

Why more eggs can mean fewer descendants

If you have ever taken an interest in the contents of a bird's nest, you might have paused to wonder why different species populate their nests with varying numbers of eggs. Ducks commonly lay up to 10 eggs in a clutch, whereas many seabirds lay a single egg. Much of the difference in this example can be explained by development mode. Ducks, having precocial young that feed themselves upon hatching, don't have an albatross's onerous task of flying thousands of kilometres on each foraging trip to find sufficient food to feed just one fully dependent, altricial chick. Ducks can therefore afford to lay more eggs.

Confine the comparison to closely related songbirds sharing the same altricial mode of development and occupying the same environment, and similar patterns can be found. Among larks, for instance, the Grey-backed Sparrowlark lays up to five eggs, whereas Sclater's Lark never lays more than one. Compare species in the same genus, and the differences are less obvious, unless they live at different latitudes. *Acrocephalus* warblers lay clutches of 2–3 eggs in the south-temperate zone of southern Africa, but 3–6 eggs in the north-temperate zone of Europe, and down to a single egg among some species in the tropics (for example, Seychelles Warbler).

The short answer is that a female lays the number of eggs that optimises her breeding success over her lifetime – the maximum number of young raised and surviving to



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The Grey-backed Sparrowlark (nest shown above) lays a clutch of up to five eggs, whereas Sclater's Lark never lays more than one.

become breeders themselves. Experimental manipulations of clutch size have shown that laying extra eggs does not translate to more descendants. Instead, it compromises lifetime breeding success. Either the young don't get the optimal amount of food to ensure their survival through their critical first year, or the extra workload on the female reduces her ability to care for subsequent clutches or reduces her own survival. But the million-dollar question in ornithology is why the optimum clutch size differs among species, particularly among close relatives living at different latitudes.

Hypotheses put forward to explain clutch size, and other components of life history, fall into three main categories: food availability, predation risk, and adult mortality risk. Briefly, the food hypothesis suggests that because the north-temperate

zone is more seasonal, with extreme differences in weather between winter and summer, there is a greater availability of food in the summer, allowing the birds there to lay more eggs than they could in the less seasonal south-temperate and tropical zones. According to the predation risk hypothesis, birds in the tropics lay fewer eggs to reduce activity at the nest so as to escape the attentions of a greater abundance of nest predators. The adult mortality risk hypothesis suggests that adults in the tropics don't face the spectre of succumbing to icy weather in the coming winter, so they moderate their breeding workload to ensure their long-term survival.

Because critical tests of these hypotheses are lacking, a research group at the University of Montana (USA), in collaboration with the FitzPatrick Institute, is studying the breeding biology of the birds

in the strandveld of Koeberg Nature Reserve, on the West Coast north of Cape Town. This links with similar research being done at a network of other sites around the world, in Arizona, New Zealand and Venezuela. Now in its fifth year, the Koeberg study annually monitors 1 500 nests of 20 species, collecting over 7 000 hours of video footage at nests to measure nest attentiveness, feeding rates, and the relative investment of male versus female in raising young. Experimental manipulations are being used to test contrasting predictions of competing hypotheses that seek to explain differences in the life history responses of birds to their environments. Watch this space for the insights and conclusions of this research. *With thanks to ESKOM and the wonderful assistance of the Tygerberg Bird Club ringing group.* □

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