Dear Professor Hoppeler,

Please consider our manuscript titled “Diving in hot water: a meta-analytic assessment of how diving ectotherms will fare in a warmer world” for publication in *JEB*’s special issue *Predicting the future: species survival in a changing world.*

Diving ectotherms (e.g. turtles, crocodiles, sea snakes, iguanas, newts) are crucial to the functioning of aquatic ecosystems and represent a taxonomically diverse group. However, climate warming may be particularly threatening to this group because dive durations typically decrease as water temperatures rise. Yet, we lack an understanding of whether this trend is apparent in all diving ectotherms and how this group will fare under climate warming.

To remedy this, we conducted a systematic review and meta-analysis of both laboratory and field-based studies examining the effect of water temperature increases on dive durations in ectothermic vertebrates. We also examined the influence of potential moderating factors, including the magnitude of temperature increases, animal respiration mode and animal body mass. As expected, we found that dive durations are extremely temperature-sensitive, both in laboratory-based studies and under natural field conditions. On average, dive durations decreased by 11% with every 1°C increase in water temperature and larger increases in temperature exerted stronger effects on dive durations. Bimodal breathers (i.e. ectotherms which supplement pulmonary respiration with aquatic respiration) were just as vulnerable to the effects of warming on dive durations as aerial breathers. Body mass had a weak protective effect, with larger divers being slightly more buffered to the effect of warming on dive durations compared to smaller divers.

Average water temperatures in marine and freshwater habitats are projected to increase between 1.5 – 4°C in the next century, and marine heatwaves are already increasing in intensity, duration and frequency. Our data suggest that this magnitude of warming could translate to substantial cuts in dive durations, by approximately 16 – 44%. Climate warming may therefore reduce time for obligate underwater activities (e.g. predator avoidance, foraging, social interactions) and diving ectotherms may be forced to spend more time at the water’s surface where predation risk is greatest. We believe our manuscript is a great fit for the special issue because we highlight a previously overlooked threat to diving ectotherms, and we showcase how meta-analytics can be applied to assess the vulnerability of species to a changing world.

Sincerely,

Essie Rodgers