Study shows exception to rule of lifespan for fliers, burrowers and tree dwellers

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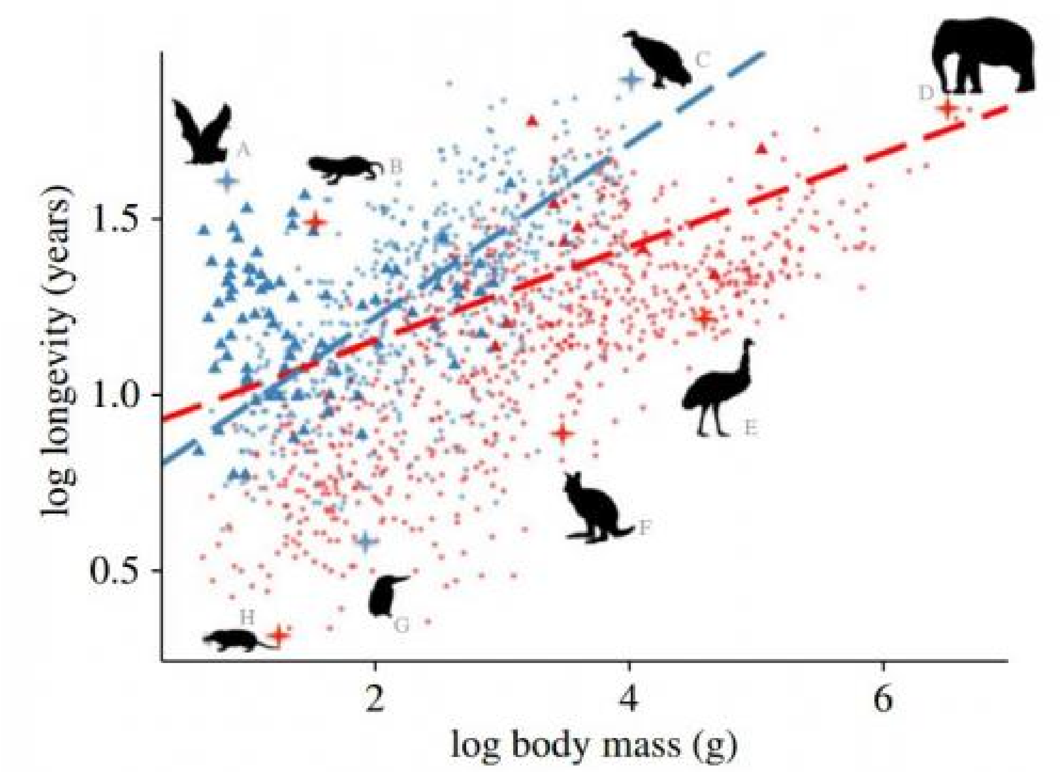

Relationships between body mass and maximum lifespan in birds and mammals. Silhouettes highlight a selection of species with much longer or shorter lifespans than expected given their body size. Credit: *Proceedings of the Royal Society B*, doi: 10.1098/rspb.2014.0298

(Phys.org) —A team of researchers working at Trinity College in Dublin, Ireland has found that there are some notable exceptions to the rule that bigger animals live longer than smaller animals. In their paper published in *Proceedings of the Royal Society B: Biological Sciences*, the team describes how they combed through extensive amounts of data to compare life-spans of different creatures and in so doing discovered that some natural abilities allow for living longer, despite size.

Biological scientists have known for years that larger animals tend to live longer than smaller animals. This is because nature allows for more years for growing, and because larger animals can better withstand times without food or water, and because they become more difficult to bring down by predators as they grow larger. In this new effort, the team in Ireland has found that there are some glaring exceptions to this rule—animals that can fly or that live in trees or in burrows live longer than other animals of the same approximate size without such benefits.

On the surface, it seems pretty clear why. A bird that can fly can more easily get away from a predator—the same would seem to be true, though to a lesser extent, for animals that live in holes too small for predators to enter, or for animals that live trees—only predators that can climb can reach them, but that takes time, giving prey ample opportunity to jump to another tree.

While some in the field have undoubtedly suspected there were exceptions to the biological size rule, until now, no one has done the work to actually prove it. The team in Ireland did so by making use of the massive amounts of data in the AnAge database. It allowed for extracting information on a wide array of animals including size, lifespan and abilities, such as running fast or flying, and comparing them. This allowed for noting trends, one of which stood out above all others. Animals that can fly have a tremendous advantage over those of the same size that don't. That advantage translates to living more years—birds for example, live up to four times as long as other mammals of the same size that cannot fly.

The researchers note that their results suggest that scientists who study longevity in humans, particularly those attempting to prolong it, consider the implications of inherent abilities in animals, rather than just enhancements to existing chemistry.

More information: Ecology and mode-of-life explain lifespan variation in birds and mammals, *Proceedings of the Royal Society B*, DOI: 10.1098/rspb.2014.0298

Abstract
Maximum lifespan in birds and mammals varies strongly with body mass such that large species tend to live longer than smaller species. However, many species live far longer than expected given their body mass. This may reflect interspecific variation in extrinsic mortality, as life-history theory predicts investment in long-term survival is under positive selection when extrinsic mortality is reduced. Here, we investigate how multiple ecological and mode-of-life traits that should reduce extrinsic mortality (including volancy (flight capability), activity period, foraging environment and fossoriality), simultaneously influence lifespan across endotherms. Using novel phylogenetic comparative analyses and to our knowledge, the most species analysed to date (n = 1368), we show that, over and above the effect of body mass, the most important factor enabling longer lifespan is the ability to fly. Within volant species, lifespan depended upon when (day, night, dusk or dawn), but not where (in the air, in trees or on the ground), species are active. However, the opposite was true for non-volant species, where lifespan correlated positively with both arboreality and fossoriality. Our results highlight that when studying the molecular basis behind cellular processes such as those underlying lifespan, it is important to consider the ecological selection pressures that shaped them over evolutionary time.