50 Years Ago

The heavy nuclear explosion on October 30, 1961, at 8.33.33 G.M.T. at a distance of 1,160 km. in Novaya Zemlya (presumably at tropospheric heights) was recorded at Sodankylä by means of a seismograph, a microbarograph, a magnetograph, and a vertical incidence ionosonde. The deflection of the microbarograph took place at 9.42 G.M.T. with an amplitude of about ± 1 mb … On October 31, the microbarograph again showed two very distinct and strong deflexions, namely, at 18.32 and 21.38 G.M.T. These deflexions are interpreted as being caused by round-the-world waves due to the same nuclear explosion, one being propagated in the backward, the other in the forward, direction. The mean velocity deduced from these round-the-world waves is 311 m./sec … The waves are supposed to have been guided in the spherical shell between the ground and the stratopause.
From *Nature* 23 December 1961

100 Years Ago

The Rubber-Planter's Notebook. By Frank Braham — This book is what it purports to be, a handy book of reference on Para rubber planting, with hints on the maintenance of health in the tropics and other general information of utility to the rubber planter … The author's section on general information will be found specially useful … for the young planter going out to the East for the first time; but for the older resident in the tropics "drink as little as possible—fluids inflate the bowel" is dangerous advice … If blackwater fever is encountered death in such cases may be the result … In these essential rules also mention of the all-important hot bath and change at sundown would have added to their completeness.
From *Nature* 21 December 1911

less well-known caecilians[1]. Frogs are far more widely distributed than the other groups.

Hof *et al.* used a complex, wide range of modelling approaches in their study. Briefly, they used data on the distributions of 5,527 amphibian species in bioclimatic models to predict the global distribution of the species on a latitude–longtitude grid consisting of cells 2° × 2° in size. This analysis took into consideration a broad range of future climate scenarios proposed by the fourth Intergovernmental Panel on Climate Change. To forecast the spread of chytridiomycosis, they used a previously published model[11] that predicted the distribution of the causative fungus *B. dendrobatidis*. Their data on land use and land-use changes came from the Millennium Ecosystem Assessment, a report on the current state and the future of Earth's ecosystems.

According to Hof *et al.*[5], the outlook for amphibians is not good. For frogs — the most diverse group — the areas most affected by climate change coincide with regions of greatest species richness. The authors' models indicate that, in some of the regions with the greatest diversity of frogs, more than half of the species will probably be negatively affected by climate change by 2080. Strong climate-change impacts are also likely for some salamanders, particularly tropical faunas.

The models also suggest that land-use changes, especially in tropical regions, are likely to have strong negative effects on amphibians in some of the areas that have high levels of amphibian diversity. Finally, they predict that the distribution of *B. dendrobatidis*, and thus possibly of chytridiomycosis, will be focused in temperate and mountainous areas. This is better news for frogs, which reach their peak diversity in the lowland tropics, but may be bad news for salamanders, whose centre of diversity is in northern temperate regions.

Possibly the worst news is that, on the whole, the areas most affected by each category of threat do not coincide geographically: less than half of the grid cells in the 25% of land most threatened by any one factor are also in the 25% most threatened by any other factor. Because the threats are spread out, more than half of the total geographic distribution of each major amphibian taxon is in areas that Hof *et al.* predict will be highly affected by at least one of the three threat factors by 2080. The picture becomes worse when only the most diverse faunas are considered — roughly two-thirds of the areas that have the highest diversities of frogs and salamanders are likely to be highly threatened in some way.

The effects of major changes in land use will probably be as strong as, or even stronger than, Hof and colleagues assume, because the complex life histories of amphibians may render them particularly vulnerable to the disruptive effects of habitat modification[12]. But in other respects, the exceedingly gloomy picture presented by the authors might turn out to be too pessimistic. For example, the exact effects of climate change and chytridiomycosis on amphibians are not known, and so their overall impact may be less than is predicted[5]. The somewhat coarse grid used in Hof and colleagues' bioclimatic modelling might also obscure small-scale variations that could allow species to avoid the negative effects of climate change by shifting their habitat ranges relatively short distances, or simply by changing how they use their existing ranges (for example, by choosing less exposed retreat sites)[5,7]. Moreover, the authors' analysis equates the presence of *B. dendrobatidis* to negative conservation effects of chytridiomycosis, but the impact of the disease varies strongly among regional faunas, ranging from disastrous population collapses in some areas to little or no effect in others[9,13].

On the other hand, some of Hof and coworkers' results may be overly optimistic. For example, they did not model possible non-additive impacts of threats, such as the strong possibility that the threat of epidemic outbreaks of chytridiomycosis may worsen with changing climate[7,10], or that habitat modification may restrict amphibians' ability to resist climate change by altering their habitat preferences[5,7]. Nevertheless, their work is a valuable step towards a true understanding of overall threat levels to an iconic group of animals. It is also a sobering reminder of how much critical information is needed before we can truly understand the extent of anthropogenic threats to global biodiversity, or be fully prepared to rationally manage them. ■

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