Research news and comment

Contributions are invited for this series featuring news and comments on wader research. The plan is to provide an informal means of disseminating news about the activities of wader researchers and their results. We also hope that this will become a forum for comment and debate as well as for airing views, floating theories and stimulating research in new directions. Tamás Székely (Dept. of Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY UK, phone: (0) 1225 383676, fax: (0) 1225 386779, e-mail t.szekely@bath.ac.uk), acts as co-ordinator of this series. Contributions can be sent either to him or to the Editor.

The costs of precocial young: A commentary on: Schekkerman, H. & Visser, G.H. (2001) "Prefledging energy requirements in shorebirds: energetic implications of self-feeding precocial development" (*Auk* 118: 944–957).

Why some birds breed once or many times a year, lay one or many eggs or have single or dual parental care are some of the big evolutionary questions. All of these questions fit into the theory known as life history where we hypothesize that every time an individual invests in current reproduction this investment must be weighed against a concomitant reduction in any future reproductive investments. One key determinant of reproductive investment is whether or not the chicks require provisioning: precocial wader chicks, for example, apparently require much less parental investment after hatching than altricial chicks. Yet most bird species do not have precocial chicks, suggesting that perhaps there are hidden costs. Knowledge of the energetic requirements of precocial chicks is needed to understand the ecological consequences of the different developmental modes that are represented by the precocial–altricial spectrum. We know little about these energetic requirements, however, because energy expenditure must be measured in field conditions: it seems likely that the significant costs will be due to foraging activity and thermoregulation.

A recent study by Schekkerman and Visser has, for the first time, measured the energetic costs of developing lapwing and black-tailed godwit chicks and has found the hidden costs of precocial young. The researchers got round the apparently intractable problem of comparing the energy budgets of precocial lapwing and godwit chicks with, of course, never occurring altricial chicks of the same species by raising a group of chicks in the laboratory, under such favourable conditions that they might as well have been altricial. They then compared the energy budgets of the laboratory birds with wild birds using doubly labelled water measurements. They found that thermoregulation and activity costs in the lab chicks was about 55% lower than free-living chicks, and the overall total energy requirements of the free-living chicks was 30% higher. The total energy requirements of free-living precocial lapwing and godwit chicks were more than twice as much as in the seven parent-fed species for which similar energy budgets are available. As a result, it appears that self-feeding precocial wader chicks must operate within fairly narrow energetic margins. If food intake is reduced, then precocial chicks will stop growing much earlier than parent-fed chicks. Moreover, precocial chicks do not have the option of reducing activity to save energy in periods of food scarcity because decreased activity will reduce their intake rate further. Therefore temporary reductions in food availability will be much more of a problem for them than for parent-fed chicks.

As long is food is plentiful, however, self-feeding chicks will not suffer because of their relatively high energy budgets, and parents, of course, are relieved from one of the most energetically stressful periods in the annual cycle. The implication of these results is that self-feeding wader chicks are probably limited to those areas where food is very abundant. The next question is to see whether stone curlews, snipes and oystercatchers, which do feed their chicks, have adopted this behaviour because of selection to increase energetic efficiency in the chick stage.

With the increasing emergence of careful energetic studies on waders, like that of Schekkerman and Visser, it is becoming clear that breeding waders are energetic big spenders. They operate at large multiples of their basal metabolic rate, but are able to pay for it because they live in areas, often at high latitudes, with extremely high prey availability. A thorough investigation of the way in which energetic requirements vary among different bird families with different degrees of precociality is needed in order to shed more light on the evolution of avian development strategies. Many more data from a range of species are now needed, but Schekkerman and Visser provide an excellent start and a model for future work.

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