

PREFACE

Reproductive strategy directly impacts fitness of organisms. This applies to all organisms, both plants and animals. In humans and the majority of other eukaryotes, the formation of a new individual starts with the union of two gametes, each derived from a female or a male parent. Here, not only synergy but also conflict emerges between the female and male genomes. For example, the male genome drives enlargement of the endosperm or placenta whereas the female genome counteracts it in plants and mammals, although insemination relies on coherence of two genomes. In animals, sophisticated rituals of courtship behavior have developed presumably through sexual selection upon traits that may promise higher fecundity of courters. Even after the delivery, parents, in some vertebrates in particular, need to invest time and energy in nursing offspring, where again female and male genomes often find conflicting interests, being manifested in sexually dimorphic nursing behavior. Except for the differences in one of the sex chromosomes, genes on female and male genomes are identical in principle. Indeed, bodies of evidence shed light on the critical roles of epigenetic modification of the genome in exerting sexually distinct functions of respective genes in the presence of female-male conflict. Sociosexual interactions in animals are mostly mediated by functions of the nervous system, which is thus the primary target of such epigenetic influences at the cellular level. These considerations impose us to postulate that differential epigenetic modifications generally underpin synergy and conflict between the female and male genome. It is therefore an urgent challenge to clarify the mechanism underlying sexually distinct epigenetic modification by the multilayered analyses at the genomic, cellular, neural, and organismal levels. The understanding of sexually distinct epigenetic modification would thus open new horizons of biology, paving the way to synthesize a novel theory that will interpret for the evolution of complex behavioral traits that are often sexually dimorphic. This issue of "Advances in Genetics," therefore, focuses on the mechanistic bases for sex-specific epigenetic modification as driven by the competing interests of female and male genomes and its ontogenic and evolutionary outcomes.