This Special Issue of Molecular and Cellular Endocrinology covers an ebullient area of Neuroendocrinology, pertaining to the genetic, hormonal and neural mechanisms controlling the onset of puberty in mammals. This initiative was undertaken some one year ago upon the suggestion of the Editor-in-Chief, Ilpo Huhtaniemi, who wisely proposed this to be a topic of broad and renewed interest for the endocrine community; I could not agree more with his prediction. Actually, since I accepted to act as Guest Editor of this Special Issue, some important regulatory mechanisms of puberty have surfaced, thus making this initiative even timelier (and more challenging).

As reviewed herein, puberty is a crucial developmental event in reproductive and somatic maturation. At puberty, reproductive competence is achieved and phenotypic sexual maturity attained. The timing of puberty is subjected to considerable genetic determination and is under the tight control of a large array of regulators, including endogenous factors and environmental cues. In addition, puberty critically relies on precedent developmental events, such as brain sexual differentiation, and thus can be considered as the end-point of a maturational continuum that leads to reproductive competence. Accordingly, puberty has been regarded as a biological sensor for the dynamic interaction between genes and environment along development.

Given its paramount importance, puberty has been the permanent focus of considerable attention, both in terms of basic science and clinical studies. Indeed, during the last decades, the physiology of puberty and the basis for its eventual deviations have been deeply scrutinized in a variety of species, through different experimental and methodological approaches. These efforts collectively allowed, by the turn of the 21st century, to compose an up-dated (and rather precise) view of the neurohormonal basis of puberty, which included the characterization of the key roles of different trans-synaptic modulators of GnRH neurons, such as glutamate, GABA and NPY, as well as the recognition of the importance of glia-to-neuron communication in the control of GnRH secretory activity at puberty. In addition, identification of the adipose-hormone, leptin, opened up new paths of research and expanded our understanding of the mechanisms for the metabolic regulation of puberty. Many of these topics were actually the subject of in-depth coverage in a previous Special Issue of the journal (Puberty: A Sensor of Genetic and Environmental Interactions Throughout Development; Molecular and Cellular Endocrinology, vol. 254–255, 2006), published as Proceedings of the 6th (and so far last) Puberty Conference that was held back in 2005.

The characterization of the above regulatory pathways, whose physiologic relevance remains unquestioned, might have transmitted the impression that puberty research was somewhat exhausted. Contrary to that prediction, we have witnessed during the last five years an up-surge of research efforts and exciting developments in the field. While the advancements have been very numerous and in different fronts, some of the most salient findings in this area can be singled out, as motors for the considerable progress experienced recently and leading paths for future research efforts. Indeed, this was the original aim of this Special Issue; i.e., to provide a compiled and up-dated view of recent milestones in our understanding of the basis of mammalian puberty, which may help to identify also new challenges and open questions in this dynamic research area. We honestly believe that this goal has been reasonably covered. Admittedly, the list of topics and contributors is not exhaustive (as expected for this type of Issues), but we hope that the different chapters will give the reader a balanced flavor of some of the most active and appealing areas of this field of Endocrinology; a summary that will be hopefully useful for specialists and other scientists with a broader (and less in-depth) interest in puberty.

This Special Issue is composed of fourteen reviews, which have been arranged into five major headings. Notwithstanding, the contents of the different reviews are very much interconnected, making such a division rather tentative (and flexible). The first section is devoted to basic mechanisms of puberty, and includes a chapter on gene/protein networks (as emerging from systems biology approaches) and puberty onset, and other summarizing animal (mostly genetically modified) models used for the study of mammalian puberty. The second section is focused on human puberty, and includes two chapters on the genetic determinants of puberty (including recent findings from genome-wide scan analyses and genetic studies in patients with hypogonadotropic hypogonadism), and one on the influence of different environmental factors as modifiers of pubertal timing in humans. The third section covers some of the most recent findings in the area of neuropeptide regulation of puberty, and includes chapters on the neurobiological roles and mechanisms of action of kisspeptins and neuropeptide B (NKB) in the control of puberty in mammals. The fourth section summarizes some recent progresses in our knowledge of the hormonal signals and central mechanisms for the metabolic control of puberty in humans and other mammalian species. Finally, the fifth section reviews some recent developments in the understanding of the environmental control of puberty, mainly by photoperiod (in seasonal breeders) and endocrine disrupting compounds, with special emphasis on novel neuroendocrine mechanisms, as revealed by animal (and, in some cases, also human) studies. As mentioned above, these sections, and the contents of the reviews within them, are highly interrelated and complementary. For instance, as reflec-
tion of its enormous importance in the control of puberty, the roles of kisspeptins are covered, albeit from different perspectives, in virtually all the sections. Similarly, other topics, such the genetic, metabolic and environmental determinants of puberty, are touched also in several reviews. Far from being redundant, we find that this will allow the reader to gain an integral and cohesive view of the molecular basis of mammalian puberty, with special emphasis being made on the most relevant signals and mechanisms involved.

At the end of this venture, I would like to express my gratitude to the authors, all highly demanded, leading scientists in the field, who promptly and enthusiastically answered to my initial invitation to contribute an article to this Special Issue of *Molecular and Cellular Endocrinology*. I would like to thank also the dedicated reviewers, who were of enormous help to reach the highest quality standards and timely publication of this issue. Finally, I gratefully acknowledge the support of the Editor-in-Chief, Ilpo Huhtaniemi, and all the Editorial Assistants of the journal, for their support in assembling this Issue. All and all, it is our hope that this piece will become a useful and handy set of references for scientists working in the exciting field of mammalian puberty, which may help to attract also the interest of other endocrinologists not as yet involved in this fascinating research area.

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