



Roan News

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team went in with a 4x4 vehicle). A number of people and organizations were involved during the 2004 survey, which recorded 52 chicks and lasted 9 days – KPMG, Nedbank, Tok Tokkie Trails and Zebra River Lodge.

Monitoring & ringing returns

Neither of these aspects has received the attention they deserve. Of the 416 vulture chicks ringed, there have only been 27 recoveries or resightings. Of these, 6 birds died of poisoning, 3 of suspected poisoning and 11 were found dead in their nests. One bird was caught in a gin trap and released by the farmer. From a hide at a restaurant on NamibRand Nature Reserve, 5 vultures were resighted although 1 bird had lost one of its colour rings, and could thus not be positively identified. The greatest distance covered was 408km to the Keetmanshoop district and the longest time elapsed between resightings was 63 months. Monitoring at two artificial water points frequented by the vultures in the Ganab region is planned for 2005.

Acknowledgements

Chris Brown, who started us off on a long and interesting road and for his moral and financial support. Gerhard Verdoorn, who made us realise that without actively conserving, there would soon be no vultures left to ring. To former colleagues, friends, neighbours and journalists who over the years gave their time and companionship to help the vultures. Sponsors that have not been mentioned in the text: Electro Repairs, a vulture friend for many years, Nicky Signs and an avid new friend, Academia Friendly Supermarket.

References

A list of references is obtainable from the author.

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9. What are the Termite Mounds Pointing at?

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Everyone who travels through northern Namibia has seen them: termite mounds topped by gnarled fingers of dried mud pointing to the northern sky.



*Termite mound covered with plaster
or paris for research purposes
(P. Cunningham)*

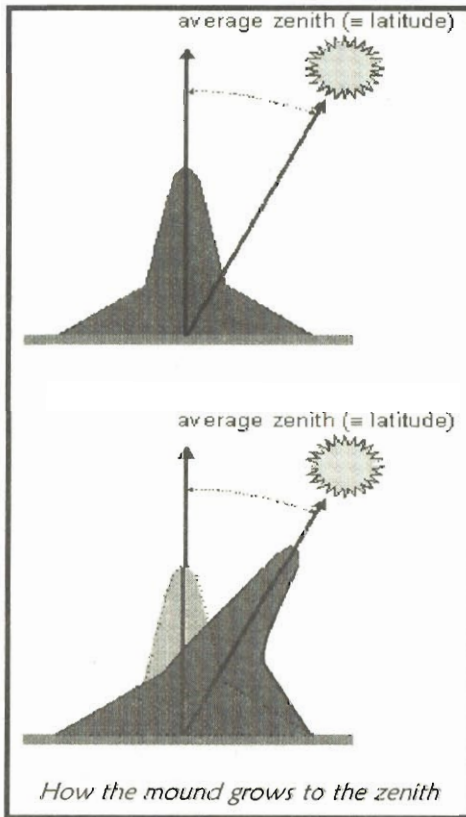
Almost everyone, it seems, also has a theory for why the mounds point north. "Prevailing winds" is a popular one. "Magnetic fields" is another. Unfortunately, that's about as far as most of these theories go, leaving it unclear just how these ideas, reasonable in themselves, could produce mounds that point so insistently to the north.

A few years ago, when I was conducting a research project near Outjo, the pointing mounds also captivated me. So I decided to devote a couple of days to the question to see if I could shed some light on it. Aided by a group of Earthwatch volunteers who were helping me at the time, and armed with some crude instruments, including a protractor built from a couple of pieces of wood slat, we set about measuring just how much, and to where, these mounds pointed.

After measuring about forty mounds, we confirmed that, indeed, they do point north (except for one young mound, that as the young are wont to do, obstinately bucked the trend, pointing south). That was no surprise, of course: anyone with eyes and a rudimentary sense of direction can see that. What was unexpected and intriguing was where in the sky the mounds were pointing. At Outjo, the mounds tilted at an angle roughly 20° off the vertical. A look at a map shows that Outjo sits

at latitude of about 20°S. Just a coincidence? Perhaps, but numerical coincidences like this one often point to an intriguing relationship. So I cooked up my own little theory.

A termite mound appears to us to be an unmovable and immutable structure. Time-lapse images of mounds over many months reveal a different picture: a churning mass of soil, although at a pace much slower than our own rapidly moving eyes and brains can apprehend. Each year, rain and wind washes roughly a cubic meter of soil off the mound, and each year, the termites in the underground nest bring a cubic meter back up.



As long as the two rates of soil movement match, each eroded grain replaced by another glued into place by a worker termite, the mound appears to be immutable. If the two rates do not match, however, mound shape can change. My little theory asserts that the mound tilt is a shape change brought on by a sun-induced imbalance of soil movement rates. Here is how I think it works. Imagine a mound that is not tilted, a vertical pillar of soil.

The mound grows by termites transporting grains of soil up into the pillar and sticking them onto the surface with salivary glue. You can often see this new building as rough patches of soil that dot the mounds: early in the morning, these patches stand out because they are still darkened by the moisture of the salivary glue. At the same time, soil is always eroding from the surface. If deposition and erosion are uniform, the mound remains a vertical pillar.

Imagine now that the mound is illuminated on one side by the sun. One side of the hypothetical vertical mound will now be warmer on one side than the other, and this imposes a bias in how avidly termites transport soil. How rapidly a termite works will depend, in part, upon its temperature. Termites adding soil to the warmer surfaces therefore transport soil at faster rates than termites adding soil to the cooler surface. The result: the mound grows with an increasing tilt until temperatures, and soil transport rates, are uniform over the surface.

This happens when the mound points to the sun's average zenith angle, which is the angle between the sun at noon and a point directly overhead. The beautiful kicker: the average zenith angle happens also to be the latitude, which explains the coincidence we observed between latitude and angle of tilt!

One of the greatest pleasures of the scientific life is to hit upon a theory like this that wraps everything up in a pretty bow. However, beauty is not truth, no matter how much we might desire it, and one of the scientist's hardest obligations is to be the Scrooge that points out all the pretty gift's flaws. So it is here: there are a lot of loose ends. For one thing, there is the matter of which side of the mound, north or south, is illuminated and warmed more by the sun? North of the Tropic of Capricorn, for example, the sun moves a few degrees into the southern sky during the summer. The north side of the mound should get more summer sun than the south side will. The summer is also the season when termites build their mounds most avidly. Wouldn't the termites then add more soil to the southern side, and grow with a tilt to the south? Direct measurements of temperature on the mound do not dispel the question. Temperatures on the north side of the mound are consistently warmer than the south side, and the difference is greatest in the summer, when the sun should warm the south side more.

One measurement that would help settle the matter is whether there is a latitudinal variation in mound tilt. If mounds are growing toward the average zenith, as my theory suggests, one should see a systematic variation of tilt with latitude. Closer to the equator, mounds should stand up straighter, whilst toward the Tropic of Capricorn, the mounds should tilt more. If the theory is incorrect, there should be no latitudinal variation of tilt. This presents an interesting opportunity for some citizen science by the readers of this magazine. These termites span a substantial range of latitude within Namibia, from about 22° at Okahandja, up to 17°-18° along the border with Angola. A mound's angle of tilt is easily measured from a photograph of the mound's west or east aspects. If enough photographs can be obtained over a wide

enough latitudinal range, any latitudinal gradient in tilt that is there will be revealed.

If you would like to help us solve this mystery, please go to the following web site for instructions on how to take your photographs, and where to send them (See contact details below).

Further readings

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