

FOSSILS

1. **DESCRIPTION:** Teams will demonstrate their knowledge of ancient life by completing selected tasks at a series of stations. Emphasis will be on fossil identification and ability to answer questions about classification, habitat, ecologic relationships, behaviors and the use of fossils to date and correlate rock units.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:** Each **team** may bring only one magnifying glass; one published field guide that they may tab and write in and one 3-ring binder (any size) containing information in any form from any source. The materials must be 3-hole punched and inserted into the rings (sheet protectors are allowed).
3. **THE COMPETITION:** Emphasis will be placed upon task-oriented activities. Participants will move from station to station, with the length of time at each station predetermined and announced by the event supervisor. Participants are not permitted to return to stations, but may change or add information to their original responses while at other stations. **Identification will be limited to species on the list, but other species may be used to illustrate key concepts.** The questions will be chosen from the following topics:
 - a. Conditions required for a plant or an animal to become fossilized.
 - b. Common modes of preservation: permineralization, petrification/petrifaction/silicification, mineral replacement, cast/mold, imprint, actual remains. Uncommon modes of preservation include encasement in amber/copal, mummification, freezing, **entrapment** in tar/asphalt.
 - c. Relative dating: law of superposition, original horizontality, cross cutting relationships, unconformities (buried erosion surfaces).
 - d. Absolute dating: radiometric dating, half-life, carbon dating, volcanic ash layers.
 - e. Geologic Time Scale
 - f. Index Fossils
 - g. Fossil bearing sedimentary rocks: limestone, shale, sandstone, mudstone, coquina, etc.
 - h. Modes of life: filter feeder, predator, scavenger, deposit feeder, benthic, pelagic, etc.
 - i. Environments: marine, terrestrial, fresh water, etc.
 - j. Mineral and organic components of skeletons, shells, etc: (calcite, aragonite, silica, chitin)
 - k. Taxonomic hierarchy: kingdom, phylum, class, order, family, genus, species
 - l. Adaptations and morphologic features of major fossils groups (i.e., Trilobites—compound eye on Phacops; lack of eyes on Cryptolithus; body parts—cephalon, thorax, pygidium)
 - m. Important paleontological events and discoveries and their significance e.g., Ediacaran fossils, **Lagerstätten**, Burgess Shale, Permian extinction, dinosaurs with feathers from China, Cretaceous extinction, Pleistocene Ice Age.



4. **REPRESENTATIVE STATION TASKS:** Possible questions, tasks, stations and/or examples:
 - a. Identify each fossil and record its mode of preservation.
 - b. Identify each dinosaur (model/image) by name. Record each specimen's order (Saurischia or Ornithischia) and the period(s) in which it lived (Triassic, Jurassic, or Cretaceous).
 - c. Identify each index fossil by its informal name and record the geologic period(s) during which it thrived.
 - d. Order each specimen according to age, oldest to most recent. Geologic Time Chart provided.
 - e. Based on the fossil and rock associations, determine the environment in which the organism lived.
 - f. Construct a range chart and determine the age of the fossil assemblage.
5. **SCORING:** Points will be awarded for the quality and accuracy of responses. Ties will be broken by the accuracy and/or quality of responses to several pre-identified questions.

Recommended Resources: All reference and training resources including the **Smithsonian Fossil Handbook** and the **Fossil CD** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>