



2024年第10期 总423期

## 茶学研究专题

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1. 用于测定昆虫生物多样性指数的方法和装置、昆虫传感器和昆虫传感器系统
2. 用于控制和传递捕虫器状态的方法和系统

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## 学术文献

### 1. Pheromone biosynthesis activating neuropeptide family in insects: a review (昆虫信息素生物合成激活神经肽家族的研究综述)

简介: Neuropeptides are involved in almost all physiological activities of insects. Their classification is based on physiological function and the primary amino acid sequence. The pyrokinin (PK)/pheromone biosynthesis activating neuropeptides (PBAN) are one of the largest neuropeptide families in insects, with a conserved C-terminal domain of FXPRLamide. The peptide family is divided into two groups, PK1/diapause hormone (DH) with a WFGPRLa C-terminal ending and PK2/PBAN with FXPRLamide C-terminal ending. Since the development of cutting-edge technology, an increasing number of peptides have been sequenced primarily through genomic, transcriptomics, and proteomics, and their functions discovered using gene editing tools. In this review, we discussed newly discovered functions, and analyzed the distribution of genes encoding these peptides throughout different insect orders. In addition, the location of the peptides that were confirmed by PCR or immunocytochemistry is also described. A phylogenetic tree was constructed according to the sequences of the receptors of most insect orders. This review offers an understanding of the significance of this conserved peptide family in insects.

来源: Frontiers in Endocrinology 期刊

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### 2. Pathogen-Mediated Alterations of Insect Chemical Communication: From Pheromones to Behavior (病原体介导的昆虫化学通讯的改变: 从信息素到行为)

简介: Pathogens can influence the physiology and behavior of both animal and plant hosts in a manner that promotes their own transmission and dispersal. Recent research focusing on insects has revealed that these manipulations can extend to the production of pheromones, which are pivotal in chemical communication. This review provides an overview of the current state of research and available data concerning the impacts of bacterial, viral, fungal, and eukaryotic pathogens on chemical communication across different insect orders. While our understanding of the influence of pathogenic bacteria on host chemical profiles is still limited, viral infections have been shown to induce behavioral changes in the host, such as altered pheromone production, olfaction, and locomotion. Entomopathogenic fungi affect host chemical communication by manipulating cuticular hydrocarbons and pheromone production, while various eukaryotic parasites have been observed to influence insect behavior by affecting the production of pheromones and other chemical cues. The effects induced by these infections are explored in the context of the evolutionary advantages they confer to the pathogen. The molecular mechanisms governing the observed pathogen-mediated behavioral changes, as well as the dynamic and mutually influential relationships between the pathogen and its host, are still poorly understood. A deeper comprehension of these mechanisms will prove invaluable in identifying novel targets in the perspective of practical applications aimed at controlling detrimental insect species.

来源: Pathogens 期刊

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### **3. Sex Pheromone Receptors of Lepidopteran Insects (鳞翅目昆虫的性信息素受体)**

简介: The sex pheromone receptors (SPRs) of Lepidopteran insects play important roles in chemical communication. In the sex pheromone detection processes, sex pheromone molecule (SPM), SPR, co-receptor (Orco), pheromone binding protein (PBP), sensory neuron membrane protein (SNMP), and pheromone degradation enzyme (PDE) play individual and cooperative roles. Commonly known as butterfly and moth, the Lepidopteran insects are widely distributed throughout the world, most of which are pests. Comprehensive knowledge of the SPRs of Lepidopteran insects would help the development of sex lure technology and the sex communication pathway research. In this review, we summarized SPR/Orco information from 10 families of Lepidopteran insects from corresponding studies. According to the research progress in the literature, we speculated the evolution of SPRs/Orcos and phylogenetically analyzed the Lepidopteran SPRs and Orcos with the neighbor-joining tree and further concluded the relationship between the cluster of SPRs and their ligands; we analyzed the predicted structural features of SPRs and gave our prediction results of SPRs and Orcos with Consensus Constrained TOPology Prediction (CCTOP) and SwissModel; we summarized the functional characterization of Lepidopteran SPRs and SPR-ligand interaction and then described the progress in the sex pheromone signaling pathways and metabotropic ion channel. Further studies are needed to work out the cryo-electron microscopy (EM) structure of SPR and the SPR-ligand docking pattern in a biophysical perspective, which will directly facilitate the understanding of sex pheromone signal transduction pathways and provide guidance in the sex lure technology in field pest control.

来源: Frontiers in Ecology and Evolution 期刊

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### **4. The critical role of primer pheromones in maintaining insect sociality (引物信息素在维持昆虫社会性中的关键作用)**

简介: Primer pheromones play a pivotal role in the biology and social organization of insect societies. Despite their importance, they have been less studied because of the complexity of the required bioassays and, consequently, only a few of them have been chemically identified to date. The major primer pheromones are that of the queen pheromones that regulate reproductive skew and maintain colony cohesion and function. From a theoretical viewpoint, several features regarding the chemistry of queen pheromones can be predicted. They should be generally nonvolatile in order to avoid saturation of the colony space, which might otherwise hamper their perception because of sensory habituation. Accordingly, they should be actively dispersed throughout the colony by workers. The queen pheromone should also be caste-specific, qualitatively different from any worker pheromone, and preferably multicomponent, to allow unequivocal identification of the queen. The bi-potency of the female larvae in social Hymenoptera to become queen or worker necessitates strict regulation over pheromone production. Indeed, in the

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honeybee, the biosynthetic pathways as well as the genomic expressions are completely disparate between queens and workers. Future advances in chemical analyses, transcriptomics, proteomics, and metabolomics will enrich our understanding of the chemistry, mechanisms, and crucial role that primer pheromones play in social evolution.

来源: Zeitschrift Fur Naturforschung Section C-A Journal of Biosciences 期刊

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## ➤ 相关专利

### **1. METHOD AND APPARATUS FOR DETERMINING AN INDEX OF INSECT BIODIVERSITY, AN INSECT SENSOR AND A SYSTEM OF INSECT SENSORS (用于测定昆虫生物多样性指数的方法和装置、昆虫传感器和昆虫传感器系统)**

简介: 一种用于确定昆虫生物多样性指数的装置, 包括: 多个光学昆虫传感器装置, 配置为单独放置在地理区域内, 每个昆虫传感器装置配置为: 通过检测来自检测体的光来监测延伸到昆虫传感器装置外部的检测体内的昆虫活动, 并输出指示与各自检测到的昆虫检测事件相关联的一个或多个光学检测属性的探测器数据, 每个昆虫检测事件指示存在于检测体中的一个或多个昆虫; 数据处理系统以通讯方式耦合到多个光学昆虫传感器设备, 并配置为: 接收来自多个光学昆虫传感器设备中各自的探测器数据, 探测器数据指示与各自检测到的昆虫检测事件相关联的一个或多个光学检测属性, 并且从接收到的探测器数据计算昆虫生物多样性指数, 指示地理区域内的昆虫生物多样性。

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### **2 . METHOD AND SYSTEM FOR CONTROLLING AND COMMUNICATING THE STATUS OF AN INSECT TRAP (用于控制和传递捕虫器状态的方法和系统)**

简介: A device for controlling at least one insect bait station (100), in particular for insects harmful to humans, animals and plants, in which the bait station is provided with : at least one container (3, 5) provided with an insect entrance opening, the container containing bait and being at least partially transparent or translucent, a lighting device (10) lighting the inside of the container but located outside same, a telecommunication module (23, 25) and a printed circuit comprising, inter alia, a memory and a processor connected to said telecommunication means. The device comprises an optical sensor essentially opposite the lighting device, and connected to the printed circuit (12), which measures the general opacity caused by the insect(s) in the container, the corresponding value being transmitted for processing and analysis of the status of the bait station.

来源: 西班牙专利

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