

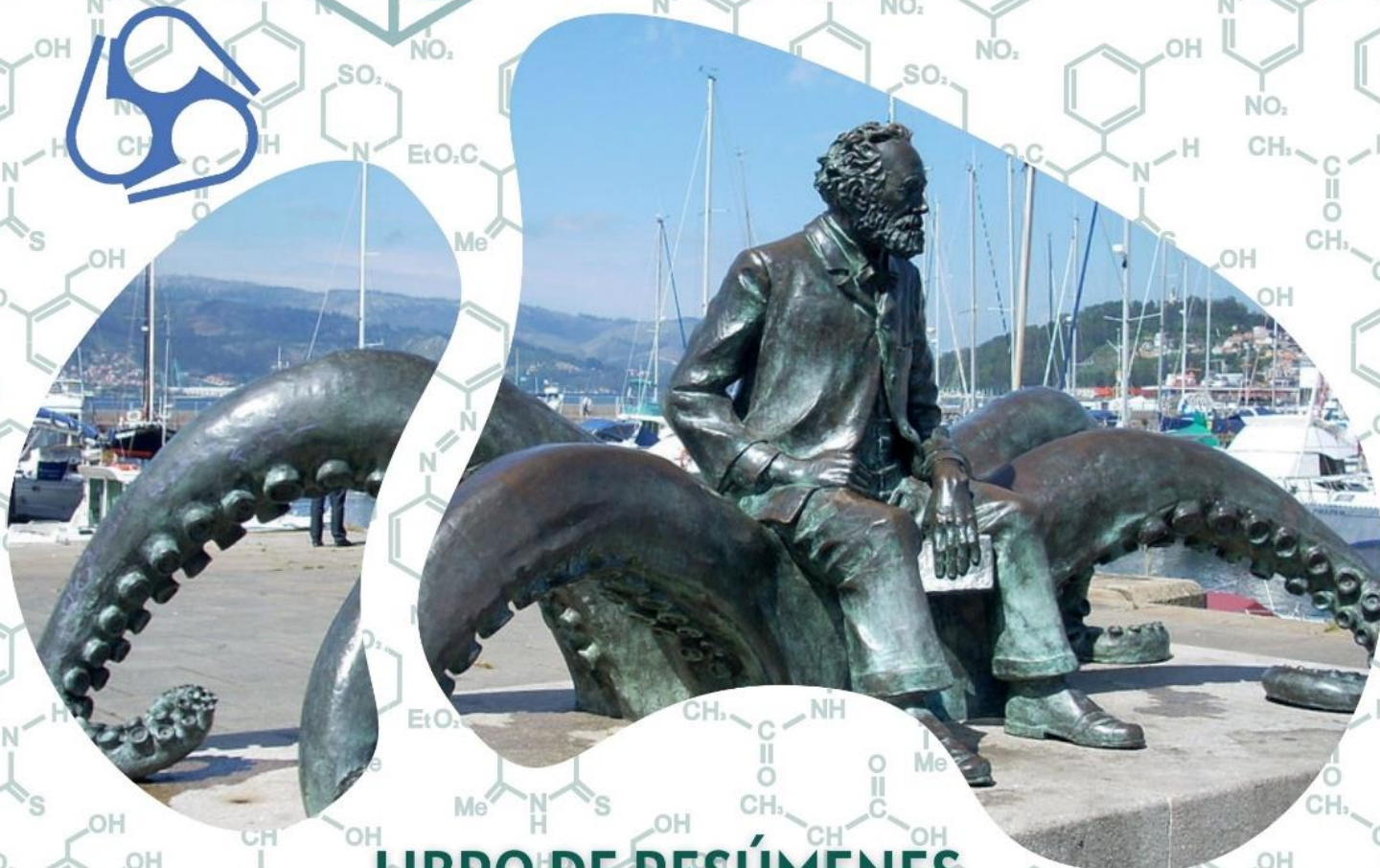
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Ensuring food safety: Electrochemical genosensors for the authentication of plant honey origin

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Honey is a high-quality and natural ingredient often consumed because of its unique sweet taste and multiple therapeutic and nutritional benefits [1]. These properties are normally intrinsically connected to the regional flora from which the plant pollen is harvested. Hence, the botanical and geographical origins of honeys play a substantial role in the end product's composition [2].

With the recent interest in natural food products many businesses, including the honey industry, have observed a significant expansion in production and market value [2]. However, honey is susceptible to adulteration and, as more and more adulterated honeys are being found on the global market, it is difficult to monitor the safety and quality of all honey products, making honey fraud a serious problem for both consumers and the food industry [3]. Some of the most prevalent fraudulent acts include mislabeling the botanical and geographic origin of honeys and mixing pure honey with inferior honeys, processed sugars, syrups, and other substances [4]. Thus, there is a need to develop an analytical tool that can quickly, cheaply, and easily guarantee the quality and safety of honey.

In this study, an electrochemical genosensor, based on a sandwich format DNA hybridization reaction between two complementary probes, for the detection and quantification of two pollen producing plant species: *Erica arborea* and *Castanea sativa* were designed and optimized. Analyzing public databases, two synthetic DNA-target sequences capable of unequivocally detecting the pollen from *E. arborea* and *C. sativa* were selected and designed. Their complementary oligonucleotide probes were also designed and cut into two distinct sequences: the DNA-capture and DNA-signaling probes.

In order to recognize the two plant species in real honey and pollen DNA samples and optimize the hybridization procedure, a mixed self-assembled monolayer of each plant species' DNA-capture probe and mercaptohexanol was used. Then, the electrochemical signal was enzymatically amplified using chronoamperometric measurements. A concentration range of 0.03 to 2.00 nM for *E. arborea* and 0.03 to 1.00 nM for *C. sativa* were obtained. The developed sensors were successfully applied for the detection and quantification of the two plant species in real plant samples and, thus, indicate the botanic origin of honeys. Therefore, the developed electrochemical genosensors are a viable and affordable analytical tool to authenticate the botanical origin of honeys, ensuring honey quality and safety for consumers as well as the industries.

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References

- [1] S. Soares, F. Rodrigues, C. Delerue-Matos, *Molecules*, 28 (2023) 2106.
- [2] G. Zhang, W. Abdulla, *Food Control*, 138 (2022) 108992.
- [3] C. Brooks, L. Parr, J.M. Smith, D. Buchanan, D. Snoich, A. Hebshy, *Food Control*, 130 (2021) 108171.
- [4] L. Manning, J.M. Soon, *Journal of Food Science*, 81 (2016), 823-834.