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Can exotic leathers help unlock the potential of hothouse Earth?

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Our planet is buckling under a range of environmental challenges. For any food or raw material to stand a chance of a future, it needs to be part of the solution and not the problem. Leather is facing difficult questions in the face of these very real sustainability challenges. This is particularly so for the apparently less-defensible varieties, such as exotic skins. Recently, conservation scientists did a deep dive into reptile leather. Their findings are surprising. In fact, they are truly remarkable and could be game-changing.

The sustainability question

Reptiles as a source of food have nurtured the human spirit since the dawn of mankind¹, and their armour-like skin has helped clothe warriors² and forge civilisations. The act of crafting luxury

leather products and superimposing these on a rich culture of fashion now adds to this allure; a more recent if less-tangible accolade closely tied to heritage.

The most recent hallmark of reptile leather is sustainability. This is a relatively new and comparatively less well understood value-class, but it may well be the most decisive, and this is what this story is about. How well does reptile leather stack up on the planetary health scale? How “sustainable” is it? To answer this question, we must start at the beginning – about 320 million years ago when nature first began work on the design and function of this precious raw material.

The rise of reptiles

The great age of reptiles was the late Cretaceous period, about 66 million years ago. This was a time when CO₂ levels were much higher than they are now (around six times pre-industrial levels) and temperatures were much warmer (about 4°C more).

Earth’s climate was essentially a giant greenhouse. The heat was ideal for reptiles and they flourished at unprecedented levels. Massive herds of dinosaurs stretched out from the equator to the poles. To the casual observer, it must have made the Serengeti wildebeest migration seem like a couple of pigeons crossing a city sidewalk.

How does a landscape support such large herds of 50-ton beasts³, especially given that those herds bred in massive nesting ►

sites that hatched into armies of baby dinosaurs growing at rates of up to 100kg per day? The answer lies in a hothouse planet populated by cold-blooded physiologies.

Reptiles are cold-blooded and thus derive most of their energy requirements indirectly from the sun. It is cold-bloodedness that made dinosaur populations so efficient and productive. Our prehistoric greenhouse planet could hold far greater biomass simply because those animals were solar-powered rather than high-octane warm-blooded species like birds or mammals. The ability of our planet to capture and store solar energy was far greater back then than what we see today.

We still see glimpses of this extreme reptilian productivity today. The island of Aldabra in the Indian Ocean supports a population of giant tortoises⁴ that live at densities of up to 8,000 individuals per sq km; an eye-watering biomass of 350kg per hectare!

The fall

But it was not to last. The rise of warm-blooded animals began with the downfall of the dinosaurs 65 million years ago. To stay relevant in a world full of smart, energetic birds and mammals, reptiles retreated to the ecological badlands; niches where there were simply too few resources to sustain the energy-demanding physiologies of warm-blooded animals.

Here they began to evolve adaptations focused on surviving extreme conditions; places where limited or unpredictable resources effectively eliminated the warm-blooded competition. The result was a potent evolutionary cocktail of resource efficiency and resilience. These were the adaptations that ultimately allowed reptiles to compete with warm-blooded animals, and even dominate if conditions were harsh enough. This is why reptiles are the most common large animals in Australia's unforgiving outback.

A painful new beginning

Civilisation essentially began about 10,000 years ago at about the same time as the start of the Holocene epoch. This was a time characterised by an unusually stable climate; a climate that brought near-perfect goldilocks conditions to the budding agricultural settlements along the Fertile Crescent.

A predictable climate coupled with abundant resources helped catalyse the rapid advancement of agriculture. It led to the domestication of wild species and the singling out of those that best suited the brutish horsepower requirements of the day. These times of plenty defined the evolution of our livestock systems. They can be credited for our modern-day dependency on a handful of energy-extravagant species represented by billions of near-identical individuals.

But things are changing⁵. As the Holocene gives way to the Anthropocene, we see a new era of hot and unpredictable weather patterns, resource deficiencies and zoonotic diseases running rampant across vast swathes of our warm-blooded livestock systems. Could this signal the beginning of a new age of reptiles?



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A brighter future

The sustainability credentials of reptiles clearly have deep roots, but there are also cryptic hints of their potential dotted throughout human history. Captain Cook exploited the energy-efficiency and resilience of giant tortoises to sustain his months of arduous seafaring with little food or water. Indeed, the reptile design not only played an important role in the foundation of the American colonies, but it also aided their subsequent rise to global dominance through the exploitation of that fossilised dinosaur energy we talked about earlier – oil and gas.

In response to global change, scientists and farmers alike have been frantically working on solutions to our agri-food challenges, but progress has been painfully slow. Modifying existing systems has yielded little since the Green Revolution started in the 1970s. There is now an increasing realisation that only radical transformations can bring about the scale of positive changes required.

Two decades ago, farmers in Asia began looking at the potential of reptiles as a new class of agricultural livestock⁶. Driven by local tendencies for reptiles on the menu and mounting livelihood challenges, small-scale farmers spearheaded the first attempts at reptile production. Today, the industry is booming, largely thanks to an accidental and eclectic mix of sustainability wins⁷, and the technology is expanding, especially in the global South.

In an upcoming series of articles to be published in ILM, we will talk more about the successes and failures of the reptile industry and try to make sense of where the sustainability chips will ultimately fall for the leather industry. In the next issue, we look at the origins of the industry – an exploration of wild harvest systems and indigenous tribes in the jungles of Southeast Asia. |

References

1. Biton, R., Bailon, S., Birkenfeld, M., Bridault, A., Khalaily, H., Valla, F.R. and Rabinovich, R. (2021). <https://doi.org/10.1371/journal.pone.0247283>.
2. The British Museum. (n.d.). parade-armour; helmet; cuirass | British Museum. [online] Available at: https://www.britishmuseum.org/collection/object/Y_EA5473.
3. Carballido, J.L., Pol, D., Otero, A., Cerda, I.A., Salgado, L., Garrido, A.C., Ramezani, J., Cúneo, N.R. and Krause, J.M. (2017). <https://doi.org/10.1098/rspb.2017.1219>.
4. The biomass, production and carrying capacity of giant tortoises on Aldabra. (1979). *Philosophical Transactions of the Royal Society of London. B, Biological Sciences*, 286(1011), pp.163-176. <https://doi.org/10.1098/rstb.1979.0024>.
5. Wfp.org. (2024). The State of Food Security and Nutrition in the World (SOFI) Report - 2024 | World Food Programme. [online] Available at: <https://www.wfp.org/publications/state-food-security-and-nutrition-world-sofi-report>.
6. Aust, P.W., Van Tri, N., Natusch, D.J.D. and Alexander, G.J. (2016). <https://doi.org/10.1017/s003060531600034x>.
7. Natusch, D., Aust, P.W., C. Caraguel, Taggart, P.L., Ngo, V.T., Alexander, G.J., Shine, R. and Coulson, T. (2024). <https://doi.org/10.1038/s41598-024-54874-4>.



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