Ken, what is a street-term to use for the "microdinosaurs" that survived the 65 myp meteor (to a grasshopper, a chicken or tinamou sure looks like Tyranosaurus rex), stock from which we get what we call "birds" today? I abruptly realize that I have no vision of what the bird people think of as the bird life forms (whatever those are) that made it through the nuclear winter - I suppose that they were tinamou and pheasant/quail type things, as well as small carnivores hammering/scavenging the insects and small mammals that could survive on seeds, rotting stuff, detritus and eating each other. IF there is a paper somewhere that waxes eloquent on these terrestrial animals during and very immediately after the nuclear winter, I sure would love that reference. Thanks. Dan Janzen and Winnie Hallwachs

Hi Daniel,

I always figured there probably were just a handful of bird clades that survived the end-Cretaceous. Something tinamou-like as founder of the paleognath clade, a primitive duck, perhaps a something quail-like (or a megapode whose buried eggs hatched months later into precocious chicks that didn't need parents to raise them), and perhaps a few shore-birds to give rise to "higher bird" clades.

However, there now seems to be increasing evidence that there might have been 20 (or more) bird clades that survived. There was a paper a few years back that would probably interest you. It was by Sylvia Hope on neornithine bird fossils of the Cretaceous. I'll try to see if I can find a reference to it. And just last year there was a penguin fossil found in the Paleocene which has convinced some workers that even penguins existed in the Upper Cretaceous. I guess it would not be surprising that penguins survived the extinction, being aquatic and the southern hemisphere was less devastated than the north. I can also imagine burrowing-type owls surviving as well.

As for mammals, reptiles, and amphibians, small burrowers were best adapted, and especially if they were hibernating or estivating underground at the time. Even though frogs seem rather unlikely to survive, the ones that were in suspended animation (buried
in the ground) were actually very-well protected and probably had plenty of insects to eat once they did emerge. Insectivores probably did much better in general than carnivores (except for reptiles, like crocs and snakes, which can go long periods without eating). Hibernating mammals could have also slept through the worse of it without eating. Anyway, I'll try to find a reference for that paper by Sylvia Hope (who I believe works at the California Academy of Sciences).

----Ken

P.S. I didn't find the Sylvia Hope reference, but did find a paper of which she was a co-author, and I think it's probably just the kind of paper you are looking for (here's the reference and abstract):

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"Survival in the first hours of the Cenozoic"
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ABSTRACT: For several hours following the Chicxulub impact, the entire Earth was bathed with intense infrared radiation from ballistically reentering ejecta. The global heat pulse would have killed unsheltered organisms directly and ignited fires at places where adequate fuel was available. Sheltering underground, within natural cavities, or in water would have been a necessary but not always sufficient condition for survival. Survival through sheltering from an initial thermal pulse is not adequately considered in literature about Cretaceous- Tertiary nonmarine extinctions. We compare predicted intense, short-term, thermal effects with what is known about the fossil record of nonmarine vertebrates and suggest that paleontological evidence of survival is compatible with theoretical results from bolide physics.