

# Method development for detecting a phytosanitary vitamin K antagonist molecule: Brodifacoum in three compartments of a mangrove ecosystem

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Are you motivated by the quality of aquatic environments and chemical analysis?



This internship at the interface between ecology and chemistry is made for you

## Internship Context

Island systems with little or no human habitation are veritable sanctuaries of biodiversity, however subject to severe erosion. Invasive alien species have recently been identified as the main cause of this decline, and constitute a major concern for the preservation of these isolated environments. Indeed, if the natural species present have been able to adapt to the sometimes extreme environmental conditions, they have not however developed any defense mechanism against the colonization of new species such as rats which exercise predation on birds.

In order to combat this threat, the spreading of biocidal baits is envisaged to combat the proliferation of rats, particularly in certain ecosystems that are difficult to access such as mangroves.

The phytosanitary molecule selected to carry out eradication actions is Brodifacoum, which belongs to the chemical family of vitamin K antagonists (Figure 1).

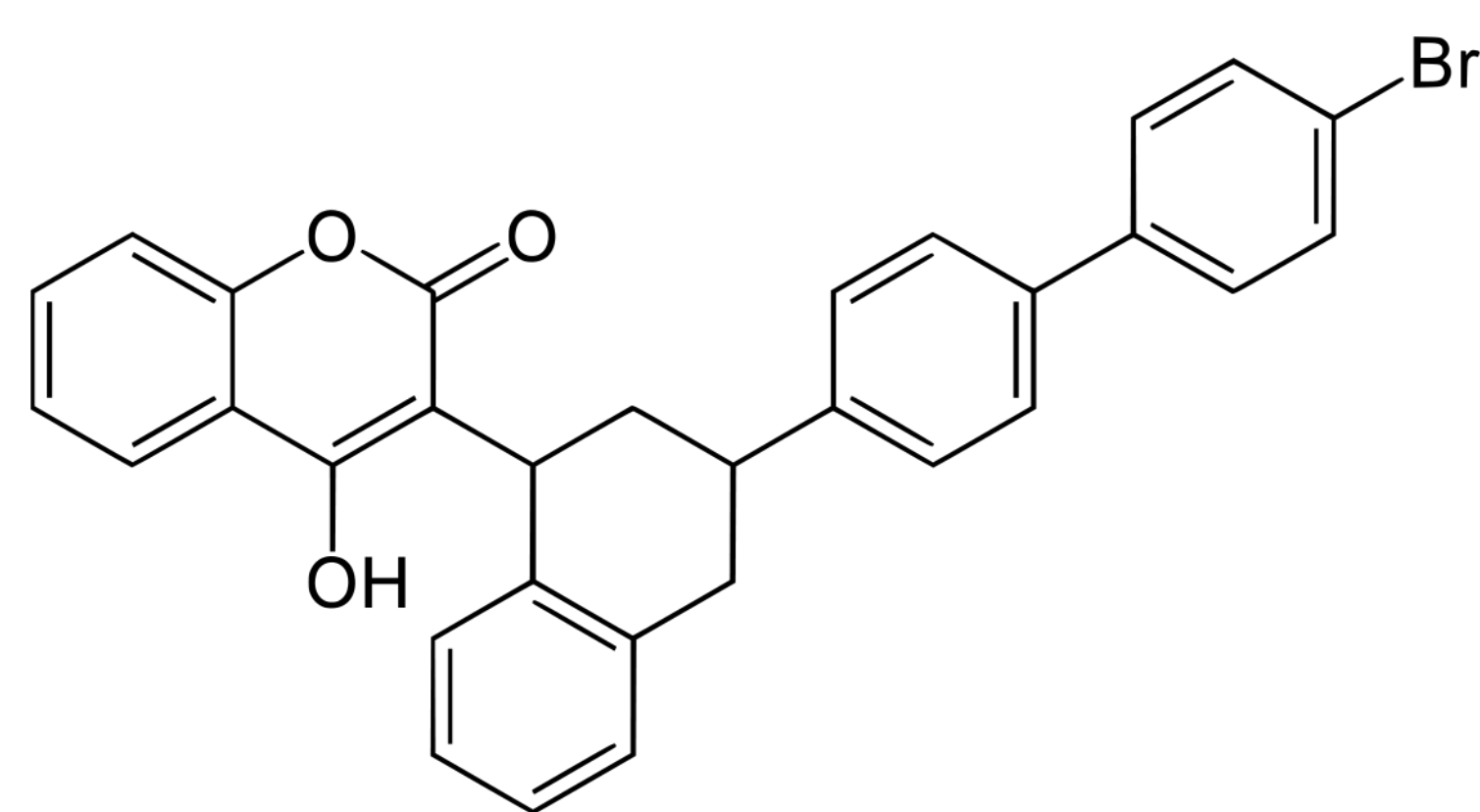


Figure 1 : Brodifacoum structure

Given the very limited number of studies focusing on the impact of anticoagulant biocidal molecules on aquatic ecosystems, it was decided to carry out a spreading test on a relatively isolated mangrove in Europa (17ha), station 1 and study the fate of brodifacoum in this station and 3 others around the island (Figure 2).

This research project is in collaboration with the University Center of Mayotte and the French Southern and Antarctic Lands (TAAF)

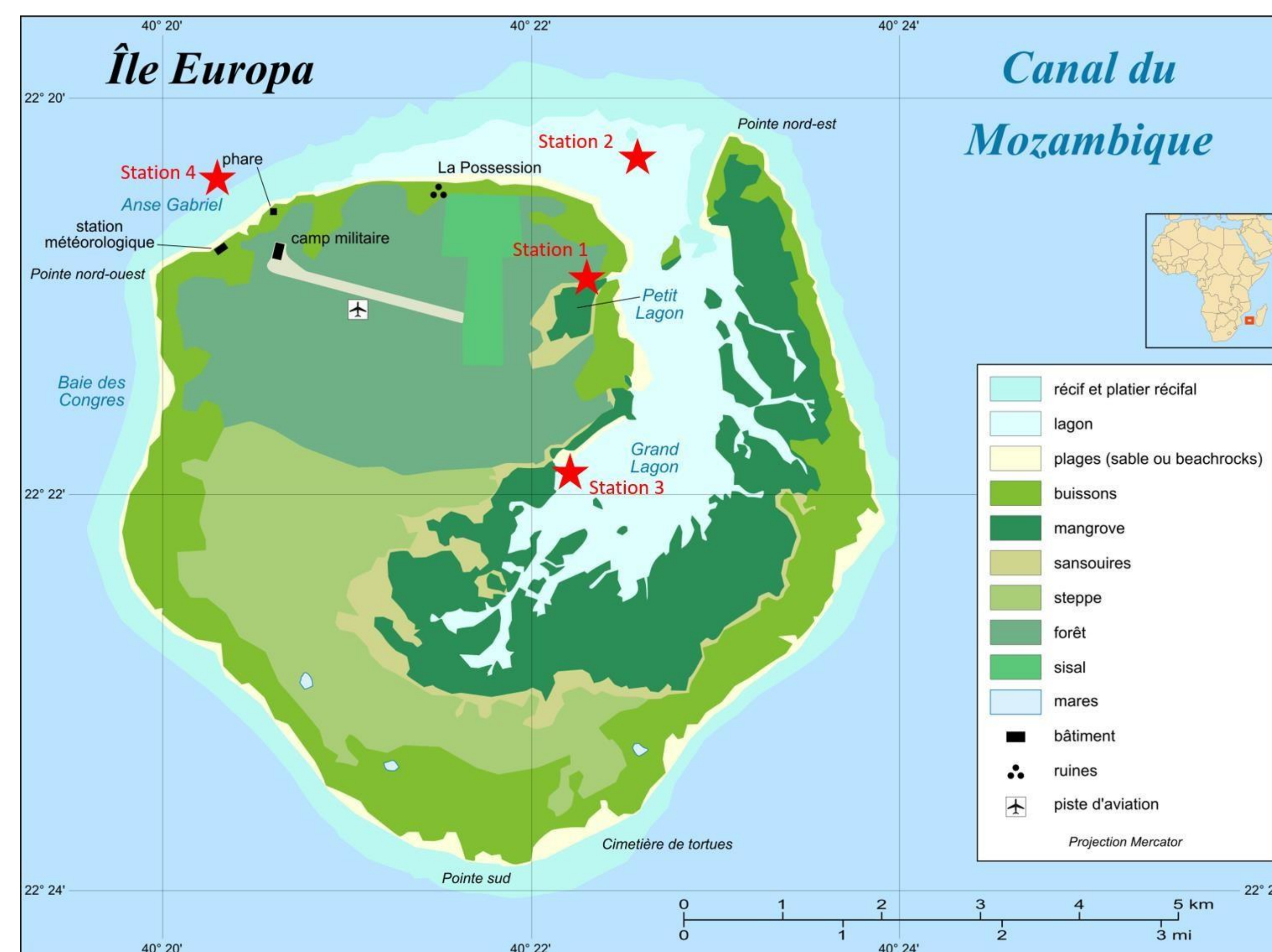


Figure 2: Indicative location of the main monitoring stations (POCIS + samples + biote). Credits: Eric Gaba and Bruno Navez (2008). Source: NASA, Wikimedia Commons

## Internship objectives

In this context, a preliminary work consisted in developing an analytical method allowing to detect brodifacoum and its metabolites in three compartments of aquatic ecosystems by high resolution mass spectrometry :

- Water matrix (method already developed)
- Living tissues (method already developed)
- Sediment matrix (method to be developed)

To then be able to apply it to the mangrove ecosystem and to adjacent aquatic ecosystems at three time steps:

- Evaluation of an initial state: Spreading - 1 month (already done)
- Short-term impact assessment: Spreading + 1 month (already done)
- Long-term impact assessment: Spreading + 1 year (to be performed)

The student will be required to analyze the samples from the third sampling campaign. He will also interpret all the data from the 3 matrices analyzed and the 3 campaigns to conclude on the impact of brodifacoum on this mangrove ecosystem (transfer from environmental compartments to biota, bioaccumulation, biomagnification, associated risks).

The student will be trained in the preparation of environmental samples and in liquid chromatography coupled with high resolution mass spectrometry. This is an ideal internship for a student wishing to work in the field of water quality.