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Editorial: Editors' showcase: nervous system and cognate behaviors

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Editorial on the Research Topic
Editors' showcase: nervous system and cognate behaviors

Understanding the detailed underlying mechanisms of mammalian behavior is of great interest to both basic and applied neuroscience. The processing of information from the environment and the ability to display a range of behaviors depends upon a coordinated interaction of different structures of the nervous system with specialized functions, from sensory receptors to higher processing centers. There is a wealth of literature demonstrating that different mammalian species present unique molecular, anatomical, and physiological traits, highlighting the importance of studying a broad range of species. However, the vast majority of our present knowledge regarding how specific mammalian brains produce specific mammalian behaviors, and why this occurs, relies on information obtained from relatively few species. Thus, comparative studies of the mammalian nervous system can help uncover the key features that generate the diversity of nervous system structures and species-specific functions, while also identifying common mammalian traits. Specifically, the section "Nervous System and Cognate Behaviors", from the recently created "Frontiers in Mammal Science", section emphasizes the importance of diverse research perspectives, including the study of a broad range of mammalian species, to gain a more comprehensive understanding of mammalian brains and their role in producing behavior.

The present Research Topic "*Editors' Showcase: Nervous System and Cognate Behaviors*" comprises the first collection from this section, dedicated to highlighting the research of the Editorial Board members. It contains 8 articles: 3 reviews, 2 original research articles, 2 perspectives and 1 hypothesis and theory article. In this Research Topic, the 33 participating authors present some of their recent advances and hypotheses regarding the structural and functional outcomes of the mammalian nervous system.

The articles included in this Research Topic are briefly summarized below:

An impressive review by Puelles, an internationally recognized expert in developmental neurobiology, focuses on brain regionalization and developmental genes. This review summarizes and illustrates the assumptions, structure, and updates that apply to the prosomeric model of brain development, presenting a viewpoint on the fundamental structural components of the brain and their organization.

Chong and Gămănuț's review highlights the anatomical and physiological characteristics of the main neuronal types of the claustrum in primates and rodents. These authors show the extent of known commonalities and differences, and draw attention to the research gap between the two orders.

The review by Feliciano's focuses on the modeling of the genetic mosaicism of the mammalian target of rapamycin pathway in the cerebral cortex. He deals with somatic mosaicism including how it can be modeled in the developing cerebral cortex and discusses the clinical significance of such modeling.

Bhagwandin et al. describe —in an original article— the localization of the three calcium-binding proteins (parvalbumin, calbindin, and calretinin) in 10 neuronal structures of the cerebellar cortex across 143 mammalian species. This exhaustive survey, covering an extensive variety of species, allows consistencies and variances in the calcium-binding protein chemoarchitecture of the cerebellar cortex of mammals to be captured. This contributes to the understanding of the significant roles in the species-specific learning and refining of the motor, perceptual, and cognitive skills required to survive in the environments that these mammals inhabit.

Magalhães-Junior et al.'s original article specifically examines the architecture of motor cortical areas in the capuchin monkey, a New World species known for its advanced manual dexterity, comparable to that of Old World primates. This group provides a descriptive analysis of the histochemical subdivisions of the motor and premotor cortex in the capuchin monkey. Their findings provide insights into the evolution and structure of these brain regions, enhancing the understanding of their complexity and development.

The perspective article by Petanjek et al. explores the topic of Von Economo neurons as a specialized neuron class of the human cerebral cortex. This group's argument is based on the idea of the unique features that these neurons display and offers a critical analysis of selected existing literature, with an emphasis on comparative studies.

Leao et al. raise, in a perspective article, the significance and potential benefits of utilizing the relatively unexplored armadillo as a mammalian model to study the developmental variation that contributes to organism individuality. The group's argument is based on the reproductive biology of armadillos, since they are the only known mammals that always generate offspring that are genetic clones and the potential for this characteristic to help understand the complex interplay between genetic, environmental, and stochastic factors in the biology of individuality.

Finally, a hypothesis and theory article by Ruiz-Cabrera et al. explores the expansion modes of primate nervous system structures in the light of the Prosomeric Model. These researchers illustrate the use of the Prosomeric Model as the proper theoretical framework for analyzing the expansion of the cerebral and cerebellar cortices, the pontine nuclei, the striatum, the nigrostriatal dopaminergic system, the thalamus, and the amygdala in primates compared to rodents, conveying a unifying theory of brain development.

In summary, this Research Topic brings together a variety of excellent articles, dealing with some of the latest discoveries, recent advances, and new perspectives in the field of the nervous system and cognate behaviors. This Research Topic aims to provide the reader with valuable insights across a range of species and foster a deeper understanding of the structure and function of the mammalian nervous system.

Author contributions

RB-P: Writing – original draft, Writing – review & editing.

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The author(s) declare that no Generative AI was used in the creation of this manuscript.

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