simplistic. The deep mantle is a complex place. Temperature, for example, may also play a role, because post-perovskite should only be stable above the core–mantle boundary in regions where cool subducted lithospheric slabs are sinking into the D″ layer (Fig. 1a). After pooling and absorbing heat from the core, a transformation back into a perovskite-dominant phase assemblage is expected, as previously subducted material is pushed away from the sites of active downwelling mantle flows[11]. Patterns of anisotropy in the post-perovskite should then be transferred into perovskite. Furthermore, there are departures from simple circulation patterns of deep mantle flow. For example, dense rock is thought to have accumulated in large piles beneath Africa and the central Pacific[12]. These dense piles should resist and complicate the patterns of deep mantle flow. Patterns of anisotropy produced by mantle deformation are also sensitive to the presence of other crystalline phases[13] and the unique chemistry of the piles could alter the stability of the post-perovskite[14].

Dobson *et al.*[3] use laboratory experiments with an analogue material to show that the high-pressure mineral post-perovskite can inherit texture from the lower-pressure mineral perovskite, and vice versa. If this result holds for the magnesium silicate perovskite of the deep mantle, this textural inheritance may help explain patterns of seismic anisotropy in the lowermost mantle that have long puzzled deep-Earth researchers. ❐

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References

1. Murakami, M., Hirose, K., Sata, N., Ohishi, Y. & Kawamura, K. *Science* **304,** 855–858 (2004).
2. Kendall, J.-M. & Silver, P. G. in *The Core–Mantle Boundary Region* (eds Gurnis, M. *et al.*) 97–118 (Geodynamic Series 28, American Geophysical Union, 1998).
3. Dobson, D. P. *et al. Nature Geosci.* **6,** 575–578 (2013).
4. Wysession, M. E. *et al.* in *The Core–Mantle Boundary Region* (eds Gurnis, M. *et al.*) 273–297 (Geodynamic Series 28, American Geophysical Union, 1998).
5. Tsuchiya, T., Tsuchiya, J., Umemoto, K. & Wentzcovitch, R. M. *Geophys. Res. Lett.* **31,** L14603 (2004).
6. Wookey, J., Stackhouse, S., Kendall, J.-M., Brodholt, J. & Price, G. D. *Nature* **438,** 1004–1008 (2005).
7. Oganov, A. R., Martonak, R., Laio, A., Raiteri, P. & Parrinello, M. *Nature* **438,** 1142–1144 (2005).
8. Walker, A. M., Forte, A. M., Zookey, J., Nowacki, A. & Kendall, J.-M. *Geochem. Geophys. Geosyst.* **12,** Q10006 (2011).
9. Panning, M. & Romanowicz, B. *Geophys. J. Int.* **167,** 361–379 (2006).
10. Nowacki A., Wookey J. & Kendall J.-M. *Nature* **467,** 1091–1906 (2010).
11. Hernlund, J. W., Thomas, C. & Tackley, P. J. *Nature* **434,** 882–886 (2005).
12. Garnero, E. J. & McNamara, A. K. *Science* **320,** 626–628 (2008).
13. Wenk, H.-R., Cottaar, S., Tomé, CN., McNamara, A. & Romanowicz, B. *Earth Planet. Sci. Lett.* **306,** 33–45 (2011).
14. Lay, T., Hernlund, J., Garnero, E. J. & Thorne, M. S. *Science* **314,** 1272–1276 (2006).

PALAEOCLIMATE

The mummies' tale


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The Egyptian empire coalesced some 5,000 years ago around the River Nile. The river's seasonal floods irrigated farm lands, and ensured the region's food supply. Indeed, the civilization was so dependent on the Nile's waters that periods of drastic reductions in the volume of the flood were associated with political unrest and sometimes even the ousting of the government.

The height of the Nile's floodwaters was so central that it was recorded alongside lists of kings and their achievements. However, this ancient register only spanned the first to fifth dynasties, about 5,000 to 4,400 years ago. Sparse sediment records have been used to fill in some of the gaps between modern observations and the historic account, and indicate a gradual drying of northeastern Africa through time. Christophe Lécuyer of Univesité de Lyon 1 and colleagues confirmed this aridification, but instead of relying on the sediment record, they looked to the tissues of the people who were consuming the waters of the Nile (*Earth Planet. Sci. Lett.* http://doi.org/mvj; 2013).

In the Nile region, the $\delta^{18}O$ value of river water is controlled by the source and amount of precipitation reaching the area. The isotopic signature of the water is in turn imparted to the organisms that consume it. In mammals, the signature is particularly clear in bone and tooth material, both of which are composed of phosphate minerals. Lécuyer and colleagues collected samples of tooth enamel and bone from mummies that have been recovered from Egypt, particularly from the Theban region and Lower Egypt. These mummies — currently housed in museums in France — span the Predynastic to Byzantine periods (roughly 6,000 to 1,300 years ago).

The oxygen isotope measurements confirmed that the climate became warmer and more arid through time. The observed isotope trend is consistent with either a temperature increase of 2 °C or a precipitation decrease of 140 mm per year, or some combination of warming and drying.

But the analyses of oxygen and strontium isotopes also revealed some information about the habits of the ancient Egyptians: according to the strontium isotopes, only 1 of the 48 humans studied had migrated a significant distance from the region where he was born.

Intriguing variations between the oxygen isotope signatures of mummies from the same sub-period suggest that specific dietary changes may have marked the Egyptians' transition from childhood to adulthood, or that movement within the Nile Valley might have been common.

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