Preface

In Volume 18 of *Progress in Psychobiology and Physiological Psychology*, I am pleased to welcome a new editor, my colleague Harvey Grill, to this series. Harvey replaces Adrian Morrison who has served as Co-Editor since Volume 12. During that fifteen years, Adrian worked with the late Alan Epstein and for two volumes with me. Adrian's editorial skills were considerable as was his broad appreciation of behavioral neuroscience—a vision that kept his volumes current and exciting. Harvey and I pledge to continue to emulate the editorial energy and dedication that Adrian, and all the past editors, have brought to this series.

Harvey Grill is an ideal person to continue the lineage of behavioral neuroscientists whom have edited this distinguished series since its inception in 1966. This list includes the co-founders of P4, Eliot Stellar and Jim Sprague, the addition of Alan Epstein when Eliot retired his editorial pen to become Provost at Penn, the recruitment of Adrian Morrison when Jim became an emeritus Professor, and finally, me to replace Alan when he was tragically killed in 1992. Harvey is widely recognized as a leading investigator on the neurological controls of gustation, eating and body weight regulation and, in that regard, his research expertise overlaps with both Alan Epstein and Eliot Stellar. Harvey's work has been instrumental in challenging the long held view that the neural controls of motivated behavior reside exclusively in the hypothalamus by demonstrating the impressive integrative capacity of the brainstem, an important theme that shares much with Jim Sprague's early work on collicular control of vision and Adrian Morrison's analysis of medullary-pontine regulation of sleep. Harvey is past contributor to this series (in Volume 11 with Rent Berridge), a past recipient of the APA Early Career Development Award and a past president of the Society for the Study of Ingestive Behavior. I look forward to working with Harvey and am certain that this series and its readership will benefit from his vision, creativity and dedication to the field of behavioral neuroscience.

Steve Fluharty

Volume 18 consists of four original chapters covering a broad range of contemporary topics in behavioral neuroscience. The first of these chapters

is contributed by Alan Rosenwasser who revisits a topic he wrote about in Volume 13. Circadian control is central to behavioral regulation (e.g., activity, energy, thermal) and must therefore feature in the neural mediation of behavioral systems. Not surprisingly then, circadian neurobiology is currently one of the most broadly embraced model systems in behavioral neuroscience. Insights into the multifaceted nature of the circadian contribution to biological systems come from genetic, cellular, as well as systems levels of analysis. Alan Rosenwasser skillfully reviews the current status of this rapidly developing field. He focuses on the mammalian suprachiasmatic nucleus system emphasizing inputs to the "clock," their neurochemical phenotype, and outputs from the "clock" to behavioral and other effector systems. Another virtue of this chapter is its integration of current data and organizing principles drawn from the analysis of non-vertebrate species and cellular system.

Lori Flanagan-Cato's essay focuses on the neuroendocrine controls of female reproductive behavior in the rat. Mating behavior in the female rat consists of a prominent reflex known as lordosis in which the female exhibits dorsiflexion of the back thereby facilitating copulation. Although this reflex is elicited by flank stimulation provided by the mounting male, it will only occur when estrogen levels are high. Thus, behavioral receptivity is precisely timed to coincide with ovulation to maximize the chances of successful pregnancy. The neural circuitry that governs the lordosis reflex has been studied extensively and has revealed the importance of estrogen-responsive neurons in the ventromedial nucleus of the hypothalamus (VMH). However, until very recently, it was not possible to elucidate all of the synaptic connections between the VMH and the epaxial muscles that subserve this behavior. Flanagan-Cato first reviews research from her own laboratory that utilizes pseudo-rabies viral tract tracing to identify pathways from the VMH through the periaqueductal gray, medullary reticulospinal and terminating on motor neurons in lumbar ventral horn that innervate the female flank muscles. She then goes on to describe more recent experiments suggesting that estrogen may modulate the synaptic strength of this circuit by controlling dendritic spines on neurons intrinsic to the VMH, as well as those that project to lordosis relevant brain circuitry. The elucidation of these estrogen-induced changes within a defined neural circuit emphasizes why the study of lordosis continues to be one of the best models to investigate hormones and their effects on behavior.

The last few years have witnessed unprecedented advances in our understanding of the neurobiological controls of feeding behavior. This period of rapid discovery was ushered in by the identification of leptin as an adiposity hormone that acts in the brain to control food intake and energy expenditure commensurate with fat stores. Since its discovery by Friedman and colleagues in 1995, progress has been swift in identifying the many

neurochemical systems in brain that are regulated by leptin. Almost all of this research has focused on the final common path of ingestion, food consumption during a meal. However, as Tim Bartness points out in his chapter, the long term regulation of food intake and energy homeostasis is a much richer landscape involving many adaptive changes in food searching strategies and storage. Particularly neglected in this regard is the contribution of hoarding to long-term physiological regulation. Bartness begins with a comprehensive review of the literature on food hoarding in a variety of rodent models. He then proceeds to consider the possibility that some of the neural control systems that act with the consummatory phase of food ingestion may also act within the context of food hoarding and he reviews data from his own laboratory that begins to investigate this important issue. Perhaps most significantly, Bareness' provocative essay reminds us that the continued focus on elucidation of neural mechanisms without corresponding detailed analysis of behavior threatens to widen the gap between cellular and behavioral neuroscience at precisely the time so many of us are working to close it.

The development of strategies for unraveling the taste sensory code is at the heart of Alan Spector's contribution. There are dramatic differences in the taste-guided behavior of omnivores, herbivores, and carnivores based on evolutionary pressures related to their unique diet history. The neural basis of taste-guided behaviors has, however, lagged behind the depth of understanding in the coding of other sensory modalities. In fact, the nature and operating characteristics of taste receptors was largely unknown until very recently. Spector and his associates employ a research strategy that combines psychophysical analysis of taste-guided behavior with selective gustatory receptive field denervation to investigate the hypothesis that taste nerves innervate functionally specialized populations of taste receptors. Spector reviews a fascinating set of findings from his laboratory and integrates these results with current information on taste receptors, taste systems neuroscience, neural developments, and recovery of function.

Steve Fluharty
Harvey Grill