Cool species can take the heat

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(PhysOrg.com) -- Two scientists from Simon Fraser University and one from Deakin University (DU) in Australia have made a discovery that is overturning conventional wisdom about how land and marine animals react to heat.

SFU biologists Nick Dulvy and Jennifer Sunday, and DU environmental scientist Amanda Bates have discovered that all land-dwelling animals cope with extreme heat similarly, regardless of how far they live from the equator.

The puzzling finding contradicts popular belief that animals living in cooler climates, such as British Columbian frogs, are less heat tolerant than their relatives in the tropics.

The scientists have published a paper on their findings, Global analysis of thermal tolerance and latitude in ectotherms, in the latest online issue of the Proceedings of the Royal Society of London, series B.

The scientific trio compared the heat tolerance of more than 300 species of lizards, frogs, insects, spiders, bivalves, crustaceans and fish worldwide from the Antarctic to Alaska. The study is the most comprehensive analysis of the geographical distribution of life forms' thermal limits ever compiled.

"We are surprised that cold-blooded animals living at the highest latitudes have the same heat tolerance as those living in the tropics," says Sunday, a biology doctoral student and the study's lead author.

The team stumbled upon its discoveries, not by working with the animals themselves, but by gathering up previously published studies. "All the information was out there in libraries, we just needed to mine out the data to make this discovery," says Bates.

"The consistency in heat tolerance from the tropics to the poles across so many animal groups suggests a common mechanism is at play," says Dulvy, associate professor of biology.

The scientists believe there are two possible explanations for their findings. "Either heat tolerance is a historical legacy and there is little cost to retaining this trait," says Sunday. "Or animals face equally high temperatures on the hottest day of the year, from Costa Rica to British Columbia."

Dulvy stresses, "We need to understand which one of these mechanisms is controlling species' distributions to better predict their response to global climate warming."

Sunday's findings in another study drive home the importance of getting an accurate handle on how all life forms respond to global warming. In a paper that she recently presented at a marine conservation meeting, Sunday concludes B.C. sea urchins appear to be evolving their way out of problems associated with oceans' rising acidic levels. Global warming is believed to be causing the increase.

Provided by Simon Fraser University