

Dino Dung

Get the Scoop on Dinosaur Poop!

How do palaeontologists know what dinosaurs ate? They can study their teeth, jaws and body type through the fossil remains of their bones, but there are other ways of learning the dietary habits of these ancient animals. In some cases, a fossil dinosaur contains the remains of its last meal. For example, one *Compsognathus* fossil clearly showed the remains of a lizard in its stomach. But this kind of discovery is rare – stomach contents are not often fossilized along with the animal.



Fortunately, we can learn a lot from what an animal leaves behind. Scientists often collect an animal's dung or scat, because it reveals clues to the animal's diet, digestion, range and environment. Palaeontologists are beginning to study the fossilized remains of dinosaur scat. A *coprolite* is fossilized or preserved excrement – simply put, it is fossil poop! A coprolite is a trace fossil, just like dinosaur foot prints, and until recently no one really took much of an interest in its study. Today, Dr Karen Chin is considered the leading expert on dino dung, dedicating her work and study to the subject.

Dr Chin's studies of the coprolite of plant-eating dinosaurs revealed, not surprisingly, bits of leaves, stems, seeds and pollen. Previously, scientists made educated guesses as to what plants dinosaurs ate, based on studies of the environment they inhabited. Now,

they can examine in detail the specific foods consumed to get a better understanding of dinosaur diet.

While it is often difficult to match the droppings with the dropper, a discovery made in 1995 links a relatively large find of coprolite to a well known species of meat eater. Found in southern Saskatchewan, the largest piece of poop measured 44 x 16 x 13 cm and had an estimated volume of 2.4 litres! Due to its size and its proximity to nearby animal remains, it was likely left behind by a Tyrannosaurus-rex or another large meat-eating theropod. In the coprolite mass were fragments of bone from young plant-eating dinosaurs. This find holds the record for the largest sample of coprolite from a carnivore, but it is also significant for other reasons.



Previously, with only dinosaur teeth and modern reptiles to study, scientists believed that meat-eating dinosaurs swallowed whole chunks of flesh and bone. They thought that the predator's teeth, designed for grabbing, ripping and tearing, could not grind or efficiently chew. But more recent studies of a meat

eater's jaw bones and teeth show that it could easily break bones into fragments. Scientists also assumed that large meat eaters completely digested the bones they swallowed; but the trace remains of bones found in the record-breaking piece of T-rex coprolite indicate that bones could sometimes pass right through the gut.

People have been finding dinosaur coprolite for over 150 years – the first report was made by William Buckland in 1823, before people even knew what a dinosaur was! But palaeontologists began studying it only recently. Even now, some scientists doubt that it is

actually dinosaur dung and others consider it unworthy of serious study. It is difficult to distinguish dinosaur droppings from regular stone or other fossilized remains, so Dr Chin set out to prove that she was working with real dung. First, she determined that shape and size were a clue, referring to examples from modern animal droppings. She studied the droppings of large modern animals, such as elephants and whales; but the most telling piece of information came from a tiny animal.

Dung beetles can be found all over the world today, wherever dung is found. They measure from 2 to over 50 mm long, and studies have shown just how efficient these little creatures are at consuming dung. For example, a 1.5 kg pile of elephant dung on the African savannah attracted more than 16,000 dung beetles of various shapes and sizes, which ate or buried the whole pile within two hours. In a coprolite specimen that Dr Chin studied, she found what looked to be dung-beetle burrows. An entomologist (a scientist who studies insects) confirmed that she had uncovered the earliest evidence of dung beetles, and their presence proved that Dr Chin was studying coprolite and not some other fossilized formation.

LEVEL: Grade 4

OBJECTIVE: Students will learn that there is more to poop than they think! After reading through the background material, they will answer a series of questions on coprolite, and learn about the diet and physical attributes of dinosaurs, as well as their environment and the animals they shared it with.

APPLICATIONS OF SCIENCE:

It is expected that students will:

- Draw conclusions from information.
- Communicate scientific observations.
- Construct simple definitions.

LEARNING OUTCOMES:

It is expected that students will:

- Relate the structure and behaviour of animals in their environment.
- Relate dietary habits and behaviour of an animal.
- Explain how animals interact with each other.

EXERCISE: Students should read through the background material provided and answer the following questions using complete sentences (not point form).

QUESTIONS:

- 1) What are the digestive remains of living animals called?
- 2) What can be learned from studying the dung of animals?
- 3) What is coprolite?
- 4) Where was the largest known piece of coprolite found?
- 5) What sorts of remains have been found in dinosaur coprolite? (Hint: what did the dinosaurs eat?)
- 6) Who was the first to discover and identify coprolite and in what year was the discovery made?
- 7) What made the burrows in the coprolite specimen studied by Dr Chin?
- 8) Why is the study of dinosaur coprolite so important?