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Female newts appeal for their sexual attractiveness by means of a tripeptide pheromone*

A research group led by Sakae Kikuyama, Professor emeritus at Waseda University, discovered a novel peptide pheromone in sexually developed female red-bellied newts (*Cynops pyrrhogaster*). This pheromone has an activity to prompt the sexually developed males to commence courtship behavior toward the females. This is the first female sexual attractiveness peptide pheromone to be identified in a vertebrate.

1. Outline of the Research

According to the results obtained by Dr. Tomoaki Nakada at Nippon Veterinary and Life Science University and the members of this group, this pheromone is a tripeptide with amino acid sequence Ala-Glu-Phe that is secreted by the ciliary cells in the proximal portion of the oviduct of sexually developed female newts and released through the cloaca into the surrounding water in the breeding season. This substance was shown to act on the vomeronasal epithelial cells of sexually developed male newts.

To date, female sex pheromones identified in vertebrates were steroids, steroid metabolites, amino acids, prostaglandins and long-chain methyl ketones. Accordingly, imorin is the first peptide pheromone with a male-attracting activity to be identified in a vertebrate female. Previously, the same group

isolated a decapeptide pheromone (sodefrin) from the abdominal glands of the male *Cynops pyrrhogaster*¹. Sodefrin plays an important role in keeping the female attracted to the male until the sperm transfer has been successfully completed. The female pheromone identified this time was designated imorin (áimorin; derived from the ancient Japanese word “imo” meaning “beloved woman” and “rin” from “sodefrin”).

The fact that the sex pheromones in the newts are peptides indicates that variant forms can be generated by modification of the nucleotide sequence of the pheromone gene^{2,3}. This may lead to reproductive isolation and finally to generation of different species.

2. Future Prospects

The finding of sex pheromones emitted by both reproductive male and female *Cynops* newts (see Fig. below) is expected to make it possible to analyze neural pathways and mechanisms involved in transferring the signals of both pheromones and transforming the pheromonal signals into the sexual behaviors in the newts of both sexes.

3. Note

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References

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Figure

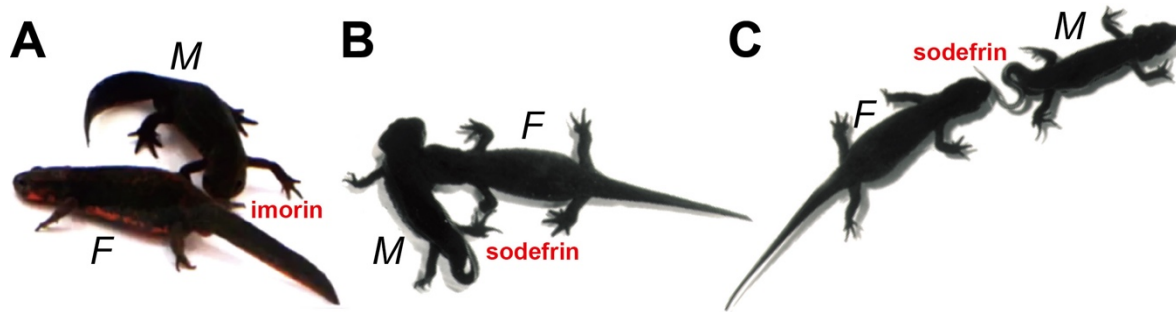


Figure caption: Involvement of pheromones of both female and male *Cynops pyrrhogaster* newts in the early phase of reproductive behavior.

The male newt (M) approaches the cloaca of the female (F) prior to commencing courtship behavior in order to confirm that she is sexually receptive by means of a female pheromone, imorin (A). Then the male moves in front of the female and vibrates his tail, sending the water, into which a male pheromone, sodefrin is emitted, toward her snout (B). When the female push the male's neck with her snout, he parades with his tail undulating and she follows him with her snout in contact with his tail. At this stage, sodefrin is still being released (C). Shortly thereafter, deposition of spermatophores by the male and capture of the spermatophores through the female's cloaca take place.

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