【Grant-in-Aid for Scientific Research(S)】
Biological Sciences (Agricultural sciences)

Title of Project: Control of Physiological Function and Behavior by Mammalian Pheromones

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Research Area : Agricultural sciences, Zootechnical science/Veterinary medical science, Applied animal science

Keyword : Functional substance

【Purpose and Background of the Research】

Mammalian pheromones are very potent biological substances, which induce drastic changes of behavior and/or physiology in recipient animals. Despite their apparent function, little is known about mammalian pheromones. In this study we will focus on two mammalian pheromones, namely the "Male effect" pheromone in ruminant species and the "Alarm" pheromone in rodent species, to investigate the chemical structure, mechanism of their synthesis, release, perception and action on the central nerves system. Based upon the data hereby collected we plan to draw a comprehensive novel picture of the chemical communication via pheromones in mammalian species.

【Research Methods】

Following research projects are scheduled.

(1) About "Male effect" pheromone in ruminants.

- Isolation and identification of chemical structure of the pheromone ligand and synthesis of their analogues including optical isomers.
- Elucidation of the mechanism of production, perception and central action of the pheromone.

Estimated pheromone pathway

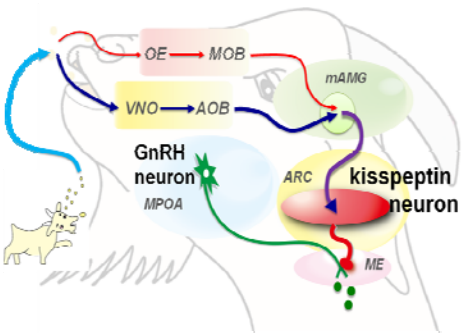

Fig.1 Pheromone information is perceived by both the vomeronasal and main olfactory system and mediated to the arcuate nucleus of hypothalamus.

(2) About "Alarm" pheromone in rodents

- Isolation and identification of the chemical structure of pheromone ligand molecule and synthesis of their analogues.
- Elucidation of the mechanism of production, perception and central action of the alarm pheromone.

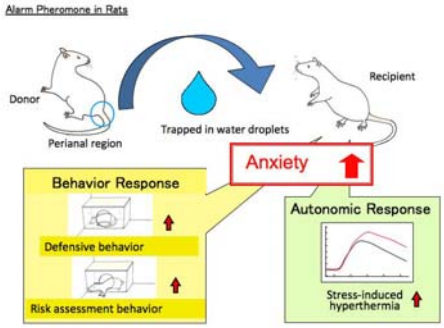

Fig.2 Alarm pheromone increases anxiety

【Expected Research Achievements and Scientific Significance】

Much deeper understanding of the chemical communication in mammalian, which will then lead to a development of new technology of controlling the behavior as well as the physiology of mammals, is expected.

【Publications Relevant to the Project】

- Murata K., Wakabayashi Y., Kitago M., Ohara H., Watanabe H., Tamogami S., Warita Y., Yamagishi K., Ichikawa M., Takeuchi Y., Okamura H., Mori Y. 2009 Modulation of GnRH pulse generator activity by the pheromone in small ruminants. J Neuroendocrinol 21: 346-350.
- Kiyokawa Y., Kikusui T., Takeuchi Y., Mori Y. 2007 Removal of the vomeronasal organ blocks the stress-induced hyperthermia response to alarm pheromone in male rats. Chem Senses 32: 57-64.

【Term of Project】 FY2009-2013

【Budget Allocation】 157,800 Thousand Yen

【Homepage Address and Other Contact Information】

http://www.vm.a.u-tokyo.ac.jp/koudou/j-home.htm