Researchers find animals with bigger brains less prone to extinction

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(Phys.org) -- Biological scientist Eric Abelson of Stanford University has been studying the link between survivability of a species over time and brain size relative to body mass, and has found that as a general rule, it appears that small mammals that have relatively large brains tend to be more likely to survive over long periods of time than those with smaller brains. He has presented his findings to a recent meeting of conservation scientists. Meanwhile, in an unrelated study, Joshua J. Amiel, Reid Tingley and Richard Shine of the University of Sydney, have found that amphibians, birds and reptiles with larger brains relative to body size released into a new environment tend to fare better than do those with smaller brains. They have had their paper on the topic published in the journal *PLoS One*.

Both studies are part of the overall body of research initiatives looking into the factors that contribute to the success of a species or conversely, which lead to their ultimate demise. Such studies help scientists better understand which species are most at risk in the modern era as more and more animals lose their natural habitat to human encroachment. Information gleaned from such research may help conservationists better determine where resources are best allocated.

It would seem likely that the smartest species of animals would be the most likely to survive when the environment changes, and Abelson's research has borne that out, but only in some circumstances. He looked at two groups of mammals, a small subset of mammals that lived from 40 million years ago on up to the present, and another small subset of

those from the so-called modern age. Half of the first group eventually went extinct. In comparing brain to body size of all of those studied, he found that small mammals with relatively large brains were more likely to have survived from "palaeo" times up till now and those of the modern age were less likely to appear on the endangered list; but only if they were relatively small animals overall, i.e. less than 10 kg. For larger mammals it didn't appear that larger brain sizes relative to their bodies helped them survive, likely due to other factors such as longer gestation periods, fewer offspring, and the need for more food.

In the second study, the research team looked at a host of different reptiles, birds and amphibians that have been relocated over the years to save them from certain death as their natural environment changed. They found that those with large brain to body ratios sizes tended to be more likely to survive in their new homes.

Such research is likely to become even more important in the years ahead as global warming causes unpredictable changes to environments all over the planet. More information about how animals respond should help conservation scientists figure out which of them at risk might best be helped.

More information: Amiel JJ, Tingley R, Shine R (2011) Smart Moves: Effects of Relative Brain Size on Establishment Success of Invasive Amphibians and Reptiles. *PLoS ONE* 6(4): e18277. doi:10.1371/journal.pone.0018277

Abstract
Brain size relative to body size varies considerably among animals, but the ecological consequences of that variation remain poorly understood. Plausibly, larger brains confer increased behavioural flexibility, and an ability to respond to novel challenges. In keeping with that hypothesis, successful invasive species of birds and mammals that flourish after

translocation to a new area tend to have larger brains than do unsuccessful invaders. We found the same pattern in ectothermic terrestrial vertebrates. Brain size relative to body size was larger in species of amphibians and reptiles reported to be successful invaders, compared to species that failed to thrive after translocation to new sites. This pattern was found in six of seven global biogeographic realms; the exception (where relatively larger brains did not facilitate invasion success) was Australasia. Establishment success was also higher in amphibian and reptile families with larger relative brain sizes. Future work could usefully explore whether invasion success is differentially associated with enlargement of specific parts of the brain (as predicted by the functional role of the forebrain in promoting behavioural flexibility), or with a general size increase (suggesting that invasion success is facilitated by enhanced perceptual and motor skills, as well as cognitive ability).

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