

*The Development of Brain and Behaviour in the Chicken*

Lesley A Rogers (1995). CAB International: Wallingford. 273pp. Hardback. Obtainable from the publishers, Wallingford, Oxon OX10 8DE, UK (ISBN 0 85198 9241). Price £45.

This book provides an extremely authoritative and detailed analysis of the development of the chicken brain from before hatching to sexual maturity. The author's own speciality, the lateralization of brain function, is especially well covered in each chapter. From the moment the embryo turns its head to the left, thus exposing the right eye to a greater degree of light stimulation through the egg shell, asymmetry in visual processing and corresponding brain development is apparent. This has marked effects on the later behaviour of the young chick. We learn, for example, that major categorizations, between food and non-food items are better performed by the right eye (left brain hemisphere) than the left. Conversely, tasks requiring attention to fine detail, such as the recognition of conspecifics, are better accomplished by the left eye (right hemisphere). Other strengths of the book are its discussions of behavioural development, with particular focus on imprinting, memory formation, sleep and early feeding behaviour. Throughout the book the author attempts to set neurobiological work in an ethological context. She continually questions the validity of neurobiological laboratory experiments. Many experiments have been conducted where embryos are stimulated with light before hatching in order to assess later effects on brain function. But Rogers questions the degree to which such light stimulation might mimic that experienced by embryos during the brooding hens' normal incubation behaviour. She also takes some experimenters to task for studying brain development without simultaneous investigation of behaviour.

The book does not cover the development of *all* behaviour patterns in the chicken. Much is known, for example, about the behavioural control and development of wing-flapping, dust-bathing and nesting, but given the book's emphasis on the young chick, these are not fully discussed. Ultimately, however, it is of far more value to have a book that deals comprehensively with some issues than one that sketches over too many. For applied ethologists the book should serve as a good introduction to some basic facts about brain and behaviour in the young chick. There are many suggestions for further research which should prove stimulating to researchers. There is a particular need to extend detailed studies of chick behaviour beyond the first two weeks post-hatching. I suspect, however, that the majority of readers may be students of neurobiology and, for them, the last chapter which deals with welfare issues may come as a surprise.

'It may seem rather inappropriate to discuss issues of animal welfare in a book that has reported many results obtained using invasive procedures.' My thoughts on reaching the last chapter were echoed by this upfront declaration by the author. Her rationale is that the information obtained from studies of chicken brain development and function may change our attitudes to the species. In particular, she argues, work on avian cognition which is increasingly demonstrating great complexity in the bird brain, will lead to a demand for improved housing for commercially reared birds. Since little work on avian cognition has yet been conducted on chickens, Rogers alludes to examples of cognitive research with pigeons and parrots and suggests that similar work should be conducted on chickens in the future. I share the hope that we will improve chicken housing but there are problems with Roger's argument that a demonstration of cognitive complexity in chickens will pave the

way. First, housing conditions for commercially reared pigs are not always noticeably better despite the common perception that they are 'intelligent' animals. Second, it is not clear what aspect of cognitive complexity (if any) correlates with the ability to suffer. Do food storing birds or homing pigeons with enhanced spatial cognition abilities deserve more consideration than birds without these abilities? Anything that encourages us to treat chickens with more respect is worthwhile but it could be counterproductive to use cognitive ability as a criterion for assessing welfare needs. As Bentham stated, the question is not can they talk?, not, can they reason?, but can they suffer?

The last chapter is actually a passionate argument against the battery cage, although the depth of behavioural work in this area is not fully explored and, surprisingly given the emphasis on young chicks, welfare problems of young broiler chickens are not discussed. From this point of view, the first chapters will be valuable to anyone with an interest in brain and behaviour, whilst the last chapter may be particularly valuable to students of neurobiology exposed to welfare arguments for the first time. And congratulations on the forthright concluding remarks '*Gallus gallus domesticus* is indeed the avian species most exploited and least respected'.

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***Wild Otters: Predation and Populations***

Hans Kruuk (1995). Oxford University Press: Oxford. 290pp. Hardback. Obtainable from the publishers, Walton Street, Oxford OX2 6DP, UK (ISBN 0 19 854070 1). Price £30.

Hans Kruuk has written a most readable and stimulating book. In it he describes the detailed otter research which he and his colleagues at the Institute of Terrestrial Ecology Banchory, have been carrying out in Shetland and north-east Scotland for the past 13 years or so. To find out why otters have been faring so badly throughout most of Europe it was important to get clear answers to the fundamental ecological question (so essential to the conservation of every species): what limits numbers?

To do this it was sensible to collect base-line data in areas where otters were apparently safe and plentiful. Shetland was an obvious research area because as well as being relatively common, their coastal otters are diurnal and can be observed. As Kruuk points out: 'armed with the knowledge gained in Shetland and north-east Scotland we are in a better position to proceed with questions about otters in the rivers and marshes of mainland Britain and elsewhere'.

As the author acknowledges, care has to be taken in using Shetland data but that is also true for every other individual study area. At least in Shetland hypotheses could be devised for the many questions which had to be asked; hypotheses which could then be tested elsewhere.

The key questions about what limits otter numbers are clearly summarized in the introductory chapter. The need to study otter densities and social organization, the behaviour which affects them, factors affecting mortality and reproduction, and the effects of food and habitat.