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**Sudoe**



**Phy2SUDOE**

European Regional Development Fund

**RECOVERING CONTAMINATED SOILS THROUGH PHYTOMANAGEMENT  
IN SOUTHWEST EUROPE**



## PRODUCT 3.4

# **COLLECTION OF MACROINVERTEBRATE TISSUES WITH ENVIRONMENTAL APPLICATIONS POTENTIAL**

GT3 - Identification and Conservation of endemic biodiversity of contaminated sites for potential exploitation in biotechnological applications

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## 1. INTRODUCTION

Macroinvertebrates contribute to key ecological processes, including nutrient cycling, organic matter decomposition, and water purification. They are integral components of food webs, providing food sources for higher trophic levels and supporting biodiversity sites with chronic metal contamination, such as mining sites. Macroinvertebrates also serve as environmental sentinels, i.e., as indicators of contamination and habitat degradation caused by, e.g., mining activities. Changes in their abundance, diversity, and physiological responses can provide early warning signs of detrimental effects on the ecosystem. They also hold significant scientific value in unraveling the evolutionary mechanisms of metal tolerance developed.

The tissues of macroinvertebrates, namely snails, slugs, earthworms, and some grasshoppers and crickets, collected in different mines within the Phy2SUDOE project network (Table 1), are now stored in the Biscay Bay Environmental Biospecimen Bank (BBEBB), located in the Research Centre for Experimental Marine Biology & Biotechnology in Plentzia (PiE-UPV/EHU), affiliated with the University of the Basque Country (UPV/EHU). These samples are available for researchers and scientific institutions that would like to advance knowledge on the topic. The BBEBB was designed to store environmental samples, combine chemical data, and assess biological effects in those samples, with the aim of providing a continuous update of the ecotoxicity profiles and including biological specimens of different target species (terrestrial and marine) such as annelids, molluscs, and fish, among others. The BBEBB is part of the International Environmental Specimen Bank Group (IESB) which promotes the worldwide development of techniques and strategies for environmental specimen banks and seeks international cooperation and collaboration among nearly 30 environmental specimen banks worldwide.



**Table 1:** Contaminated sites where macroinvertebrates were collected during the Phy2SUDOE project.

LOCATION	TYPE OF DEGRADED SOIL	MAIN CONTAMINANTS
<b>St Médard d'Eyrans</b> (Gironde, Fr)	Abandoned industrial area	Cu/PAH
<b>Borralha</b> (Montalegre, PT)	Former mining area	Cu, Pb, W
<b>Touro</b> (Galicia, ES)	Mine tailing	Cd, Pb, Zn
<b>Lanestosa</b> (Basque Country, ES)	Former mining area	Pb, Zn
<b>Bandeira quarry</b> (Galicia, ES)	Abandone serpentine quarry	Ni, Cr
<b>Sentein-Bulard</b> (Ariège, FR)	Former mining area	Zn, Pb, Cd

This collection will allow the assessment of the impact of mining activities on these organisms and their associated ecosystems, and researchers can analyze the tissues to determine the accumulation of contaminants or changes in physiological responses, providing valuable insights into the potential ecological effects of mining operations. This information plays a crucial role in developing effective environmental management strategies and mitigating the negative impacts on macroinvertebrate populations. Additionally, the collection serves as a valuable resource for future studies on the long-term effects of mining on macroinvertebrates. It allows for surveys, analyses, and the monitoring of changes in genetic, physiological, or morphological characteristics over time. This long-term perspective is essential for understanding the resilience and adaptability of macroinvertebrates to mining-induced stressors, as well as identifying potential evolutionary responses or adaptations. Moreover, the collection of macroinvertebrate tissues from mining sites contributes to the overall knowledge



and understanding of these organisms in the context of mining ecosystems. It provides a reference dataset for comparisons with other ecosystems and enables broader-scale assessments of the ecological consequences of mining activities.

## 2. COLLECTION OF MACROINVERTEBRATES

The tissues of the collected macroinvertebrates were processed and preserved in a new section created in the Environmental Biospecimen Bank of the Bay of Biscay: MINE MACROINVERTEBRATES (Table 2). Each sample was assigned a unique accession number and is accompanied by a detailed information sheet that includes data such as sampling date, location, species description, size, and weight. This information was recorded and integrated into a database managed by UPV.

**Table 2:** Collection of Invertebrates (section: Mine Invertebrates) available in the Biscay Bay Environmental Biospecimen Bank.

SITE	SPECIES	TYPE OF SAMPLES (NO.)
LANESTOSA	- 32 slugs ( <i>Arion ater</i> )	- Fixed & paraffin (Slugs (10), snails (5))
	- 17 snails (13 <i>Cantareus aspersus</i> (4 <i>Cerneuella virgata</i> ))	- Frozen - Slugs (22), snails (12)
SENTEIN-BULARD	- 3 Grasshoppers & crickets	- Frozen
TOURO	- 20 Snails (13 <i>Cantareus aspersus</i> ; 7 <i>Cerneuella virgata</i> )	- Fixed & paraffin (slugs 6, snails 12)
	- 17 Slugs: <i>Arion ater</i>	- Frozen (slugs 11, snails 8)
BANDEIRA (Serra do Careon)	- 5 snails ( <i>Cantareus aspersus</i> )	- Fixed & paraffin (snails 5, slugs 5)
	- 15 slugs ( <i>Deroceras reticulatum</i> )	- Frozen (slugs 10)
SAINT MEDARD D' EYRANS	- 4 snails ( <i>Cantareus aspersus</i> )	- Frozen
BORRALHA		- Fixed & paraffin (slugs 5)
	- 16 slugs ( <i>Arion ater</i> )	- Frozen (slugs 11)



The collection will also facilitate cooperation and data sharing among researchers and institutions. Centralizing the samples and associated data, it promotes interdisciplinary research, enables meta-analyses, and fosters the exchange of knowledge and best practices in mining impact assessment and environmental monitoring.

### 3. DISSEMINATION OF THE MACROINVERTEBRATE COLLECTION

The dissemination of the Mine Macroinvertebrate collection to researchers, research institutions, and environmental technicians will be performed through:

- A. Publish Research Findings:** publish research papers that refer to or that have used this tissue collection will highlight its importance, scope, and the research opportunities it offers. This will help raise awareness among the scientific community and attract the attention of researchers from different institutions.
- B. Scientific Conferences and Workshops:** present the collection at relevant scientific conferences, symposiums, or workshops; organize sessions or poster presentations to showcase the collection's significance, research potential, and available resources; Engage with researchers directly to discuss collaborations and disseminate information about accessing the collection.
- C. Collaborative Networks and Consortia:** establish collaborative networks, consortia, or research partnerships related to the field of study; share information about the collection within these networks, highlighting its value and encouraging researchers to utilize the resources available; collaborative platforms provide a direct channel for disseminating the existence of the collection and connecting with potential users.
- D. Online Platforms and Databases:** Phy2SUDOE website, PiE-UPV/EHU website (in a specific section devoted to BBEBB) will describe the collection's details, including its objectives, available specimens, and associated data. The collection will also be registered in relevant online databases to expand its visibility to a wider research community. As PiE-UPV/EHU is part of EMBRC (European Marine which integrates over 30 marine biological stations from various regions of the world's oceans and seas, access to samples stored at



BBEBB is provided and information on the collection will be available in EMBRC website.

**E. Social Media and Online Presence:** Twitter, LinkedIn, or ResearchGate will be used to share updates, publications, and relevant information about the collection.





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