

The PHI BETA KAPPA Society

VISITING



SCHOLAR

PROGRAM

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**PUBLIC LECTURE
OFFERINGS**

**FIVE STEPS TO THE SEA—HOW LAND ANIMALS BECAME “SEA MONSTERS”
IN THE DINOSAUR ERA**

Sea serpents and sea dragons are iconic figures in popular culture, yet nobody has seen them dead or alive. There were animals that may be called sea dragons if you travel back to the Age of Dinosaurs, although this planet never really had a large serpent feeding in the sea for a good reason. These fossil sea dragons from the Dinosaur Era were derived from land ancestors—they were air-breathers with lungs like us, not water-breathers with gills like fish. They must have faced many physiological problems moving from land to sea. Despite of the difficulty for land animals to become marine, land vertebrates have tried to colonize the sea at least 69 times during the last 250 million years, with some great success and many failures. Land vertebrates had five hoops to go through before successfully becoming fully marine, and only a fraction of them went through all five. This lecture will introduce you to sea monsters in the fossil record and tell a story of their success and failure. The talk will touch upon the possibilities of new ocean colonizers from land evolving in the future.

**A STORY OF FISH-SHAPED REPTILES—EVOLUTION OF ICHTHYOSAURS IN
THE DINOSAUR ERA**

At the beginning of the 19th Century, scientists had yet to encounter dinosaur fossils and the word “dinosaur” did not exist. Humans first discovered fossils of sea-going reptiles from the Age of Dinosaurs before dinosaurs themselves. A large ichthyosaur collected by Mary Anning in 1809 was the first large fossil

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reptile known to science. The discovery marveled the people of the time. This creature looked like a fish for having “fins”, yet its bones had some clear characteristics of reptiles—therefore the name Ichthyosauria, meaning fish-reptiles or fish-lizards. Some later discoveries even showed that they had a tail fluke made of soft tissue to swim like a fish. Many questions were raised by the discoveries because we do not have anything like ichthyosaurs living today. Scientists are still trying to answer some of these original questions, whereas answers have been found for the rest. For example, we now know what early ichthyosaurs looked like before becoming fish-shaped, and how long it took them to become fish-shaped. This lecture will cover the exciting new findings about the group, with a glimpse of how paleontologists get their work done.

CLASSROOM DISCUSSION TOPICS



1. MASS EXTINCTIONS OF THE PAST AND FUTURE—ARE WE IN A MASS EXTINCTION?

Many of us are worried about the current climate change and inferred possibilities of a future mass extinction. Tremendous efforts are being made to understand the current environmental changes, and yet less substantial research is being conducted on the mass extinctions that occurred in the past. Yet, there is an obvious disconnect between these two fields. What do we know from each of the two and what are the keys to connecting between the two? Are we currently in a mass extinction episode? The class will be given basic knowledge and then engage in discussion step by step.

2. WHAT THE PUBLIC WANTS IN DINOSAURS AND HOW IT AFFECTS SCIENCE

Dinosaurs have fascinated humans for two centuries since the time of William Buckland, who named the first dinosaur genus in 1824. From early on, they had cultural and subcultural impacts to the society at large. It is difficult to grow up today without learning about dinosaurs anymore because they are frequently featured in various media and deeply integrated into elementary

science education. The public loves news on dinosaurs, forcing the media to seek out newsworthy research results from scientists. This demand for newsworthiness in turn may be distorting the science of dinosaurs and other fossil animals. Recent examples of what may be considered exaggerated research results from vertebrate paleontology are given. The class will discuss whether this is a problem and, if so, if there is a remedy. Can the scientific value of a study be judged democratically?

3. FOSSIL MARINE REPTILE DISCOVERIES AND ECONOMIC GROWTH—A PARALLEL BETWEEN THE 19TH CENTURY ENGLAND AND 21ST CENTURY CHINA

Street, Somerset in UK was a village of fossil marine reptiles in the first half of the 19th Century, toward the end of the Industrial Revolution. The village had a limestone quarry, which supplied building materials for industrial activities. Fossil marine reptiles were collected as byproducts because they were contained in the limestone to make concrete. These fossils in turn fueled the science of the time. In those days, scientists did not excavate fossils themselves but instead acquired them from rock mines and quarries. Fossil forgery became a common practice as the demand for these fossils increased, with the forgery techniques becoming refined through time. This resulted in the infamous scandal of Thomas Hawkins selling forged fossils to the British Museum of Natural History. Despite the advancement of technology and science, almost the same sequence of events took place earlier this century, this time in China. Why did history repeat itself despite the almost two-century worth of differences between the two examples in the levels of technology and science, as well as in geography? The class will have a glimpse of the two interesting time slices of history and then discuss the underlying factors that led to the repetition of the phenomenon two centuries later. Will it happen again, and is it the right thing to prevent it?