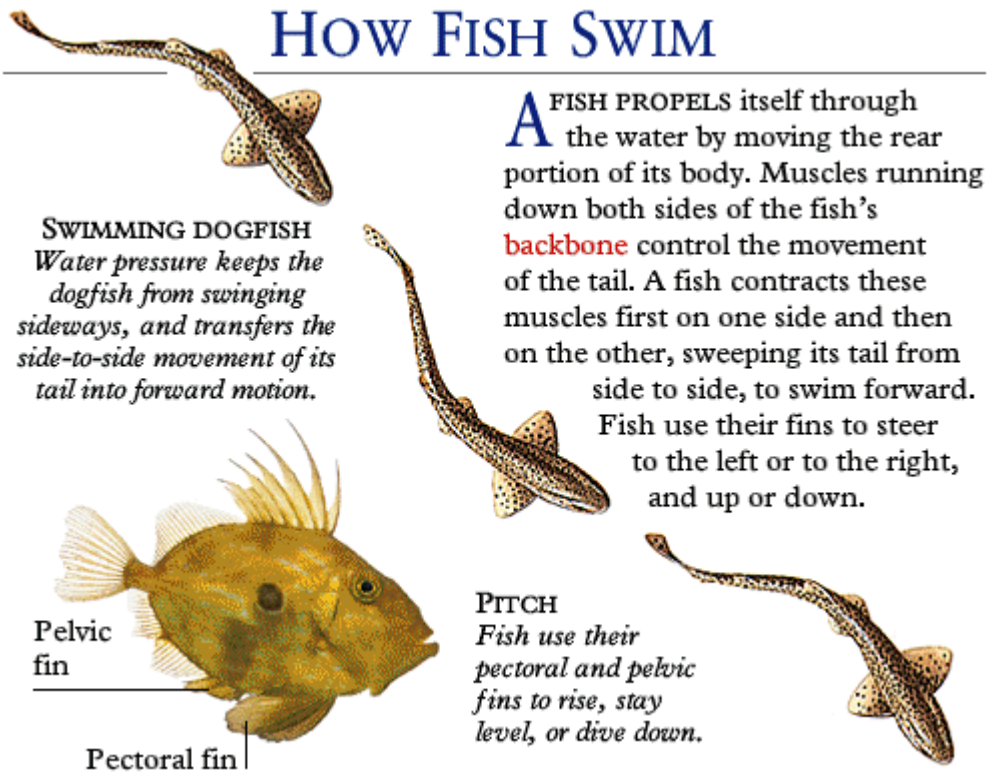


Motion Detector

Water carries sound vibrations through small pores in a fish's skin and into the lateral line, an inner fluid-filled canal. Moving through the canal, the vibrations stimulate the hairs of sensory organs. The branching lateral nerve connects these sensory organs to the fish's brain, transmitting information about the flow of surrounding water and the movements of other organisms.

Translate the text "Motion Detector", use these words if you need.

motion - движение
to carry – передавать, проводить
fluid-filled – наполненный жидкостью
to move - продвигаться
movement -продвижение
sensory hairs – чувствительные волоски
branching – ветвящийся
to connect -соединять, связывать
flow – поток, течение
surrounding - окружающий
other -другой



DO YOU KNOW THESE WORDS?

to propel - продвигать вперёд
rear - хвостовой, задний, тыльный
portion - часть
muscle - мышца, мускул
run down - двигаться вниз по
both - оба, обе
side - сторона
to control - управлять
movement – движение
to contract – сжимать,сокращать
first - сначала
then - затем
to sweep – двигаться величаво

to steer -править,управлять движением
pressure – давление,сжатие,воздействие
to keep smbd. from doing smth.- препятст к-л делать что-либо
to swing – качать, раскачивать
sideways –со стороны или в сторону
to transfer -передавать
forward motion – движение вперёд
pitch – килевая качка, высота
rise -поднимать
stay level –оставаться на к-л уровне
dive down –погружаться, нырять

EXERCISES

I. Find the English equivalents in the text:

Рыба продвигается вперёд; по воде; задняя часть тела; мышцы; обе стороны; позвоночник рыбы; управляют движением хвоста; сокращает эти мышцы; на одной стороне; затем; на другой стороне; изгибая свой хвост; из стороны в сторону; плыть вперёд; управлять рулём; налево; направо; вверх; вниз.

II. Answer the questions:

1. Which portion of its body does a fish move when propels itself through the water?
2. What muscles of the fish control the movement of the tail?
3. What does a fish do to swim forward?
4. Which fins do fish use to rise stay level or dive down?

III. Translate from Russian into English.

1.Рыба продвигается вперёд по воде движением хвостовой части своего тела.
2. Мышцы, двигаясь вниз по обеим сторонам позвоночника рыбы, управляют движением хвоста.
3. Рыба сокращает эти мыщцы сначала с одной стороны, затем с другой, изгибая свой хвост из стороны в сторону, чтобы плыть вперёд.
4. Рыбы используют свои плавники, чтобы управлять движением налево, направо, вверх или вниз.

IV. Translate the texts “Swimming Dogfish” and “Pitch” on the previous page from English into Russian and answer these questions:

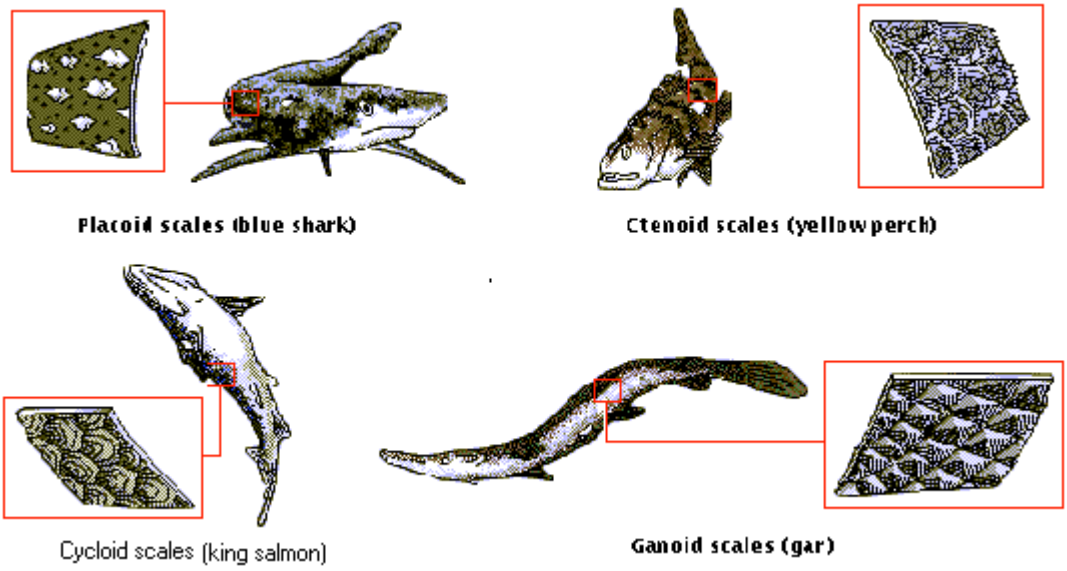
1. What keeps the dogfish from swinging sideways?
2. Why do the fish use their pectoral and pelvic fins?

Scales

The bodies of most fishes are covered with a layer of scales, which are bony or horny plates arranged in overlapping rows, with the free posterior end

of one scale overlapping the attached anterior end of the scale behind it. A thin epidermis usually covers the scales. In a number of species the scales develop into bony plates. In some species, such as the eel, the scales are minute. In others, such as the catfish, they are almost absent.

Fishes have sometimes been classified according to the shape and characteristics of their scales. The most important types are ganoid scales, which are rhombic in shape and covered with an enamel-like layer; cycloid scales, which are almost round with smooth edges; and ctenoid scales, which are also round but have serrate, or comblike, exposed edges. The epidermal layer of the body contains the pigment cells that give the fish its color. Also in the epidermal layer are cells secreting a slippery mucus that covers the entire body.



Fish Scales.

Most fish are protected by scales, overlapping bony plates that cover all or part of the body. Scales come in four forms: placoid, cycloid, ctenoid, and ganoid. Ctenoid scales have small points on the surface and are rough to the touch. These and smooth, rounded cycloid scales are most common among modern fishes. Some less highly developed fishes have tough ganoid scales, while sharks and many rays have placoid scales, sharp and toothlike.

EXERCISES

I. Match the expressions:

1. покрыты	a. with smooth edges
2. слоем чешуек	b. give the fish its color
3. костные пластины	c. overlapping
4. расположенные	d. are covered
5. перекрывающий	e. with a layer of scales
6. тонкий эпидермис	f. in a number of species
7. у многих видов	g. are almost absent
8. у других	h. a thin epidermis
9. почти отсутствуют	i. according to the shape
10.по форме	j. in others
11.самый важный	k. bony plates
12.с гладкими краями	l. arranged
13.придают рыбе её цвет	m. the most important
14.выделяющие слизь	n. the entire body
15.всё тело	o. secreting a mucus

II. Translate all the Russian words into English:

1. The bodies (большинства рыб) are covered (слоем чешуи).
2. The scales are (костные или роговые) plates (расположенные) in overlapping rows.
3. (Тонкий) epidermis (обычно) covers the scales.
4. In some (видов) such as (угорь), the scales are (мелкие).
5. In others, such as (зубатка), they are (почти) absent.
6. Fishes have (иногда) been classified (по) the shape and characteristics of (их чешуи).
7. Ganoid scales are rhombic (по форме).
8. Cycloid scales are (почти круглые) with smooth edges.
9. Ctenoid scales have serrate or (открытые края).
10. (Акулы) and (скаты) have placoid scales (острые) and thoothlike.
11. The pigment (клетки) give the fish its color.
12. A slippery mucus (покрывает) the entire body.

III. Answer the questions:

1. What are the bodies of most fishes covered with?
2. What usually covers the scales?
3. What kind of scales are in the eel?
4. Which species of fish has no scales at all?
5. Do you know the most important types of scales?
6. The shape of ganoid scales is rhombic, isn’t it?
7. Are the cycloid scales round with smooth edges or square with sharp ones?

8.What gives the fish its color?
9.The entire body of fish is covered with a slippery mucus, isn't it?

IV. a)Translate the text "Fish Scales" from English into Russian;
b)Try to ask as many questions as possible.

V. Translate the following sentences into English, consult the dictionary if you need.

1. Жабры у рыб являются органами дыхания.
2. Основное назначение воздушного пузыря рыбы – - это обеспечение плавучести.
3. У многих рыб нет воздушного пузыря.
4. Сердце, желудок, печень и почки относятся к внутренним органам.
5. Тело некоторых рыб покрыто голой кожей; на ней нет чешуи.

PART II
Supplementary Reading

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Fish, aquatic vertebrate animal, usually possessing gills in the adult stage and having limbs, when present, in the forms of fins. Unlike other commonly recognized groups of animals, the fishes are a heterogeneous assemblage of groups that cannot be recognized by any defining trait (as mammals, for example, can be recognized by the presence of mammary glands or hair). Consequently, there are exceptions to the definition given here. Fishes are usually understood to include the jawless vertebrates such as the lamprey and hagfish; and the shark, ray, chimaera, lungfish, and bony fishes. The latter group includes the forms most commonly known as fish.

The word *fish* is commonly used to refer to an individual animal or to a species, or to fish in general. When referring to two or more kinds or species, the convention is to use the plural *fishes*.

Age and Diversity

The earliest known vertebrates were jawless fishes that left fossilized remains in rocks laid down during the Ordovician period beginning about 480 million years ago. Early forms were of small size, seldom more than a few inches in length, and possessed gills in a series of pouches. The first fishes with jaws radiated during the Devonian period, the so-called Age of Fishes, and became the dominant form of vertebrate life in marine and freshwater habitats. The major lines of fishes, including sharks, the coelacanth, and bony fishes, appeared in the latter part of the period.

Fishes constitute more than half the total number of known modern vertebrates. Scientists recognize an estimated 22,000 living species, compared with 21,500 extant amphibians, reptiles, birds, and mammals. Unlike other vertebrates, new species of fishes continue to be discovered at a high rate and it is expected that the eventual number of recognized living species will approach 28,000.

Anatomy

In general, fishes are somewhat torpedo-shaped, with bodies that are moderately compressed at the sides and taper more markedly at the tail than at the head. The fundamental feature is the serially repeated set of vertebrae and segmented muscles, readily seen in a filet or skin specimen, that enable the fish to propel itself by moving from side to side. Typically, the body carries a number of fins, which are membranes supported by rays or spines, that function in propulsion or orientation. One or more dorsal fins may be located along the center line of the back. A caudal fin lies at the end of the tail and is the primary organ for generating thrust in most species. One or more anal fins are situated on the ventral midline between the vent and the tail. The body has two pairs of lateral fins: the pectoral fins, which are usually placed on the sides behind the gill openings, and the pelvic fins, which lie on the belly between the

head and the vent. Great diversity exists in the shape and anatomical details of fishes, ranging from the stringlike eel to the globe-shaped puffer or greatly flattened fluke. Fins are often much modified or absent in accord with the diverse modes of life. Certain species of swamp eels lack most of the

features by which fishes are commonly recognized, including gills, fins, and scales, and may even be primarily terrestrial. About 50 species of bony fishes lack eyes.

The various species of fishes also show extreme variation in size. A recently discovered goby from the Indian Ocean reaches only 10 mm (about 0.5 in) in length, while the whale shark may reach 15 m (50 ft) and an estimated weight of 68,000 kg (150,000 lbs).

Fishes vary greatly in coloring as well, displaying a wide range of hues and patterns. In general the coloration is lighter on the belly than on the back, but in water the fish appears to be of a uniform shade because the only light comes from above. A number of tropical fishes, notably the butterfly fish, are brilliantly colored and patterned. Their coloration may serve as a means of species recognition or, in the case of venomous species, as a warning to would-be predators. Many fishes have the ability to alter their colors markedly to blend with their environment. The flatfish has been observed changing color to match a checkerboard pattern on the bottom of an aquarium.

Many species have specialized shapes and organs that aid them in hunting and feeding. Among such fishes are the lanternfish and other deepwater species, which have luminous organs to reveal or attract their prey. The anglerfish lies on the ocean bottom and presents a small, wormlike knob of flesh on the end of a long spine as a bait to other fishes.

Scales

The bodies of most fishes are covered with a layer of scales, which are bony or horny plates arranged in overlapping rows, with the free posterior end of one scale overlapping the attached anterior end of the scale behind it. A thin epidermis usually covers the scales. In a number of species the scales develop into bony plates. In some species, such as the eel, the scales are minute. In others, such as the catfish, they are almost absent.

Fishes have sometimes been classified according to the shape and characteristics of their scales. The most important types are ganoid scales, which are rhombic in shape and covered with an enamel-like layer; cycloid scales, which are almost round with smooth edges; and ctenoid scales, which are also round but have serrate, or comblike, exposed edges. The epidermal layer of the body contains the pigment cells that give the fish its color. Also in the epidermal layer are cells secreting a slippery mucus that covers the entire body.

Skeleton

The scaly integument covering the body of a fish comprises the dermal skeleton. The endoskeleton, or inner bony framework, of most modern fishes consists of a skull, containing jaws equipped with teeth; a vertebral column; ribs; pectoral arch; and a series of interspinal bones that support the fins. In the ancient fishes, represented in modern times by such fishes as the sturgeon, skeletons are largely cartilaginous rather than bony.

Internal Organs

The digestive system of a fish usually consists of a mouth with rows of sharp, crushing, or brushlike teeth; a pharynx; an esophagus; a stomach; and an intestine terminating in an anal vent. The several organs of the alimentary canal are not sharply differentiated in all species. All species, however, have a pancreas and a liver.

The respiratory apparatus of jawed fishes consists of a series of slits, the gill clefts, which open from the pharynx to the gill chambers at either side of the back of the head. These chambers open to the water outside, but can be covered by a series of bones called the gill cover. Inside the gill chamber and in the gill clefts are the gills themselves, which assume the form of thin sheets or filaments through which the blood circulates. When the fish takes in water and expels it through the gills, dissolved oxygen passes across the thin gill membranes into the blood, and carbon dioxide waste passes out of the blood into the water. A few species, however, such as the lungfish, can also breathe atmospheric air by means of a well-developed lung. Most bony fishes have an organ used in buoyancy control. Called the gas bladder, this precursor of the lung is a chamber that opens off the alimentary canal and fills with oxygen and nitrogen taken from the blood. The chief function of this organ is to adjust the fish to the varying water pressures at different depths so that the animal will have neither positive nor negative buoyancy. Thus the fish may maintain its depth without effort.

The circulatory system in most fishes is simple, consisting of a two-chambered heart that forces blood forward through the gills, then to the head, and from the head back to the rest of the body through a major artery situated beneath the spine. The rate of circulation is slower in fishes than in other vertebrates.

Muscles

The chief muscles in the body of a fish are arranged along the sides of the trunk and tail. The larger mass runs along the back at either side of the spinal cord, and the smaller mass is located below it. Each muscle mass is composed of a series of interlocking segments. In ordinary swimming the successive contraction of the muscle segments from front to back alternately on either side gives the caudal fin a wavelike motion. Small muscles control the motions of mouth, gills, fins, and eyes. A few types of fishes, such as the eel, swim by

serpentine motions of their bodies. Certain others, among them the trunkfish, propel themselves by the action of their fins without great body motion.

Nervous System

The central nervous system of most fishes consists of a spinal cord and a brain that has a large cerebellum, a pair of optic lobes, a small cerebrum, and a medulla oblongata. The form and size of various parts of the brain vary markedly in different species. The eyes have almost spherical lenses with a flattened cornea. The entire lens of the eye is moved toward or away from the retina in order to focus on different objects. The eyes of some cave fishes that live in complete darkness are rudimentary or absent. Fishes smell by means of a pair of double nostrils leading into an olfactory pit. Many fishes detect chemical stimuli through sense organsor -tentacles around the mouth or on other parts of the body.

Fishes hear without the aid of external ears. Sound vibrations are transmitted through the bones of the skull to an internal ear containing three semicircular canals. This inner ear acts as an organ of equilibrium as well as an auditory organ. Fishes are also equipped with unique sensory organs called lateral lines. These organs consist of canals that run along the sides of the head and body and connect with the outside surface of the fish through small pores. The chief function of the lateral line is to sense extremely low-frequency vibrations, but in some species it can also detect weak electrical fields.

Reproduction

Fishes exhibit diverse means of producing young. Although various methods of heterosexual reproduction are most common among fishes, some species are *hermaphroditic*—that is, individuals develop both ovaries and testes, either during separate life stages or simultaneously. Sexual parasitism is exhibited in some species of angler fishes, in which the male permanently attaches himself to the body of the female, deriving nutrients from the female's circulatory system.

Oviparous fishes are those that lay eggs that are fertilized outside the female's body. In such species, development of the young is also external. Species that scatter eggs in open water often produce eggs in prodigious quantities. A single cod, for example, may produce in excess of 3 million eggs. Other egg-layers, such as the Pacific salmon, may undertake remarkable homing migrations in association with spawning activity. Parental care after hatching may be absent or elaborate, often involving the defense of a nest or territory. In the bowfin and some African species of cichlid, the young will enter the mouth of a parent for protection when predators threaten.

Viviparous fishes have internal fertilization and bring forth the young in an advanced state of development. Viviparity has evolved many times among

fishes and occurs in the shark, the coelacanth, and such popular aquarium fishes as the guppy and the mollie. Diverse mechanisms exist whereby nutrients are provided to the embryos, which may increase in size a thousandfold before birth. Ovoviviparity is exhibited in some species, in which the young hatch within the oviduct of the female and are thus born live.

Habitat Diversity

Fishes occupy almost every conceivable aquatic habitat. The killifish is abundant in the world's highest large lake, South America's Lake Titicaca (3810 m/12,500 ft above sea level); other species have been recorded from the bottom of the deepest lake, Lake Baikal (1637 m/5371 ft deep) in Russia, and from abyssal depths of the ocean (7000 m/22,960 ft). In a Mexican hot spring, a killifish tolerates temperatures as high as 45°C (113°F), whereas the Antarctic icefish lives at about -2°C (29°F). The water does not freeze at this temperature because of its high salt content, and the fish does not freeze because its blood contains a form of biological antifreeze. Some fishes live in almost pure fresh water, while a killifish in Hispaniola tolerates salinity as high as four times that of the sea. Cave fishes may pass their lives in complete darkness, while fishes in desert marshes experience record levels of solar radiation. A group of annual fishes in South America survives periodic desiccation by spending the dry season as dormant eggs, only to hatch and develop with the arrival of the next wet season.

The greatest number of marine species are found in tropical waters, particularly in association with coral reefs. The greatest diversity of freshwater species occurs in the great lakes of Africa and in the streams of tropical rain forests, particularly in the Amazon Basin in South America.

Economic Value

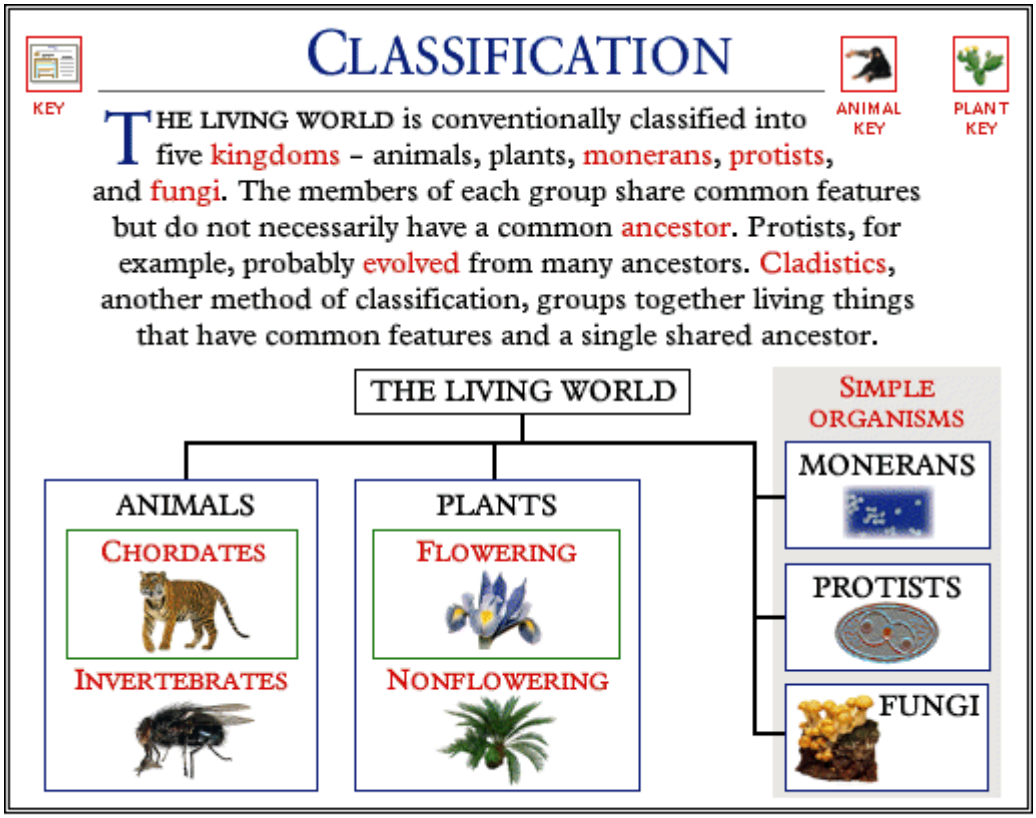
Fish are one of the most important sources of animal protein for humans, and many fishes are used as food. Subsidiary uses of fish and fish products include the manufacture of nitrogenous fertilizers from fish and fish scraps, and the extraction of fish-liver oils as one of the sources of vitamin D. Fish scales are sometimes used in making artificial pearls. Isinglass, a form of gelatin, is prepared from the air bladders of certain species, and glue is made from fish offal.

Conservation Issues

Many fish species are threatened with extinction including the great white shark, most killifish species, and every sturgeon and paddlefish species. The threat comes from a variety of sources. According to the United Nations Food and Agriculture Organization (FAO), 70 percent of fish species commercially caught around the world are overexploited—that is, harvested beyond their ability to sustain a given population size, caught to the limit, or recovering

from overexploitation. One third of the world catch is bycatch, fish caught unintentionally, that is discarded as waste. Over 90 percent of the world's fisheries are in coastal waters, making them particularly vulnerable to pollution and habitat destruction as human populations migrate toward the coast. Humans have accidentally and intentionally introduced exotic fish species that often replace or threaten native fish populations. Numerous salmon populations are jeopardized by dams that hinder adults from reaching their spawning grounds. Fish play an important role in aquatic ecosystems and have long provided valuable resources to humankind. Recent declines in their numbers demonstrate that fish stocks, even large marine fish stocks, are not a limitless resource.

Scientific classification: Fishes are classified differently by different zoologists. Some of the classifications are very complex and divide fishes into more than 100 orders and suborders. In the most generally used system, the subphylum Vertebrata is divided into two superclasses: Agnatha, which includes the lamprey and other fishes without jaws; and Gnathostomata, which includes the fishes with hinged jaws. The latter are further divided into the class Chondrichthyes—the cartilaginous fishes such as the shark, ray, and chimaera—and the class Osteichthyes—the bony fishes. The bony fishes are made up of the subclass Sarcopterygii—lobe-finned fishes—and the subclass Actinopterygii—ray-finned fishes. The recent ray fins consist of two groups, (1) Chrondrostei, which includes the sturgeon, and (2) the Neopterygii, which comprises ten superorders: the Ginglymodi, which includes the gars; Halecomorphi (the bowfin); Elopomorpha (the eel, bonefish, and tarpon); Clupeomorpha (the anchovy, herring, and shad); Osteoglossomorpha (the salmon, pike, and smelt); Ostariophysi (the arapaima, or pirarucu; elephant fish; and mooneye); Protacanthopterygii (the catfish, electric eel, minnow, and hatchetfish); Scopelomorpha (the lanternfish and lizard fish); Paracanthopterygii (the cod, hake, toadfish, and trout-perch); and Acanthopterygii (the John Dory, perch, rockfish, sea horse, sunfish, tuna, flatfish, killifish, sculpin, and remora).



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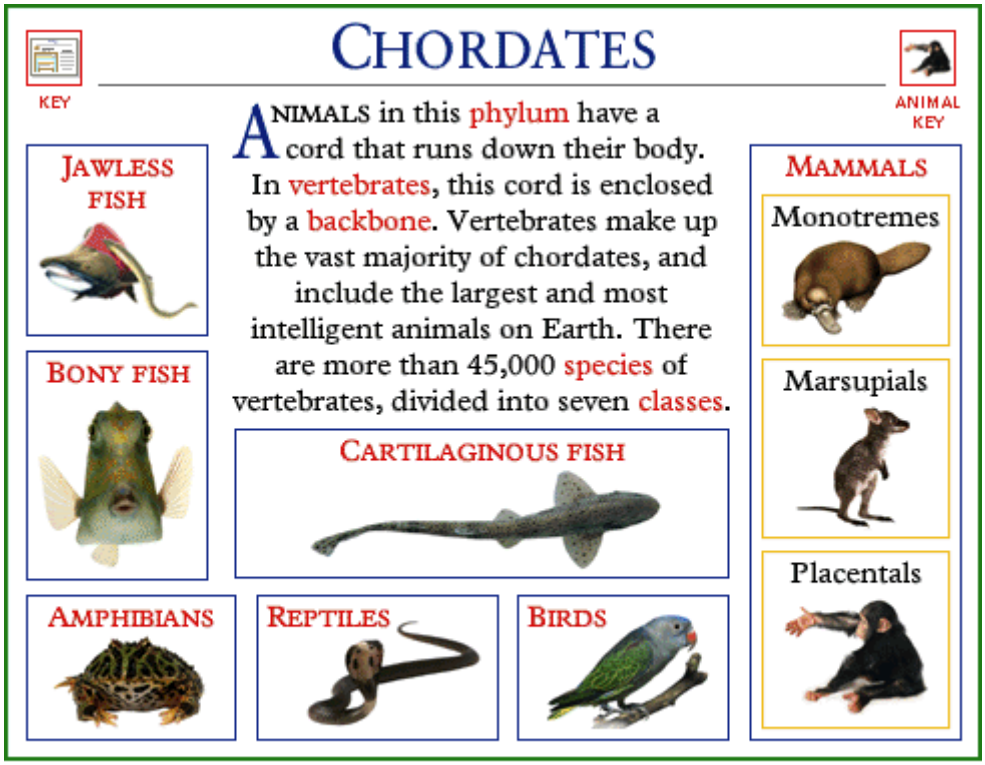

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KEY

JAWLESS FISH

ANIMAL KEY

Agnatha

APPROXIMATELY 70 SPECIES

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KEY

BONY FISH

ANIMAL KEY

Osteichthyes

APPROXIMATELY 25,000 SPECIES

These are some of the most important orders found in this class.

ANGLERFISH	STURGEONS
CARP	LUNGFISH
CATFISH	PERCHES AND RELATIVES
COD	SALMON AND TROUT
EELS	SEA HORSES
FLYING FISH	STICKLEBACKS
HERRINGS AND ANCHOVIES	

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KEY

CARTILAGINOUS FISH

ANIMAL KEY

Chondroichthyes

APPROXIMATELY 700 SPECIES

This class is often divided into the two orders shown below.

SHARKS	SKATES AND RAYS

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READING SUPPORT

Обращаясь к словарю, помните:

1.Слова в словаре находятся в алфавитном порядке. Причём место слова определяется не только начальной буквой, но и всеми последующими;

2.После каждого слова в словаре дана транскрипция. Она подскажет вам, как правильно прочесть слово;

3.Любое слово в словаре стоит в начальной форме. Значит, по слову, встретившемуся в тексте, надо определить его начальную форму, то есть единственное число существительного, неопределенную форму глагола, положительную степень рплагательного и т.п.;

4.Многие слова в английском языке имееют несколько значений. Выберите то значение, которое подходит по смыслу предложения;

5.Некоторые слова, имеющие одинаковое написание, могут относиться к разным частям речи. Выясните, к какой части речи относится искомое слово, и найдите значение этого слова по словарю.

Учитесь ориентироваться в тексте:

1.Когда вы читаете текст, попытайтесь прочесть все сразу до конца без остановки. Не ищите незнакомые слова в словаре. Старайтесь понять значения незнакомых слов из контекста;

2.Когда вы отвлекаетесь для того, чтобы посмотреть слово в словаре, вы теряете нить повествования.Вы можете посмотреть слово позже, если не уверены в том, что правильно догадались;

3.Пытайтесь читать как можно быстрее, каждый раз заставляйте себя увеличивать скорость чтения;

4.Заголовок часто отражает тему, идею, проблему текста;

5.Текст обычно разбит на абзацы. Абзац состоит из нескольких предложений и начинается с красной строки. Главная идея в английском тексте обычно находится в первом и последнем абзацах.

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