

Contents

Contributors ix

Preface xi

1 Genetic Control of Sex Differences in *C. elegans* Neurobiology and Behavior 1

Douglas S. Portman

- I. Introduction 2
- II. Main Text 4
- III. Conclusions 29
- References 31

2 The Neural and Genetic Substrates of Sexual Behavior in *Drosophila* 39

Daisuke Yamamoto

- I. Hypothesis on the Master Control Gene for Behavior 40
- II. Discovery of *fru* Mutants and Their
Phenotypic Characteristics 42
- III. Molecular Biology of *fru* Locus 49
- IV. Cellular Basis of *fru* Functions in Male
Courtship Behavior 53
- V. Conclusions 58
- References 59

3 Sexual Differentiation of the Vocal Control System of Birds 67

Manfred Gahr

- I. Introduction 68
- II. Sex-Specific and Sex-Typical Vocalizations 70
- III. The Endocrinology of Birds' Vocalization 72
- IV. Steroid Sensitivity of the Vocal Control System
of Afferent Auditory Regions and
Modulatory Systems 75
- V. Sexual Dimorphisms of the Vocal Control
System of Songbirds 84

VI. Sexual Differentiation of the Vocal Control System of Songbirds	87
VII. Sexual Differentiation of Vocal Control Areas in Adulthood	91
References	94
4 Gene Regulation as a Modulator of Social Preference in Voles	107
Elizabeth A. D. Hammock	
I. Introduction	108
II. Oxytocin and Pair Bonding in Voles	110
III. Vasopressin and Pair Bonding in Voles	111
IV. Gene Regulation in Male Species-Typical Behavior: Evolutionary Tuning Knobs	114
V. Sexual Dimorphism	121
VI. Coda	122
References	123
5 Genetic Basis for MHC-Dependent Mate Choice	129
Kunio Yamazaki and Gary K. Beauchamp	
I. Introduction	130
II. The MHC	130
III. Mouse Mating Preferences	131
IV. Functions of MHC-Mediated Mating Preference	132
V. Familial Imprinting Determines H-2 Selective Mating Preferences	133
VI. Pregnancy Block	134
VII. Parent-Infant Recognition	135
VIII. Chemosensory Discrimination	136
IX. MHC-Dependent Mating Preferences in Other Taxa	137
X. HLA: Odortypes and Mate Selection in Humans	138
XI. Conclusions and Implications for Future Work	139
References	140
6 Molecular Biology of Peptide Pheromone Production and Reception in Mice	147
Kazushige Touhara	
I. Introduction	148
II. Intraspecies Effects of Volatile Pheromones in Mice	150
III. Peptides and Proteins as Social Signals in Mice	151

IV. The Exocrine Gland-Secreting Peptide Family in Mice	152
V. Molecular Biology of Pheromone Reception	157
VI. Pheromone Signals to the Brain	162
VII. Pheromones and Evolution	163
VIII. Concluding Remarks	165
References	166
7 Environmental Programming of Phenotypic Diversity in Female Reproductive Strategies	173
Michael J. Meaney	
I. Introduction	174
II. Main Text	178
III. Conclusion	204
References	205
8 Genomic Imprinting and the Evolution of Sex Differences in Mammalian Reproductive Strategies	217
E. B. Keverne	
I. Introduction	218
II. Placental Regulation of Maternal Endocrine Function and Behavior	220
III. Genomic Imprinting: Coadaptive Evolution of Brain and Placenta	222
IV. Genomic Imprinting, Hypothalamic Development, and Behavior	226
V. Sex Differences in the Rodent VNO Pathway	228
VI. Brain Evolution and Behavior: A Role for Genomic Imprinting	231
VII. Conclusions	237
References	239
9 Sex Differences in Brain and Behavior: Hormones Versus Genes	245
Sven Bocklandt and Eric Vilain	
I. Role of SRY in Sex Determination	246
II. Male and Female Brains are Different	247
III. The Central DOGMA of Sexual Differentiation	247
IV. Sex Hormones in Brain Sexual Differentiation	248

V. Exceptions to the DOGMA	248
VI. Evidence for a Direct Role of SRY in the Brain	250
VII. Sexual Orientation is a Sexually Dimorphic Trait	251
VIII. Homosexual Brains are Different	253
IX. The Role of Prenatal Androgen Exposure on Sexual Orientation: Myth or Reality?	254
X. Indirect Hormonal Measures	255
XI. The Genetics of Sexual Orientation	256
References	260
Index	267