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# LECTURE SERIES

FALL/WINTER 2018/19

Max Planck Institute  
for Ornithology



MAX-PLANCK-GESELLSCHAFT

THURSDAY | November 29th, 2018 | 13 P.M. | HOUSE 4 LECTURE ROOM

## KAREN SPENCER

University of St. Andrews | Host: Hau Research Group

### Developmental programming in birds: integrating data on in ovo and external stimuli

Even before it is born the conditions an animal experiences can have profound long-term effects on its health and wellbeing. In birds, mothers deposit a range of nutritional and hormonal factors into the egg that can alter embryonic development. If the mother experiences stress during egg laying a higher level of stress hormones are deposited into the egg, which can alter the development of the neuroendocrine system then controls the ability to respond to stress. In later life adults exposed to pre-natal stress have been shown to exhibit altered stress responses, fear-related behaviours and there is very good evidence that they are more likely to develop negative health issues. Work carried out by myself and colleagues suggests that in ovo conditions can program later behaviours via neuroendocrine systems and that these conditions may act as a signal to the offspring to alter development in such a way as to maximise survival in the post-natal environment, but that that there will also be costs associated with this strategy. However, oviparous species are often also exposed to many external factors as well, without the buffer of the maternal body as in mammals. The fact that birds use acoustic calls to communicate in many different contexts, such as calling to chicks or alarm calls when stressed, suggests that these calls can provide salient cues as to the quality of the environment. However, whether they provide such cues to embryos is unknown. We still have much to learn about the importance of different types of acoustic stimuli in shaping later phenotypes. Here I will detail some of the new experiments going on in my lab to investigate the adaptive significance of pre-natal acoustic stimuli. I will suggest that we should consider both in ovo and external stimuli as programming factors and work is now needed to integrate the two stimuli types to determine if re-programming of embryonic phenotypes is possible when environmental conditions change over the incubation period.

#### WHO IS KAREN SPENCER?

2001	PhD University of Stirling, Scotland
2001	Post-doctoral Fellow, University of Birstol, UK
2006	Post-doctoral Fellow, University of Glasgow, UK
2007	BBSRC David Phillips Research Fellow, University of Glasgow/St Andrews
2011	Lecturer in Behavioural Neuroendocrinology, University of St Andrews
2016	Reader in Behavioural Neuroendocrinology, University of St Andrews

#### SELECTED PUBLICATIONS

- Spencer, K.A., and Minderman, J. (2018). Chapter Three - Developmental Programming via Activation of the Hypothalamic–Pituitary–Adrenal Axis: A New Role for Acoustic Stimuli in Shaping Behavior? In *Advances in the Study of Behavior*, Volume 50, M. Naguib, L. Barrett, S.D. Healy, J. Podos, L.W. Simmons and M. Zuk, eds. (Academic Press), pp. 87-126.
- Zimmer, C., Larriva Hormigos, M., Boogert, N. J. & Spencer, K. A. 7 Apr 2017 Transgenerational transmission of a stress-coping phenotype programmed by early-life stress in the Japanese quail. *Scientific Reports*. 7, 19 p., 46125
- Zimmer, C. G. G., Boogert, N. J. & Spencer, K. A. Aug 2013 Developmental programming: Cumulative effects of increased pre-hatching corticosterone levels and post-hatching unpredictable food availability on physiology and behaviour in adulthood. *Hormones and Behavior*. 64, 3, p. 494-500.

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