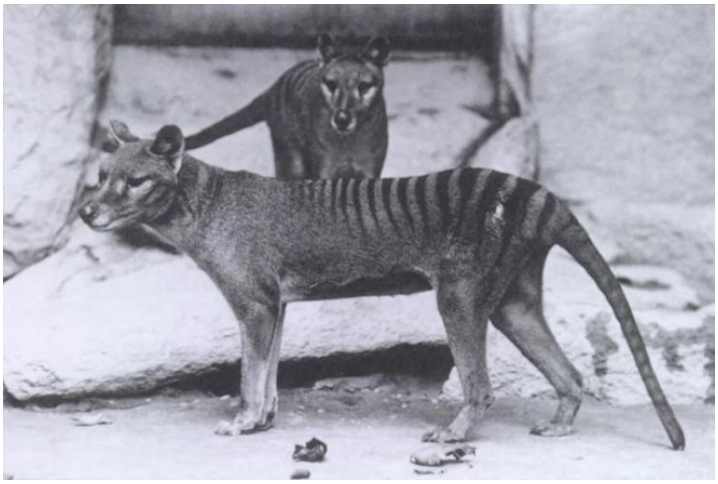
NOT A WOLF, BUT A TIGER



Evolution and extinction are inextricably linked together. An understanding of one is incomplete without a comprehension of the other, and no animal embodies these complementary concepts better than *Thylacinus cynocephalus*.

Thylacinus goes by a few different names – the marsupial wolf, the Tasmanian tiger, or, simply, the thylacine. Whatever you choose to call the species, though, this peculiar, striped marsupial is simultaneously a potent symbol of convergent evolution and the ecological destruction our own species is capable of. Thousands of years of competition with dingoes and humans contributed

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to the predator's extinction on mainland Australia, and intense hunting by Tasmanians intent on protecting their sheep – combined with supplementary pressures like habitat destruction – wiped out the last of the thylacines during the 1930's. (Some believe that a few of these marsupials might still survive, but these hopes are likely in vain.)

The thylacine has not been forgotten. The extinct carnivore is a favorite of biology teachers and science writers – Richard Dawkins has mentioned it in at least three of his books – as a simple illustration of convergent evolution. Look at the skulls of a Tasmanian wolf and the placental grey wolf and, unless you are a skilled anatomist, you will be hard-pressed to tell the difference between the two. Despite being separated by over 125 million years of evolution, a lineage of marsupial predator and a lineage of placental carnivore became adapted in a strikingly similar way. Natural selection independently pushed these animals into the same morphospace, textbooks and lectures instruct us – the thylacine is just one example of marsupials mimicking placentals.

But appearances can be deceiving. The skull of *Thylacinus* may be a remarkable marsupial facsimile of the grey wolf skull, but this does not mean that the thylacine actually behaved like its placental counterpart. In fact, many of the proposed equivalencies between marsupials and their placental proxies do not hold up very well under close scrutiny – the fossil "marsupial lion", for example, is a vastly different creature than *Panthera leo*. In the case of the thylacine, a study just published by Borja Figueirido and Christine Janis suggests that the predator probably had more in common with cats when it came to subduing prey.

Despite surviving to the early 20th century, relatively little is known about how the thylacine actually hunted. Very few people recorded any substantial observations about the predator's natural history. Nevertheless, careful study of skeletal anatomy can yield clues about adaptation – every vertebrate carries at least a partial record of its ecology and evolution in its bones. For Figuerido and Janis, the key feature for investigating the habits of the thylacine was one particular joint.

Among meat-eating mammals, different hunting styles are associated with disparate types of elbow anatomy. In pursuit predators – like wolves – flexibility is sacrificed for relatively rigid forelimbs that make the hunters more efficient runners. Among carnivores that grapple their prey to the ground, though, the elbow joint is not as restricted and has a greater range of motion. Hunting behavior is closely related to elbow flexibility, and so the scientists looked to the parts of the humerus (upper arm bone) which

articulate with the forearm to see what the thylacine's arms were capable of.

After comparing bones from 103 specimens representing 32 different species, Figuerido and Janis found that the thylacine had an elbow that was more cat-like than wolf-like. The marsupial's elbow had the flexibility of a predator that stalked prey before quickly bringing it down. "[T]he thylacine was more of an ambush predator than the living grey wolf," the scientists concluded, "which is often considered as its ecological counterpart." The thylacine probably did not hunt exactly as other ambushers do, though. Cats have specialized, retractable claws adapted to grappling prey whereas the thylacine did not. Even so, the new analysis suggests that thylacines were more likely to sneak up on prey animals and dispatch them quickly than to run them down over long distances.

Constraint may have been more important in the thylacine's elbow arrangement than adaptation to a particular hunting style, though. Marsupials differ from placental mammals in that the young are born during a much earlier stage of development and must crawl inside their mother's pouch. Because of this, the limbs of marsupials develop early – this is a response to the evolutionary pressure of having to navigate through the dense forest of hair as newborns. In turn, marsupial limbs have been limited in terms of the shapes they have been able to take since the early, arduous journey is an unavoidable fact of life. Perhaps, had this constraint been removed, a pursuit predator that could truly be called a marsupial wolf might have evolved. The requirement for strong, flexible arms early in life may have prevented this, and therefore made the thylacine an ambush predator due to quirks of development and evolutionary history.

(Scientists had hypothesized that marsupial skulls might also be constrained in shape for similar reasons – the early ossification of the skull to allow them to suckle – but a study published last year showed that marsupials had skull shapes just as disparate as their placental counterparts.)

The idea that the thylacine was an ambush predator should spur us to reconsider the reasons for the predator's disappearance. On mainland Australia, at least, competition with dingoes has been assumed to have played a critical part

in the endemic predator's extinction, but the thylacine likely had a very different method of hunting. The marsupials did not fall to a superior placental predator that was doing the same thing, only better, as a common conceit might lead us to believe. Then again, dingoes and thylacines may have been hunting the same prey, and dingoes no doubt would have taken up large swaths of territory. Dingoes cannot be exonerated from a potential role in the extinction of *Thylacinus*, but how they may have contributed is unclear.

Much like the ultimate demise of the dodo, the extinction of the thylacine is a frustrating mystery. Our species witnessed the predator's disappearance – there is even video footage of some of the last thylacines – yet these animals slipped into oblivion before we realized what we were losing. As we learn more about them, they become stranger still, and their loss feels all the more tragic.

Top Image: A pair of thylacines photographed at the Smithsonian's National Zoo circa 1906. Image from Wikipedia.

References:

Figueirido, B., and Janis, C. (2011). The Predatory behavior of the Thylacine: Tasmanian tiger or marsupial wolf? *Biology Letters* : 10.1098/rsbl.2011.0364

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