



2024年第14期 总427期

茶学研究专题

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1. 昆虫气味受体在人源性气味检测中的应用

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➤ 前沿资讯

1. World's First Higher Education Institution Dedicated to Tea Opens in Kenya (在肯尼亚开设了世界上第一所专门研究茶叶的高等教育机构)

简介：肯尼亚总统William Samoei Ruto博士阁下正式为立顿茶叶创新与技术学院揭幕，其使命是使肯尼亚成为世界茶叶种植先进技术和知识的中心。该学院由世界上最大的茶叶集团和肯尼亚茶叶的最大买家LIPTON Teas and Infusions与肯尼亚政府教育部和卡比安加大学共同资助，是第一所致力于茶叶的高等教育机构。每年将有多达3000名肯尼亚人在该学院接受专业培训，以支持该国最大的出口行业的发展，而不仅仅是生产优质原材料，还将培养全球所需的人才。通过创造国际品质和实践，该学院将进一步加强肯尼亚茶作为优质价值代名词的原产地认定，将有助于提高整个地区的生活水平。

来源：World Tea News 网站

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全文链接：<http://agri.nais.net.cn/file1/M00/03/6C/Csgk0WX837eAIYFpAAeDFoGCQhM874.pdf>

➤ 学术文献

1. Gas-phase odor mixture quantification based on relative comparison method using multiple olfactory receptors (基于多嗅觉受体相对比较法的气相混合气味定量)

简介：The gas-phase odor biosensors exhibit outstanding sensitivity and selectivity towards target ligands. Current odor detections, however, were only operated under one or multiple separated olfactory receptors (ORs) stimulated by a single component odor. Meanwhile, the nonlinear characteristic, drift, and aging problems in biosensors were the main barriers for better quantification performance. Here, we proposed a gas-phase odor biosensor for odor mixture quantification based on relative comparison method using cell expressing ORs, the liquid thickness control and liquid exchange maintained repeatable OR responses. We repeatedly compared the known and its adjacent unknown odor response thus mitigating the biosensor drift interference and sensor nonlinearity characteristic. We first conducted the odor quantification of one odor component in a mixture of five odors. The existence of other odors did not influence the quantification of Or56a towards geosmin component in the mixture. Then, two types of OR were utilized for quantifying odor mixture with or without adding the OR label information to the individual cells. With-label quantification was more precise and efficient than without-label one. Lastly, we simultaneously expressed two ORs on one cell line for wider detection range and quantified the mixture even if OR has cross sensitivity. We believe the odor mixture quantification methods established in this study will extend the application scenarios of odor biosensors especially in rapid on-site odor detection.

来源：Sensors and Actuators B: Chemical 期刊

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2. iORandLigandDB: A Website for Three-Dimensional Structure Prediction of Insect Odorant Receptors and Docking with Odorants (iORandLigandDB: 昆虫气味受体三维结构预测及与气味分子对接的网站)

简介: The use of insect-specific odorants to control the behavior of insects has always been a hot spot in research on “green” control strategies of insects. However, it is generally time-consuming and laborious to explore insect-specific odorants with traditional reverse chemical ecology methods. Here, an insect odorant receptor (OR) and ligand database website (iORandLigandDB) was developed for the specific exploration of insect-specific odorants by using deep learning algorithms. The website provides a range of specific odorants before molecular biology experiments as well as the properties of ORs in closely related insects. At present, the existing three-dimensional structures of ORs in insects and the docking data with related odorants can be retrieved from the database and further analyzed.

来源: Insects 期刊

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全文链接: <http://agri.nais.net.cn/file1/M00/10/3E/Csgk0EGk9QOAVKA7AC9X4qC9BL4534.pdf>

3. Gas Phase Odorant Detection by Insect Olfactory Receptor (通过昆虫嗅觉受体检测气相气味)

简介: The OR (olfactory receptor) with its high selectivity and sensitivity attracts many researchers to apply it to numerous kinds of odor biosensors. Till now, the liquid phase odorant detection has been well studied. However, most of the odorant molecules that scientists are interested in are hydrophobic and exist in atmosphere. Meanwhile, some odorant samples to be detected are precious and hard to collect. Here, we developed a gas phase odorant detection system using cell expressing insect OR. We then tested it with target ligand as well as reference gas and obtained the typical OR response. After this, we checked the influence of stimulation duration and liquid thickness to it. Moreover, the detection limit and selectivity were confirmed by a series of experiments. In addition, the sample concentration dependency was exhibited and a hypothesis towards inhibition phenomenon was proposed. Lastly, a human sensory test was operated to compare the performance of our system with human olfaction. In our system, only sub-milliliter target odorant was enough to trigger the OR response. Altogether, these results suggest this odor biosensor can be applied to gas phase odorant detection in multiple aspects owing to its detection capability and rapid response.

来源: IEEE Sensors Journal 期刊

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全文链接: <http://agri.nais.net.cn/file1/M00/03/6C/Csgk0WX79oOAR5jOAELZ2r50tuI967.pdf>

4. Topology prediction of insect olfactory receptors (昆虫嗅觉受体的拓扑预测)

简介: Olfactory receptors are important transmembrane proteins that enable organisms to perceive

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odours and react to them. Structural understanding of insect olfactory receptors is scarce. In this review, we discuss different transmembrane helix prediction methods, consensus methods, topology prediction methods which can enable topology prediction of these proteins. We discuss the current success rates by applying the algorithms on few G-protein coupled receptors of known structure and olfactory receptor sequences and outstanding challenges. Finally, we discuss the impact of topology prediction on biology and modeling of ORs.

来源: Current Opinion in Structural Biology 期刊

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➤ 会议论文

1. Application of Insect Odorant Receptors for the Detection of Human-Derived Odorants (昆虫气味受体在人源性气味检测中的应用)

简介: Insects can detect various odorants with high sensitivity and selectivity in accordance with their habitat. The selection of appropriate odorant receptors (ORs) in insect species can enable the detection of target odors. In this study, we developed a sensing element that detects human-derived odorants by functionally expressing insect ORs in Sf21 cells. Using a database of olfactory responses, we selected target ORs from two insect species, i.e., *Drosophila melanogaster* and *Anopheles gambiae*, for introduction into Sf21 cells along with the calcium-sensitive fluorescent protein gene *GCaMP6s*. Based on calcium imaging, Sf21 cells expressing *DmelOR13a* responded to the human-derived odorant 1-octen-3-ol and Sf21 cells expressing *AgamOR16* responded to the human aging-related odorant Z2-nonenal. These results indicate that target odorants can be effectively detected by selecting optimal insect ORs based on response characteristic data, suggesting the potential to extend the scope of ORs used for sensing technologies to diverse insect species.

来源: IEEE 会议录

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