Fossilized dung balls reveal secret ecology of lost world

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A new study of 30 million year old fossil 'mega-dung' from extinct giant South American mammals reveals evidence of complex ecological interactions and theft of dung-beetles' food stores by other animals.

The dung-beetle has fallen on hard times. Once worshipped by the Ancient Egyptians its status has now slipped to that of unsung and forgotten hero, the butt of scatological jokes. Yet the dung-beetle is truly heroic. It is a well known 'fact' that were it not for the dung-beetle the world would be knee-deep in animal droppings, especially those of large herbivores like cows, rhinos and elephants which, because they eat more food, produce more waste. By burying that waste dung-beetles not only remove it from the surface, they improve and fertilise the soil and reduce the number of disease-carrying flies that would otherwise infest the dung.

If the modern dung beetle deserves praise for these global sanitation efforts, then the extinct dung beetles of ancient South America deserve a medal. 30 million years ago the continent was home to what is known to palaeontologists as the South America Megafauna, including some truly giant extinct herbivores: bone covered armadillos the size of a small car, ground sloths 6 metres tall and elephant-sized hoofed-mammals unlike anything alive today. And of course, megafauna would have produced mega-dung! The beetles certainly had their work cut out for them and although the dung-beetles themselves did not fossilize, we know they were fully engaged in business because, amazingly, the results of their activities are preserved as fossil dung balls, some more than 40 million

years old, and some as large as tennis balls.

Now palaeontologists in Argentina studying these dung balls have discovered that they have even more to tell us about the ecology of this lost world of giant mammals, but at a rather different scale. In a study published in the latest issue of the journal *Palaeontology*, Graduate Student Victoria Sánchez and Dr Jorge Genise report traces made by other creatures within fossil dung balls.

"Some of these are just the results of chance interactions" explains Dr Sánchez. "Burrowing bees, for example, dug cells in the ground where the dung balls were buried, and some of these happen to have been dug into the balls. But other traces record the behaviour of animals actively stealing the food resources set aside by the dung beetles. The shapes and sizes of these fossilized burrows and borings in the dung balls indicate that other beetles, flies and earthworms were the culprits. Although none of these animals is preserved in these rocks, the fossil dung balls preserve in amazing detail a whole dung-based ecosystem going on right under the noses of the giant herbivores of 30 million years ago."

Source: Wiley (news : web)