

article analysis

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Submission date: 27-Nov-2020 07:16PM (UTC+0500)

Submission ID: 1458128339

File name: loss_of_taste_in_mammals.docx (19.22K)

Word count: 1326

Character count: 6962

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Background to the research

There is a major belief that five tastes can be perceived by most animals. These tastes include bitter, salty, umami, sour, and sweet. Receptors that are G protein-coupled are usually responsible for the tasting sweet, bitter, and umami. A heteroma of two closely related type 1 taste receptors is important in mediating the sweet taste. There is a great belief that the taste function in mammals also determines the feeding ecology of the animal. Some animals such as cats and majorly carnivorous are considered insensitive to compounds with a sweet taste. Pseudogenization of type 2 taste receptors is considered as the major reason for the loss of sweet taste in many carnivores and other animals including chicken and bats.

The scientific problem addressed in the research

⁵ The study was developed to investigate the loss of taste in mammals. The study aimed at investigating whether the loss of taste receptors in some mammals can be attributed to the increased specialization on the feeding ecology of different mammals. These include the loss of ¹ type 1 taste receptors as well as type 2 taste receptors responsible for perceiving both the sweet and bitter tastes.

Study hypothesis

The hypothesis of the study stated that there is a relationship existing between the feeding specialization in mammals and the loss of taste receptor function in mammals. Specifically, data was collected to focusing on the loss of the ¹ type 1 taste receptors and type 2 taste receptors which are both responsible for sweet and bitter tastes. Direct evidence was sought to investigate any direct correlation between the taste function of the mammals and their feeding ecology.

Methods used in the study

³ The study investigated the evolution of the sweet taste receptor in various animals of the order ⁴ carnivore. Eighteen species in the order Carnivora were selected for the study and a detailed evolutionary analysis of the type 1 taste receptors (Tas1r2) was conducted. The analysis also required to use of the human type 1 taste receptors as the out-group in conducting the analysis. To identify the receptors under a purifying selection for the animals selected for the study, the rates of both synonymous and nonsynonymous substitution were investigated. The

dataset collected from the 18 species was analyzed by the researchers to identify the main constraint of selection in type 1 taste receptors. 2160 bp nucleotides in total were used in the analysis after codons were removed from the alignment. A two ratio model in the research was used in the identification of the amount of pressure in pseudogenized type 1 taste receptors. Two of the available carnivore species were tested using behavioral tests to identify the relationship between the perception to taste as well as diet and Tas1r2. Two Asian otters with small claws whose type 1 taste receptors were considered defective were tested to investigate the reason for their preference in compounds with a sweet taste.

Key findings in the study

The study identified high instances of functional loss of type 1 taste receptors in most carnivores closely related to Felidae. Seven of the animals tested in this study including sea lion, fossa, and spotted hyenas were identified with a significant quantity of ORF-disrupting mutations. Seven of the species where the mutations were found shared neither of the disrupting mutations. This was in exception of the sea lion as well as the fur seal. The research provided further insight with data collected supporting the view that taste 1 receptors have undergone a convergent evolution. The type 1 taste receptor-like many of the genes found in vertebrates was identified to be still under a strong process of purifying selection. As evolution in mammals changes over time, various species have changed their diet at different times adopting a diet that is more carnivorous. Dolphins were also tested in the study to identify the instances of pseudogenized taste receptors. The dolphins showed a low response to type 2 taste receptors. The dolphins however had a high sensitivity to quinine compounds with high quinine concentrations. The pseudogenization of the taste receptors in the animals including dolphins and sea animals shows that the receptors are not useful in tasting for the species. The extra-oral taste of the compounds which require these taste receptors is impossible. These receptors which lack in the identified species are considered as primary receptors for the taste of humans and rodents. These functions are likely to be replaced by other mechanisms in the species in which the receptors have been pseudogenized. The mechanisms which substitute the receptors in the role can be identified through further study.

Importance of the study

The study helps in giving major insights into the loss of taste in some mammals. Aquine genomics identified with species such as dolphins and sea lions can be improved from the findings in this research regarding the taste of some compounds as well as lack of taste for others. The research identifies some of the receptors found in some species and insensitive in others which may be a major reason for the feeding adaptation of many mammals. The study also offers recommendations for further research to identify the various mechanisms used by the species lacking certain taste receptors as a substitute for those functions. Future scientists can use this study as a reference point in developing a further study of the evolution of taste in different species as they adapt to various feeding ecologies. The paper can also be used as a relevant research article for aquine genomics.

Practical applications of the research work

The research can be used as a major development in the field of biology. The study identifies the differences in receptors in different animals as they undergo evolution in different ecological environments. As evolution is a major part of the field of biology, the study can help in identifying some of the overlooked aspects of evolution such as the loss of some taste receptors leading to the evolution in feeding behaviors and mechanisms. As different species of animals adapt to a different environment, they are likely to substitute some of their taste receptors with different ones or with different feeding mechanisms. Future researchers interested in identifying these mechanisms can perform further studies to identify the substitute mechanism. The study also helps in affirming that the loss of taste in some mammals can be attributed to the change in feeding behavior and mechanisms in mammals.

Replication by other scientists

The methods of study used in this study are primarily for scientists in the field of biology. Only experts can be able to replicate the methods used in this research as they involve major genetic experiments. The collected data is a major process in every research paper and should always be conducted using the right model and design. Lack of an understanding of the design can undermine its efficiency in collecting data which can be used in making substantial conclusions. The results interpretation process also requires biology experts to be able to draw

important conclusions from the research paper. Future scientists can use the results in this study as a reference for future study as well as developing further questions for study.

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