



Fossil Finders

Some 30 years ago, an amateur fossil collector named Kathy Wankel made a breathtaking find while camping with her family at the Fort Peck Reservoir in Montana. On a rocky island where they were boating, she saw the corner of a bone sticking out of a bank.

A month later, she was able to chip out a set of long bones and take them to the nearby Museum of the Rockies. Experts there identified them as something very rare indeed: the first arm bones of a *Tyrannosaurus rex* that had ever been found. The discovery led to the eventual excavation of an almost complete skeleton, and Wankel's *T. rex* now resides at the Smithsonian National Museum of Natural History.

Finding a fossil in the wild—and putting your own hands on physical prehistoric remains—is a thrilling way to connect with Earth's deep past. Collecting fossils is also an absorbing, addictive activity, one that is available to almost anyone and can make you feel like a kid digging up buried treasure. Fossils are found in many parts of the U.S., including slabs and chunks of petrified wood in the West, ancient shark and megalodon teeth along the East Coast shorelines, and exquisite ammonite shells in the Great Plains and other regions.

A Lesson on Common Fossils

Ammonites. Shells of squidlike creatures that were plentiful in the Triassic, Jurassic, and Cretaceous periods can be less than an inch in size or up to nine feet wide. They swam in the oceans that once covered the Great Plains of North America, the Himalayas, and Antarctica, until they were extinguished along with the dinosaurs 66 million years ago.



Brachiopods. Commonly preserved in rocks such as limestone, sandstone, or mudstone that formed from marine sediments, these fossils look like clams, though they aren't actually closely related to modern mollusks. They were so abundant in the Paleozoic Era that they formed part of the ancient reefs.

Corals. Coral fossils are found around the world, and some specimens are more than 500 million years old. Corals are relatives of sea anemones and jellyfish that secrete calcium carbonate to form their exoskeletons. The beautiful patterns of their bodies are found in fossilized form.

Shark teeth. The teeth of the giant megalodon, a relative of the modern great white shark and the largest fish ever known, are the state fossil of North Carolina. Fossilized shark teeth—which turn black in the mineralization process—are plentiful in Virginia, North and South Carolina, and Florida. A collection of 80-million-year-old specimens was recently discovered in the remains of an Iron Age house at an archaeological site in Jerusalem, evidence of how timelessly fascinating they are to collectors.

Petrified wood. Petrified wood can be so well preserved and detailed that the bark and woody structures of the ancient tree are clearly recognizable. Sometimes, collectors don't realize that they are fossils rather than recently felled branches until they pick them up and feel their weight.

How to Hunt for Fossils

Look in the right kind of rock. Fossils are formed only when an animal or plant is rapidly submerged and preserved, which means they're mainly found in sedimentary rock, such as shale or sandstone, that has horizontal layers like pancakes. If you search in igneous or metamorphic rock, which has been subjected to extreme heat and pressure that destroys any animal or plant matter, you'll be wasting your time.

The best fossil-hunting grounds are areas where the topsoil has been cut or weathered away—like dry creek beds, rocky outcrops, sea cliffs, beaches at low tide, or riverbanks. Old quarries are a great place to look for fossils since the underlying rock has been exposed.

Train your eyes. Prepare for your search by looking at images of fossils you're likely to find in your search area on museum and university websites. Learn the telltale patterns of marine creatures and plants, since most fossils are sea creatures that lived in the ancient oceans.

Consult local experts. Ask a local museum, nature center, university geology department, or fossil club to find out about fossil-rich areas, established dig sites, and rules for hunting and collecting. Budding rockhounds can also search for fossil clubs near them on Google, check an online interactive map of national fossil clubs at myfossil.org/paleosocieties, or seek out a fossil meetup group.

Gather your tools. You can spot fossils with just your eyes and some luck, but there are some



optional items that might be helpful, starting with a hammer, such as a bricklayer's hammer, a chisel, a small shovel, and a mesh screen for rinsing loose gravel. Have newspaper or tissue on hand to wrap fragile specimens and a pencil and paper for labeling and taking notes. Hunters will typically carry these items, along with a magnifying glass, gloves, and a map of the dig site in a backpack. If you're going to be chiseling or hammering, safety glasses are recommended as well as a hard hat if any rocks overhead could be unstable. Remember to wear comfortable shoes and pack some water and snacks to keep your energy up.

Know the rules. Every state has its own laws governing fossils, permits, and collection, so be sure to do your research. Some fossil sites charge admission fees or have rules about what tools you can use or how much material you can take for yourself. On private property, you'll need to get permission from the owner before you remove or collect any fossils.

Keep in mind that taking any natural objects, including fossils, from national parks is illegal. On other federal land, such as land controlled by the Bureau of Land Management or the U.S. Forest Service, you are permitted to take small amounts of common, invertebrate fossils or petrified wood for personal use (not for sale), but you can't collect any amount of vertebrate fossils without a special permit.

Getting Started

When fossil hunting at a quarry or rocky outcrop, it's best to get really close to the rock and look carefully for spiral patterns or shell prints. A magnifying glass can be helpful. Sit or kneel down in one place at a time, and examine them for patterns or details. If you spot something that may be a fossil, take your time to determine your next move. Act slowly and deliberately to avoid damaging it.

To get at a fossil that's embedded in rock, you can chisel carefully all the way around it—always pointing the tool away from the fossil. The best way is to carve out a chunk of material, like a pillar, that contains the whole specimen. Then, strike at the base of the pillar to break it off. Another method, if you have a very fossiliferous chunk, is to tap with a hammer until the rock breaks away around the fossils, according to the Illinois State Geological Survey Prairie Research Institute.

However, if you find a high-quality fossil that you don't think you can remove without damage, consider leaving it in place and taking photos only. That way, it will be preserved and may naturally loosen from the rock over time.



TECH TOOLS FOR THE HUNT

Rockhounds can lean on a wealth of websites and apps to help them tap into the fossil community. Here are a few options.

- Digital Atlas of Ancient Life. An open-access online textbook about fossils and the history of life on Earth.
digitalatlasofancientlife.org.
- Digital Atlas of Ancient Life app. A free online field guide to fossils based on content from the website, available on Android and iOS.
- MyFossil. A social paleontology app where you can add your fossils to a collaborative database, available on Android and iOS.
- The Fossil Forum. An online community for fossil experts and enthusiasts with a Fossil ID feature that allows you to post a picture of your fossil for others to comment on.
thefossilforum.com.

Label your finds, and make a note of the exact locations they were found. This information is part of the story of the fossil. At home, you can clean your fossils with a soft brush, soap and water, or a short vinegar soak. Photographing the fossil from many angles is a good idea, as it will make it easy to share your story online or with a fossil club.



For those who want to jump headfirst into fossil hunting, consider joining a paleontology-themed field trip. For example, the Bighorn Basin Paleontological Institute offers an exciting opportunity to work alongside scientists in the fossil-rich and rugged landscapes of Southern Montana and Northern Wyoming.

Amateur fossil hunters can also get up close and personal with incredible prehistoric creatures from the comfort of their couches. The Smithsonian National Museum of History allows virtual visitors to explore either in a web browser or in virtual reality. While you're there, make sure to check out the 31,000-square-foot David H. Koch Hall of Fossils to explore ancient ecosystems and visit over 700 fossil specimens, including a Tyrannosaurus rex, Diplodocus, and woolly mammoth.

Fossil hunting is a great way to expend some pent-up wanderlust, embrace your inner scientist, and perhaps even collect some bragging rights. And why not? Budding fossil hunters of all ages and walks of life are uncovering an array of paleontological treasures each and every day.