Hormones and Behaviour

Recent advances in non-invasive sampling techniques have led to an increase in the study of hormones and behaviour. Behaviour is complex but can be explained to a large degree by interactions between various psychological and physiological components, such as the interplay between hormonal and psychological systems. This new textbook from Nick Neave offers a detailed introduction to the fascinating science of behavioural endocrinology from a psychological perspective, examining the relationships between hormones and behaviour in both humans and animals. Neave explains the endocrine system and the ways in which hormones can influence brain structure and function, and presents a series of examples to demonstrate how hormones can influence specific behaviours, including sexual determination and differentiation, neurological differentiation, parental behaviours, aggressive behaviours and cognition. This is an accessible introductory textbook which will appeal to second and third year social science undergraduate students in psychology and biomedicine.

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A Psychological Approach

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Preface

In 1996 there was a timid knock at my office door. It was one of our final year undergraduates seeking a tutorial with me to discuss an idea for her dissertation, an empirical piece of research conducted independently by our students under the guidance of a supervisor. The student in question was Meyrav Menaged and (as per instructions) she had come along armed with several research papers that had given her some possible ideas for this important project. The papers were rather outdated, and concerned the possible differences in circulating hormone levels between heterosexuals and homosexuals. I read the papers with interest and not a little scepticism; her proposal sounded worthy of pursuit, but my main reservation was the lack of psychology (she was after all studying a psychology degree). I asked her to reconsider her plan and include something of psychological merit. She seemed fine with that suggestion and off she went. Several days later she returned with a pile of other papers, some addressing cognitive differences between heterosexuals and homosexuals, and others reporting links between circulating testosterone and certain kinds of spatial ability – a project was born. She would focus on cognitive differences taking into account sexual orientation and circulating hormone levels (testosterone).

The first bit was easy for me: I had taught a module on sex differences and was well acquainted with the literature, different theories, 'best' kinds of tasks to use, etc. The latter issue was more of a problem: how the hell were we going to measure testosterone? I had visions of us attempting to extract gallons of blood from some poor unsuspecting undergraduate with little idea of what to do with it afterwards. At that time our University, and my colleagues within our Division had neither the expertise nor the facilities to enable us to do this. I made a few inquiries and came across the name of David Weightman, an endocrinologist in the Medical School of our more prestigious and better-off rival (Newcastle University) across the road. With fingers firmly crossed behind my back I promised my Head of Division (and holder of the purse strings) that we would be sure to get a research paper out of this enterprise and, much as we hated to be seen to be providing funds for our rival, decided to go ahead. I made an appointment to see David and nervously gave him my spiel; while he knew little about psychology, or the supposed cognitive differences between heterosexuals and homosexuals, he knew a hell of a lot about endocrinology, and must have been impressed by our proposal, because

he agreed to come on board and provide his expertise. The fact that we would be paying his group around £12 per sample of saliva, from which they assured us they could gain an accurate record of circulating (free) testosterone, was perhaps by the by.

We (or should I say Mey) went ahead and tested a smallish group of male and female homosexuals and heterosexuals on two spatial and two verbal tasks, and impressively managed to persuade them all to drool into a small plastic pot. Mey gathered the results, conducted the statistical analyses, and hey presto we had a story to tell. She got to complete her project, and I (with some assistance from Dave) set to work putting together and submitting my first paper in behavioural endocrinology. After a rather lengthy wait (I think it was the journal rather than the quality of the paper) it was revised, accepted and published, and I had found a new and exciting research avenue. Since those days my understanding of this field has multiplied enormously. I now have two excellent PhD students (Helen Brookes and Sarah Evans), both of whom are routinely extracting saliva from (almost) willing volunteers, and our technician Anthea Milne buys-in testosterone kits and assesses levels of this hormone in our purpose-built Biophysical Analysis Unit. The cost per sample has plummeted (which pleases the purse-strings holder enormously) and now our undergraduate and postgraduate students are able to conduct behavioural endocrinological research (typically on testosterone or cortisol) on an almost routine basis. We have even begun selling our expertise to other institutions. My principal research interests focus on the possible relationships between testosterone and various physical/psychological/behavioural characteristics, and over the last few years I have been able to share my burgeoning knowledge and deliver an option entitled 'Hormones and behaviour' to our final year undergraduates.

My key problem in delivering this option has been the lack of an appropriate textbook. There are two texts addressing behavioural endocrinology on the market – Nelson's *Introduction to Behavioral Endocrinology* and Becker *et al.*'s *Behavioral Endocrinology*. Both in their own way are excellent, but both from the point of view of social science students are not so good, focussing as they do on 'hard' endocrinology, and using examples principally drawn from non-human animals. Over the course of the last few years I have written a set of lecture notes that have addressed behavioural endocrinology from a more psychological point of view, addressing topics and drawing examples that are more pertinent to social scientists, hopefully without diluting the high level of science inherent in such an endeavour. This book, then, is those lecture notes, greatly expanded and offering hopefully a slightly different insight into behavioural endocrinology from what has previously been available.

The first four chapters lay out the science of behavioural endocrinology, chapter 1 providing a basic grounding in neurobiology, essential for any student who has not come from a biological/physiological background (as many social science students have not). Chapter 2 then provides essential

coverage of the endocrine system and the key hormones that will be addressed further in this text. Chapter 3 explains what is meant by the term 'behavioural endocrinology' and provides some theoretical and conceptual background before describing the principal ways in which hormone–behaviour relationships can be established. Chapter 4 addresses the neurological effects of hormones. The following three chapters then consider the more psychological/behavioural effects of hormones, chapters 5 and 6 covering typical and atypical sexual determination and differentiation, chapter 7 focussing on neurological differentiation. Thus far the main emphasis in the chapters has been to consider predominantly unidirectional relationships, i.e. the effects of hormones on physiology/behaviour. The final three chapters then begin to bring in more bidirectional relationships and include assessments of the effects of behaviour on neuroendocrine systems. Chapter 8 discusses these more complex hormone/behaviour interactions by assessing reproductive/sexual behaviours, chapter 9 addresses attachment and parental behaviours, and chapter 10 looks at aggressive/competitive behaviours. Last but not least, the final chapter will perhaps be of most interest to psychologists as it considers the possible effects of hormones on cognitive processing. Because of the page limit, and my own particular research experience, this final chapter has had to be limited to the effects of the sex steroids. There is a glaring omission in that I have not been able to consider the glucocorticoids or the thyroid hormones, and should a second edition of this text be possible, then I shall correct this imbalance.

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