

Today: Hunting Dinosaurs

Two methods for finding dinosaur fossils

- **Prospecting-walking around looking at the ground**
- **Quarrying- opening a big pit and breaking open rocks**

1.Both methods involve finding a place to look:

Criteria include:

- Geologic strata of the right age-- (use geologic principles like those you learned about : original horizontality, lateral continuity, superposition as well as the dating methods- radioactive decay etc.)
- Usually little ground cover (trees, plants) or some commercial enterprise has cleared area
- Nobody else has looked there!

2.Tools for finding a place to look:

Geologic Maps and Satellite images/aerial photographs

Geologic maps show mapped distribution of strata of different ages

Satellite images/Aerial photographs

- Can recognize strata by color/ spectral signature in areas that have not been mapped
- Very important in most areas dinosaur hunters want to look- which are places that are no one has looked before

3. Finding a place to look: geologic strata of the right age

- Mesozoic rocks (strata) if we are looking for non-avian dinosaurs
- Most non-avian dinosaurs are known from Cretaceous age strata so we would go there for the highest probability of finding a non-avian dinosaur
- We would go to the Triassic for the biggest challenge- most new insights into early dinosaur evolution but a lower probability of finding a dinosaur-maybe lower abundance.
- We have great Triassic in Texas.

3.5 Other factors effecting where we look for a dinosaur

- The kind of environment where the dinosaur lived and died -in a desert or tropical forest
- The environment in that region now. Climate- how fast dinosaur bones are coming to the surface (via rain or wind)
- Whether or not the area is now heavily forested - how many rocks exposed to look at
- These factors are largely unpredictable... so practically speaking they aren't considered much...

4.Other tools for finding a place to look:

- Previous papers by other geologists/ paleontologists

- Locals - reports of bones, eggs etc.
- Researching the most isolated areas to visit

5. Finding a place to look: Usually little ground cover (trees, plants)

- why dinosaur hunters usually work in deserts: can see more of the surface- where the bones are exposed by rain and wind
- for quarrying methods sometimes use explosives to blow off soil and other rock covering fossil bearing strata
- for quarrying methods also go to places commercial enterprises have opened large quarries- phosphorus, brick quarries.

6.A Dinosaur Expedition involves

- International agreements/or local U.S. permits
- Staging: trucks, supplies, team
- In the field...

7.We'll look at two examples:

•in Mongolia, prospecting

•In China, quarrying

First example: Why Mongolia?

Roy Chapman Andrews at Flaming cliffs

8.Use GPS- Global Positioning System-

- know coordinates for where you are in poorly known areas
- Take a reading on the fossil itself for very accurate location data--
- can go back to same area, where new finds may likely be made.

9.Camp life sand storms:

field expeditions are generally from 2 weeks to several months

10. Prospecting, first step in finding a dinosaur=

- Walking around (many miles) looking at the ground for spots of white, black, blue or red depending on the color of the bone.
- Sometimes this involves crawling on the ground looking for very small things like tiny mammals or avian dinosaurs.

What a fossil find would first look like....

Bones on surface are the most poorly preserved we want the ones in the rock

11.Prospecting- next step

- Minimally expose bones visible on surface using pocket knife or dental tools (or rock hammer if the dinosaur is large). Lightly brush off dirt.
- **Evaluate if specimen seems worth collecting (potentially new species or especially**

complete specimen of an already described species).

- -- that is, we look for what synapomorphies/autapomorphies can be seen.
- If we are going to collect it ... we apply glue...

12. Collecting a dinosaur fossil

- After prospecting and evaluating find (deciding to collect it), further clean off bones on surface, add more special glue
- Cleaning away some rock to see if we can see a synapomorphy identifying the fossil as an important find- maybe new species or part of a poorly known group
- Dig a moat around fossil using pickax, shovels, rock hammer, knives- sometimes a cobra hammer or rock saws
- Cover top of fossil with toilet paper such that the plaster you will use doesn't stick to the exposed bone.
- Cover in splattered plaster, plaster-soaked burlap strips and more plaster. Then let dry.
- Tunnel under block so that dino is on a pedestal of rock and capped with plaster. Pry loose.
- Flip block over and cover other side in plaster.
- Prying loose a jacket (plaster covered fossil+rock matrix)
- Trimming excess rock
-lightening the jacket so that it is easier to transport
- Transportation + Cataloging
- Preparation of fossil in lab
plaster jackets with fossil embedded in rock are carefully opened in a lab with a saw and the rock is slowly removed with dental tools and compressed air "scribes"

13. Second of the two methods for finding dinosaur fossils

**Quarrying Example: Gansu Province,
in northwest China**

14. Why Gansu? Looking for new feathered dinosaur beds

What a quarry looks like: where the first feathered non-bird dinosaur was found – Liaoning Province-- Range of animals known from the feathered dinosaur strata extends to Gansu-

15. Break open slabs that represent ancient lake deposits laid down in fine layers to find insects, plants, and maybe a dinosaur

- Quarry for fossil birds and other dinosaurs in Gansu- formerly horizontal beds are turned vertically by processes related to uplift of Himalayan+ Mountains
- **Dinosaurs are not found in isolation - are discovering the remains of whole ancient community - living near by those ancient lakes**
- We wrap the slabs in toilet paper and tape, lake sediments are hard- well cemented and smaller so plaster is usually unnecessary
- Other aspects of international science - learning about new cultures!