

**Drought-induced starvation of aardvarks in the Kalahari:  
an indirect effect of climate change**

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**Electronic supplementary material (S1): Surgical implants of tracking transmitters, temperature- and motion-sensitive biologgers in free-living aardvark in the Kalahari**

*Animals*

The study took place at Tswalu Kalahari Reserve in the South African Kalahari. We captured six adult aardvarks following the protocol of capture and chemical immobilization published previously [1]. All aardvarks were captured between 16 and 25 July 2012. While anaesthetized, a left lateral laparotomy incision was made on each aardvark and we inserted a temperature loggers and a tracking telemeter in their abdomen. A motion-sensitive (activity) data logger was also inserted subcutaneously in the left paralumbar fossa. The surgical procedures for the logger implants were very similar to those described previously for other African mammals [2, 3]. Aardvarks received a local anesthetic (5ml lignocaine, Bayer, South Africa) at the implantation site, a non-steroidal anti-inflammatory agent (0.5 mg.kg<sup>-1</sup> S.C. meloxicam, Metacam, Boehringer Ingelheim, Johannesburg, South Africa), and a long-acting

antibiotic (6000 iu.kg<sup>-1</sup> I.M. procaine benzylpenicillin, Duplocillin, Intervet, South Africa).

At the end of the surgical procedures, the aardvarks were also treated with an opioid analgesic (0.01 mg.kg<sup>-1</sup> I.M. buprenorphine, Temgesic, MSD, Johannesburg, South Africa; see [1] for further details).

At the time of logger implantation, physical examination of each of the aardvarks, including the presence of a large subcutaneous fat layer visualized during surgery, revealed good overall body condition with no apparent sign of starvation or ill health.

#### *Tracking radio transmitter, temperature and activity loggers*

The VHF tracking transmitters (30mm diameter × 110mm long, mass ~100g, African Wildlife Tracking, South Africa) were implanted intra-abdominally, allowing the aardvarks to be tracked in the field with a directional antenna (Sirtrack Ltd., New Zealand). Abdominal temperature was recorded at 30-min intervals using temperature-sensitive loggers (55mm×45mm×10mm, mass ~40g, DS1922L Thermochron iButtons, Dallas Semiconductor, USA; resolution 0.0625 °C) preliminarily clock-synchronized and calibrated against a high-accuracy thermometer (Quat 100, Heraeus, Germany) in an insulated water-bath to an accuracy higher than 0.1°C. The motion-sensitive biologgers, implanted subcutaneously, were tri-axial piezoelectric accelerometers (Actical, ~35mm×35mm×15mm, mass ~40g, Mini-Mitter Corporation, Bend, OR, USA), which recorded whole body movement at 5-min intervals. Data from these biologgers were normalized as a percentage of the maximum value recorded per logger [3]. Motion and temperature loggers were set to start recording on 1 August 2012. Each implanted device was coated with inert wax (Sasol, South Africa) and sterilized in formaldehyde vapour before implantation. Loggers were retrieved for only four of the six implanted aardvarks. Three of the aardvarks died during the course of the study,

more than seven months after capture. One aardvark survived the full planned year of study. Figure 1 shows the one-year of body temperature recorded in this aardvark.

## References

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2. Rey, B., Fuller, A., Hetem, R. S., Lease, H. M., Mitchell, D., & Meyer, L. C. 2016 Microchip transponder thermometry for monitoring core body temperature of antelope during capture. *J. Thermal Biol.* **55**, 47-53.
3. Hetem, R. S., De Witt, B. A., Fick, L. G., Fuller, A., Maloney, S. K., Meyer, L. C. R., Mitchell, D., & Kerley, G. I. H. 2011. Effects of desertification on the body temperature, activity and water turnover of Angora goats. *J. Arid Environ.* **75**, 20-28.