Published in final edited form as:

Behav Brain Res. 2009 June 25; 200(2): 237–238.

Editorial

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This special issue of Behavioral Brain Research is devoted to pheromonal communication in higher vertebrates and its implication on reproductive function. This special issue aims to provide an integral and up-dated view of some of the most salient aspects of how olfaction shapes the reproductive life of animals, i.e. how olfaction can influence both sexual and parental behaviors.

Now fifty years ago, Karlson and Luscher (1959) defined ‘pheromones’ as chemosignals that provide information to conspecifics about reproductive status or which stimulate species-specific social behaviors. Over years, researchers expanded the concept of pheromones and their underlying neural mechanisms to a large number of animal species and situations. Although pheromonal action has been clearly defined and characterised in insects and lower vertebrates, there has been more controversy about the use of the term ‘pheromone’ in higher vertebrate species. However, it is clear that olfactory signals detected by sensory neurons located either in the vomeronasal organ or in the main olfactory epithelium profoundly influence behavioral and/or neuroendocrine functioning in higher vertebrates; the scope of the present issue has therefore purposely been limited to these species.

Studies of the behavioral, sensory and neurobiological processing of putative pheromones have been facilitated since the identification of olfactory receptor genes. As a result of these discoveries, a range of biological disciplines have undertaken studies to the influences of olfaction on social communication in vertebrate species. We believe that all these major developments, which have been translated into numerous scientific articles over the last years, are well represented in the content of this special issue.

So in this special issue, William Swaney and Barry Keverne will first introduce the field of pheromonal communication in an evolutionary perspective, from amphibians to primates. Jacques Balthazart & Mélanie Taziaux will then highlight the importance of chemosensory communication for social communication and reproduction in birds, a class of animals usually considered as microsmatic or even anosmic. By contrast, rodents are usually considered as one of the classes where olfaction plays the primary role in social organisation, therefore the role of olfactory cues in sexual interactions will be highlighted by several contributions based mainly on results obtained in hamsters or mice. Another set of animals where pheromonal communication plays a role in the regulation of sexual function

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is ungulates. In this context, Delgadillo et al. will discuss current ideas relative to the male effect in sheep and goats. The recent discovery of a continuous neurogenesis in the adult mammalian brain is one of the major advances in the field of neuroscience in the recent years. This phenomenon has been especially localised in the subventricular zone, thereby demonstrating that the olfactory system is very plastic and continuously receive new neurons. Although dealing not exclusively with neurogenesis in the olfactory system, Gilles Gheusi, et al. will review current evidences suggesting a functional role of this (olfactory) neurogenesis in the regulation of social (pheromonal) behaviors. Then, Gabriela Sanchez-Andrade and Keith Kendrick will examine the neurobiological mechanisms underlying olfactory memory formation in various olfactory paradigms. Finally, for ensuring a reproductive cycle, it is not only necessary to seek out the best mating partner, but also to provide adapted parental care to the offspring. In this context, Frédéric Lévy will highlight how olfaction and the underlying neuroendocrine mechanisms allow a successful interaction with the young in the context of maternal behaviour in several mammalian species, and finally, the comparative work of Benoist Schaal et al. on rabbit pups and human babies will illustrate how olfaction is of major importance for immediate post-natal adaptation of the mammalian newborn.

We believe that this special issue gives the opportunity to recapitulate on the rapid advances in the field, to discuss conflicting results of pheromonal biology, and to define future perspectives for the progress of this field. In addition, it presents a rich mixture of different animal models (including mouse, rat, hamster, sheep, rabbit and even human) that will highlight the comparative aspects of scientific research in this area. Moreover, this issue will illustrate how researchers from different methodological fields (including approaches based on ethology, neuroendocrinology, neurobiology but also psychology and molecular sciences) study the interaction between chemosensory communication and reproductive function.

Finally, we feel particularly indebted to all the researchers who enthusiastically answered to our invitation to contribute an article to this special issue of Behavioral Brain Research, and to the dedicated reviewers who helped us reaching the highest quality standards. In addition, we gratefully acknowledge the support of Joe P. Huston, Editor-in-Chief of Behavioural Brain Research and the whole editorial staff, and especially Mary Harty, for assembling this issue. In all, it is our hope that this Special Issue will become a set of references for those working on the expanding area of pheromonal biology, and will boost the interest of neurobiologists, behavioral scientists, chemosensory biologists and other not yet involved in this attractive area.