

Duration: 75 min

Elementary School

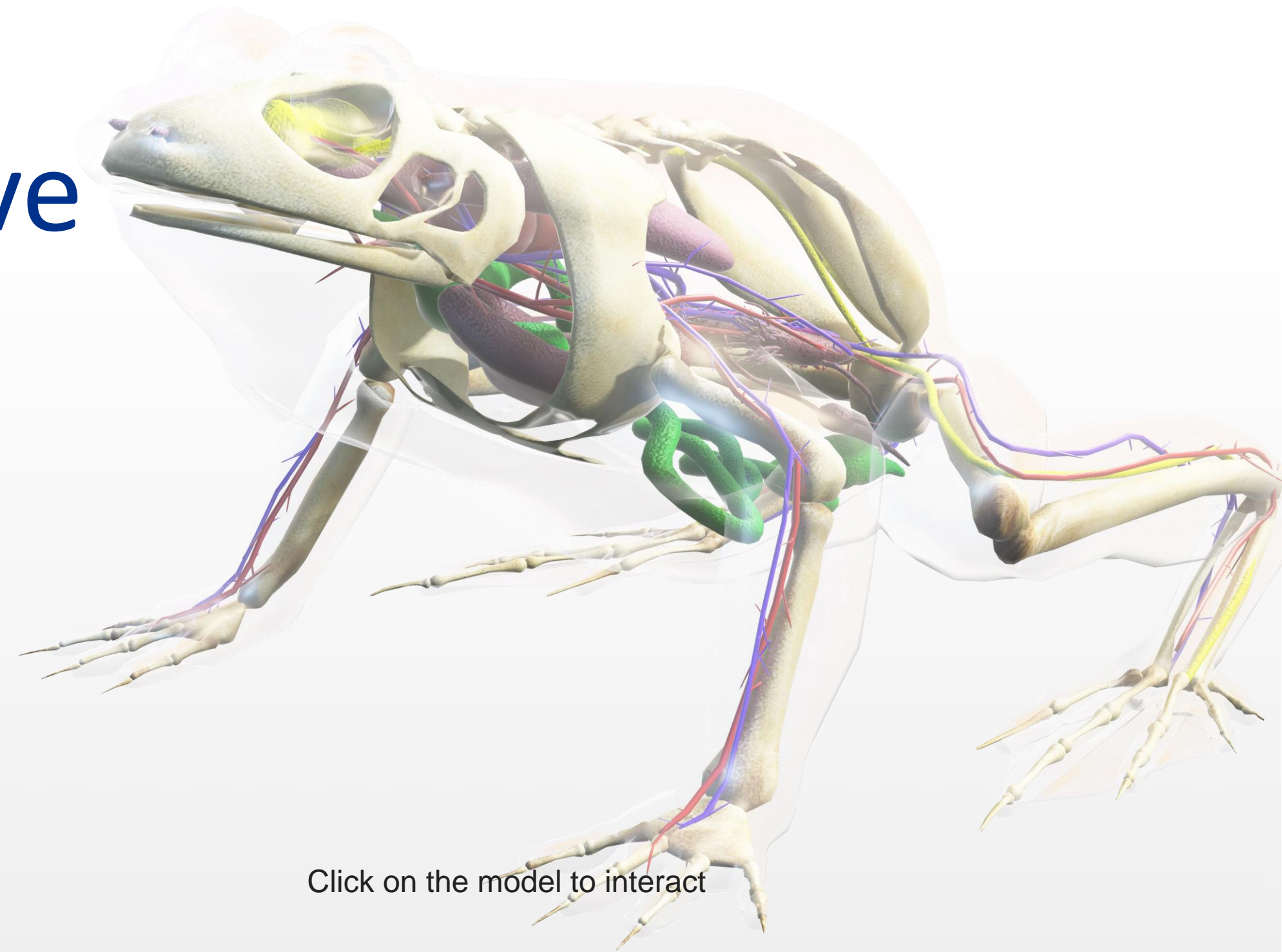
Grade: 4

CCSS, NGSS

How do animals perceive the world?

Life Science, Animal Biology

Lifelique 



Click on the model to interact

Lesson overview

The animal kingdom is very diverse. Each animal has a unique appearance, body structure, and senses, all adapted to the environment where it lives. Their environment is also reflected in the structure of their nervous systems. In this lesson, students will receive a brief overview of the nervous systems of all the types of living animals and observe them on an interactive model.

Learning objectives

- Learn about the function of the nervous system and senses.
- Compare nervous systems of various types of animals.
- Discover the interior of animal bodies thanks to 3D interactive models and a practical experiment.

Keywords

Nervous system, Senses, Animals

Standards

Common Core

CCSS ELA-Lit. RI.4.4	Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
RI.4.7	Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
SL.4.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
SL.4.3	Identify the reasons and evidence a speaker provides to support particular points

NGSS

4-LS1-2	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
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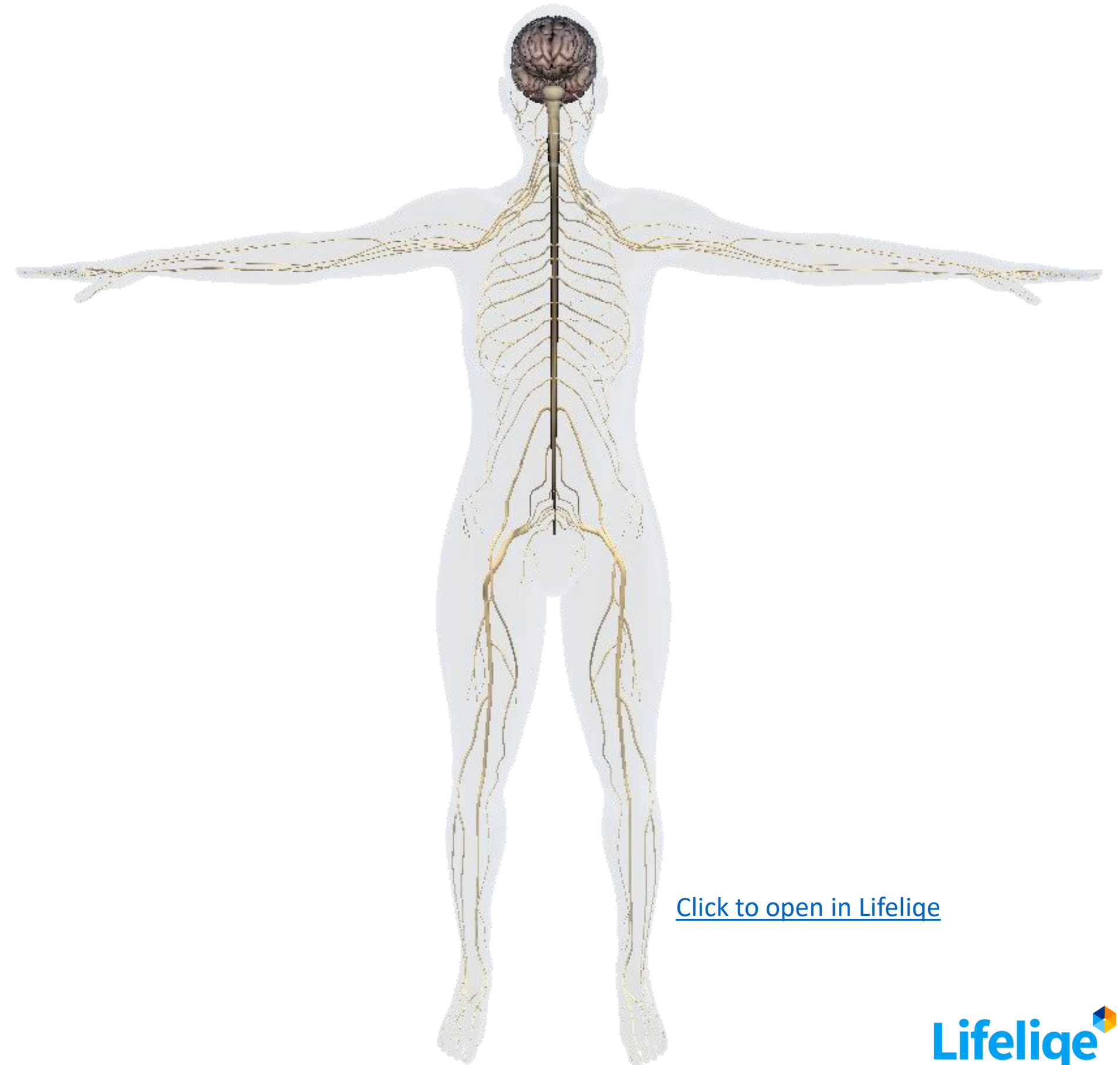
1. Introduction



This lesson will be dedicated to a description of the nervous systems and sensory organs of vertebrate animals. To begin the lesson, you can do a little brainstorming with your students to find out what knowledge they already have about the topic. Certainly they will know something about the human nervous system, which is considered to be the most complex of all known living organisms'. Ask students about its functioning; you can help them by showing Lifelike models such as **"Nervous system"** or **"Brain"** (for older students you may also use those requiring more advanced knowledge, such as **"Parts of a Nerve"**, **"Synapse (Connection)"**, **"Cranial Nerves"** and **"Spinal Nerves"**, **"Brain – Medial Section"**, **"Brain – Coronal Section"**, etc.).

Here are some basic warm-up questions:

- *Which parts of the human nervous system can you name?*
- *What do you know about the brain?*
- *Which senses do we have? Where they are located?*



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2. Animal nervous systems



Animal nervous systems are based on a similar principle to the human one, just with a great difference between human mental abilities and those of animals, and in the simpler animals also in the complexity of the nervous system. With the help of the Lifelique app and other resources, explore with your students the nervous systems of all the existing animal phyla. For each of them, you will have at your disposal models with the external and internal anatomy of at least one representative species. Invite students to observe the models carefully, looking for some additional information, if necessary, and taking notes. While observing, you can consider three basic questions about each phylum:

- **What kind of sensory input are these animals able to perceive?**

We can distinguish several types of external stimuli: light, perceived by photoreceptors or any type of light detectors (eyes, ommatidia, etc.); chemicals, as in smell, when animals are looking for food or a mate, or taste (in less complex animals these receptors are dispersed on the surface of their body); sound, dispersed by waves; and touch, felt by physical contact. Can e.g. birds/crayfish/bees see/smell/hear? Etc.

- **Where is the sensory information processed?**

Find out what the structure of the nervous system of each animal phylum is like. Do they have a central or dispersed nervous system? Name their parts.

- **How do the animals respond to stimuli?**

Which types of reactions of animals can we classify (flight, mating, fighting, etc.)?

3. Taxonomy



Basically, we can distinguish nine “traditional” taxonomic phyla:

1. **Porifera:** sponges
2. **Cnidaria:** jellyfish
3. **Platyhelminthes:** flatworms
4. **Nematoda:** roundworms
5. **Annelida:** segmented worms
6. **Arthropoda:** crustaceans, arachnids, insects
7. **Mollusca:** squids, snails, mussels
8. **Echinodermata:** starfish, sea urchins
9. **Chordata:** includes vertebrates (the majority of the phylum) but also other animals, like ascidians

In this lesson plan (with the continuation in the second part), you will try to analyze with your students the nervous system of each of these mentioned phyla, according to the main points proposed in the previous section. You can begin with the chordate, because of their familiarity and proximity to humans, about whom you summarized some basic knowledge in the introduction to this lesson.

4. Phylum: Chordata



Instructions:

While working with each of the animal phyla (or class in case of the vertebrates), first try to make a short description of each one, inviting students to participate, if possible. Then show them the model(s) which serve as representative for each phylum or class. When showing it, first ask the students to have a look at the external anatomy of the animal and, based on observation or previous knowledge, to try to respond to the questions posed at the beginning of the lesson to determine which sensory organs the animals have, where they are located on the body, and what the nervous system is like.

Put emphasis on reasoning and justifying their opinions. You can also make a list of sentence starters and other phrases which the students can use while defending their point of view (e.g., "My idea builds upon..." or "I (dis)agree, because..." or "The observation suggests that..." or "Based on...I think that....", etc.). When students have finished observing the external anatomy, switch to the model showing the internal anatomy of the same animal, focusing on the nervous system and commenting on it, also looking for some additional information.

The goal of the activity is to make an overview of the nervous systems of all the animal phyla. However, really doing a complete overview could be exhausting or overwhelming, so it's up to you which animals you consider important and will choose for the activity. According to your choice, you can intersperse the activity with some interesting videos, pictures, or articles, depending on your choice.

The Lifeliqe interactive 3D models make it possible to immerse students in the internal anatomy of animals without having to do dissections. The application offers a wide range of models of animal internal anatomy; however it's up to you if you want to make the lesson more varied by actually conducting the dissections or other related activities.

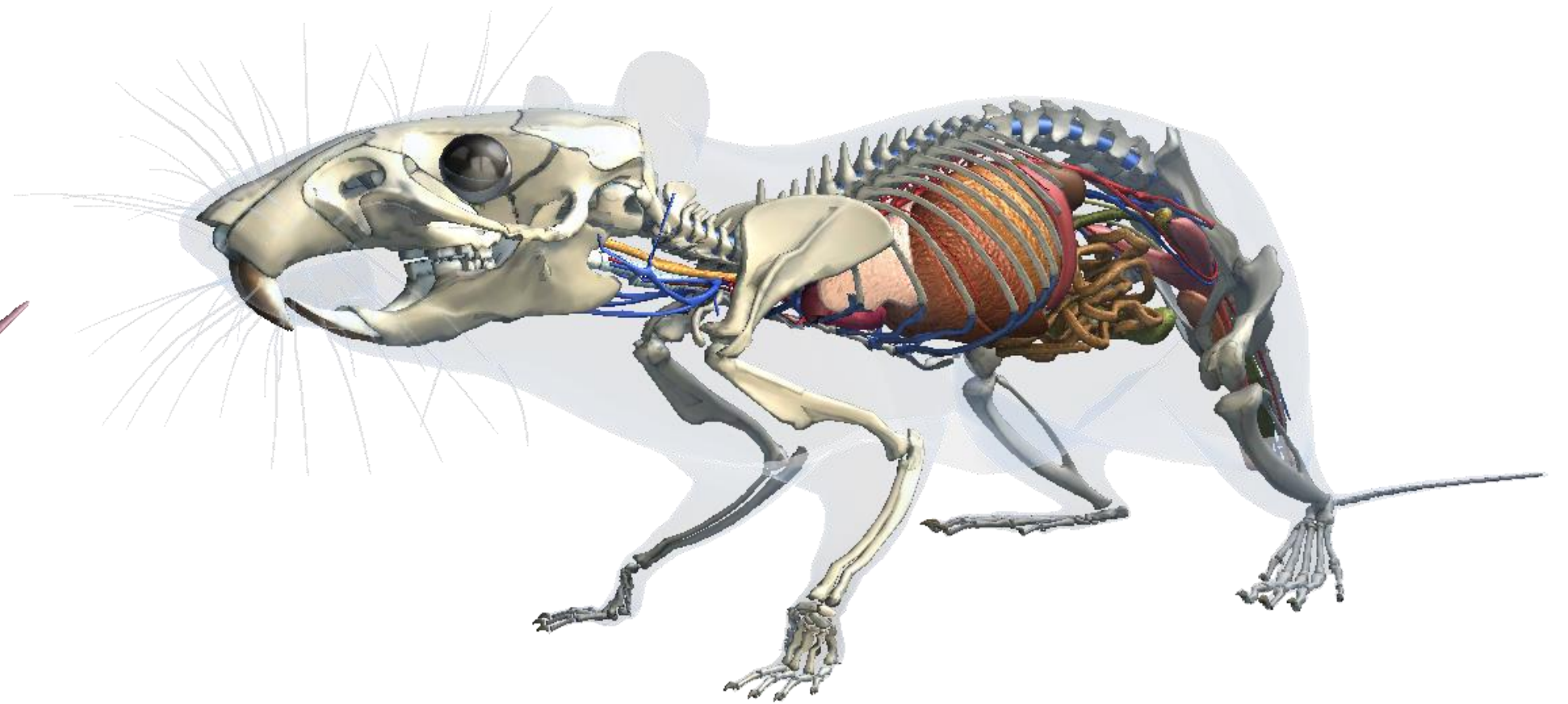
Class: **Mammalia (mammals)**

External observation: “Rat”



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Internal anatomy: “Rat – Anatomy”



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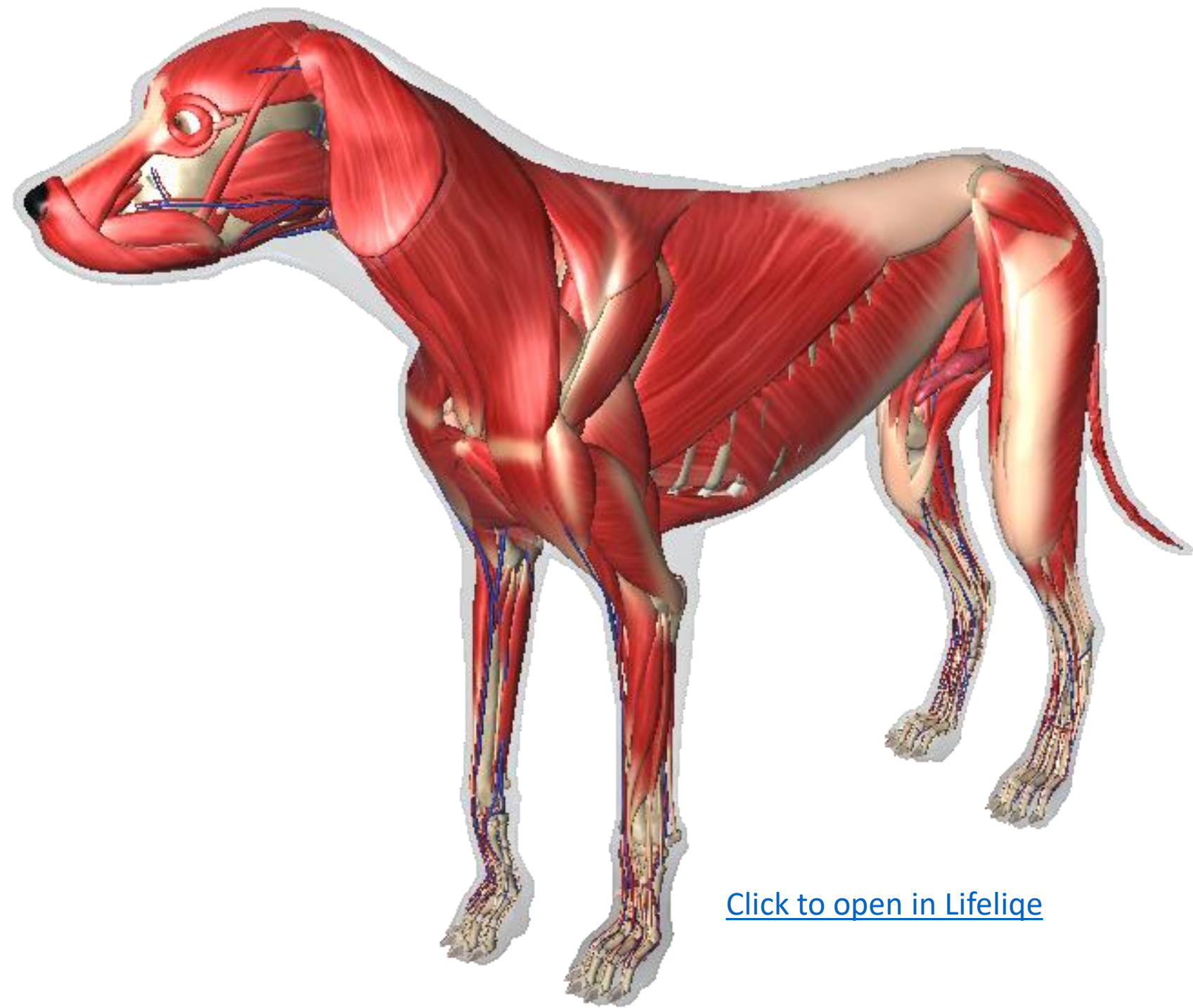
Class: **Mammalia (mammals)**

External observation: **“Dog”**



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Internal anatomy: **“Dog – Anatomy”**



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Class: **Mammalia (mammals)**

External observation: “Horse”



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Internal anatomy: “Horse – Anatomy”



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Class: **Aves (Birds)**

External observation: **“Pigeon”**



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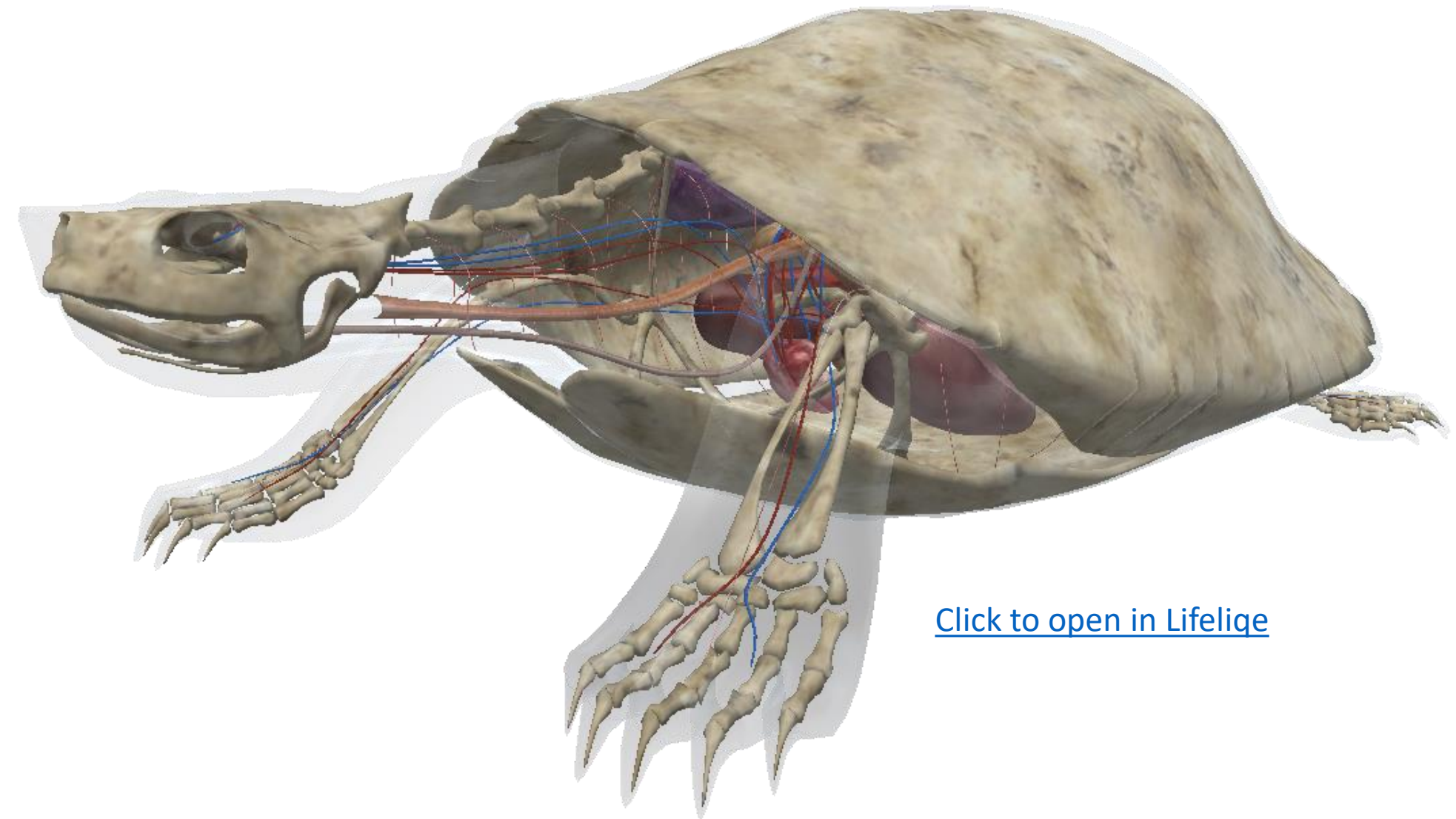
Class: **Reptilia (Reptiles)**

External observation: “**Red-Eared Slider**”



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Internal anatomy: “**Red-Eared Slider – Anatomy**”



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Class: **Reptilia (Reptiles)**

External observation: **“Cobra”**



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Internal anatomy: **“Cobra– Anatomy”**



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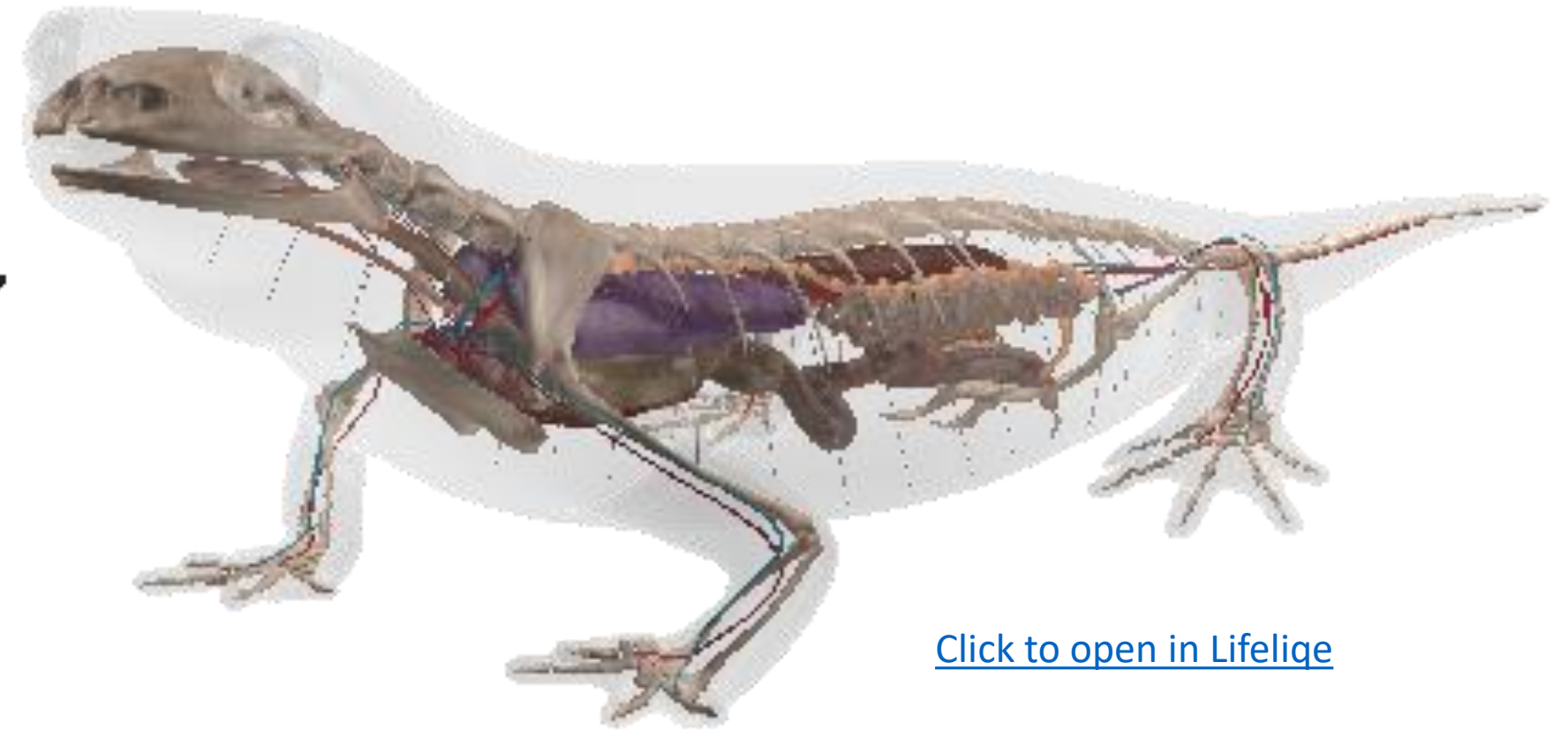
Class: : **Amphibia (amphibians)**

External observation: “Fire Salamander”



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Internal anatomy: “Fire Salamander– Anatomy”



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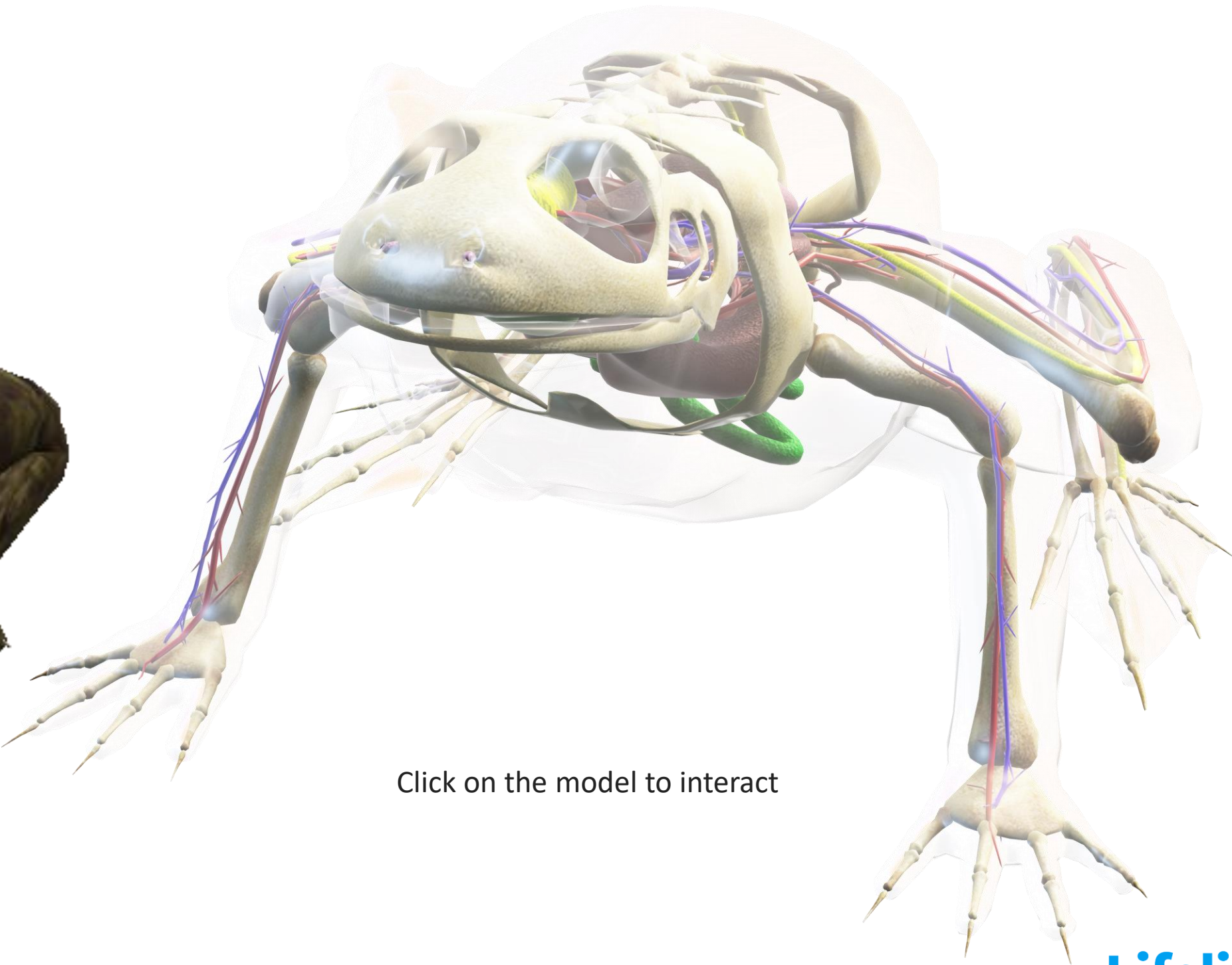
Class: : **Amphibia (amphibians)**

External observation: **“Toad”**

Internal anatomy: **“Toad– Anatomy”**



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Click on the model to interact

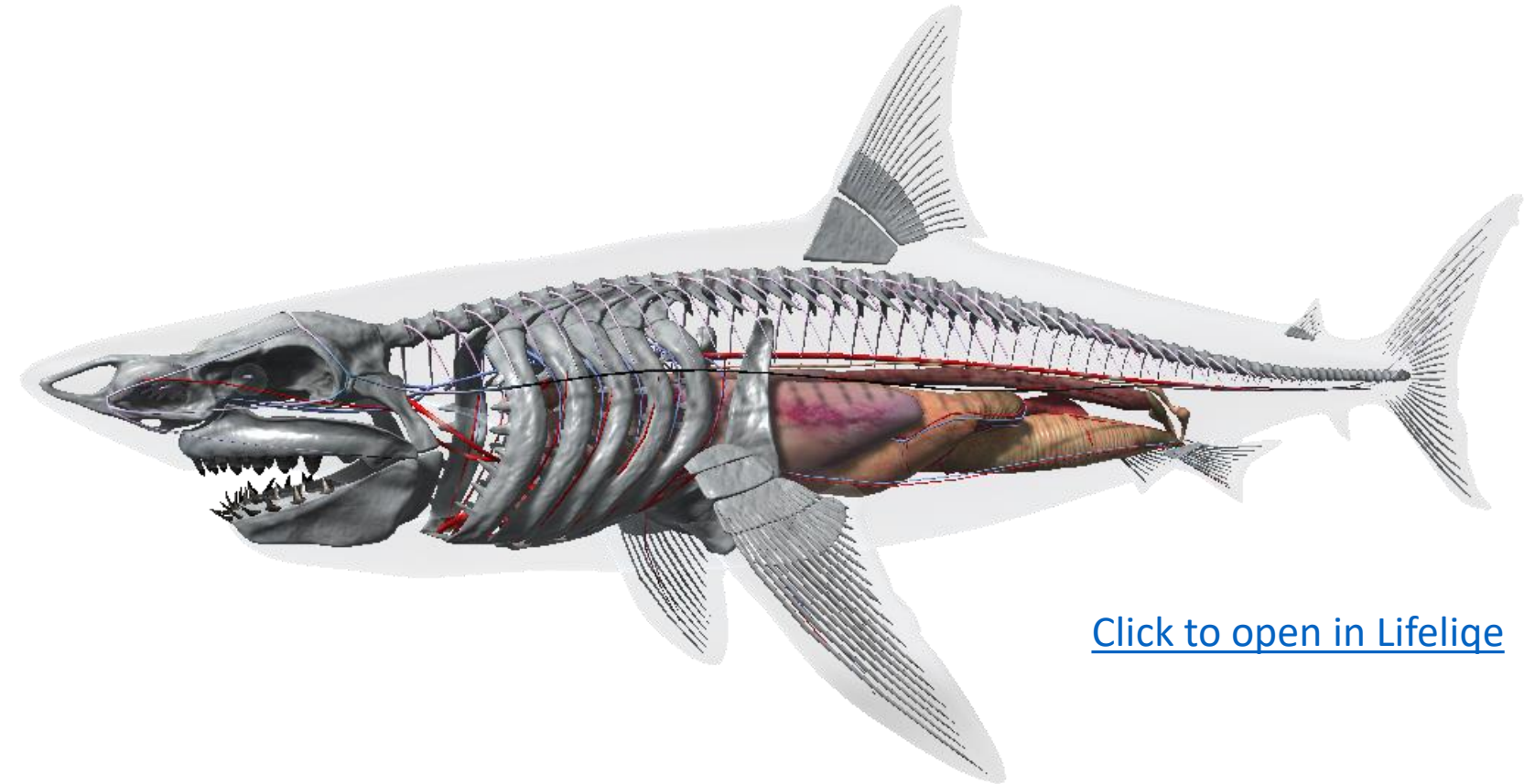
Class: : Chondrichthyes (cartilaginous fishes)

External observation: “Great White Shark”



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Internal anatomy: “Great White Shark – Anatomy”



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Class: **Agnatha (jawless fishes)**

External observation: “**Lamprey**”



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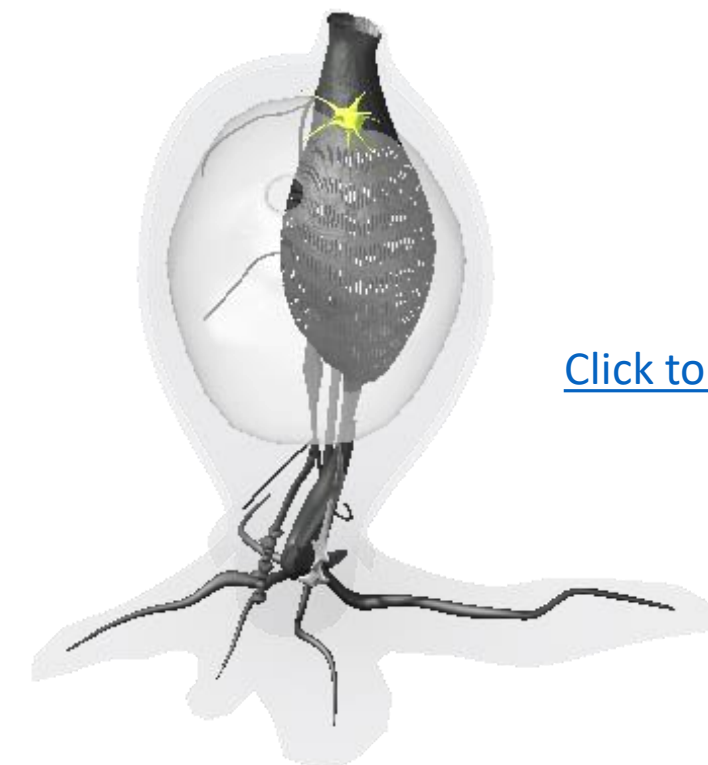
Besides the vertebrates, to the class chordate there belong also other animals, such as Ascidians. You can find the model “**Ascidacea**” in the Lifeliqe app Animal Biology library.

External observation: click on “**Epithelium and Tunic**” description item.

Internal anatomy: basic model overview



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5. Summary



In the first part of this lesson plan, students were introduced to the topic of the nervous system, and learned some basic information about the nervous systems of the phylum chordate, which is the most similar to human anatomy.

At the end of this part of the lesson, you can conduct a short summary of the results of the observations made. The second part of this lesson plan will be dedicated to the rest of the animal kingdom, generally animals with simpler bodies and so also less complex nervous systems.



Thanks for using Lifeliqe's lesson plan!

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