

Annex 3. Topic 3: The co-development of AI-based image recognition for European terrestrial molluscs

1. Challenges to address by the Proposal

Proposals should contribute to a more efficient and accurate understanding of the distribution and diversity of terrestrial molluscs, which could be used to inform conservation efforts, invasive species management and biodiversity protection.

2. Practical impact on site

Proposals should be based on real needs of local biodiversity hot-spots, protected areas or taxonomy knowledge centres all over Europe, to develop an artificial intelligence (AI) system for field and collection work, making it easier and faster to identify terrestrial molluscs in the field and in the collection.

Proposals will involve a cooperation between 3-4 natural history collections to digitise a selection of terrestrial molluscs (with emphasis on Vertiginidae, especially *Vertigo* species) and make these records and images available through GBIF. The work will focus on recognition of shells of terrestrial molluscs (so non-alcohol collections). The final selection of the species to be digitised needs to be taken in consultation with the TETTRIs consultants.

3. Collaborative approach (compulsory activities)

In cooperation with TETTRIs consultants, proposals should aim to co-develop an AI system to recognize terrestrial molluscs using image recognition technology. Based on these images an image recognition algorithm will be built as part of TETTRIs project which needs to be tested both in the field and in the collections. The field test could take the form of a field course on terrestrial molluscs where the use of the model is part of the training. Most of the budget should be spent on digitalisation (including images) in order to get a sufficient amount of training data. All images together with the connected metadata should be made publicly available through GBIF. The project will be implemented without the need for extensive training, as protocols are already in place. However, some investment of time by the TETTRIs expert will be needed to ensure that all participants follow the same protocol and target the focal species. If any, the cost for travel and accommodation for those TETTRIs experts to join the workshops should be budgeted in the proposals for 3pp.

4. Innovation

In addition to the collaboration with TETTRIs consultants, proposals may also include own creative activities and innovations, such as (**but not limited to**):

- **Citizen science:** The project should involve the development of a citizen science program focused on terrestrial molluscs. This program could involve training and mobilising volunteers to assist in collecting and digitising image data, as well as testing the image recognition model in the field. The program could also involve outreach and education efforts to increase public awareness of the importance of terrestrial molluscs and their conservation.
- **Invasive species management:** The project should focus on the use of the image recognition model to assist in the management of invasive species. For example, the model could be used to identify invasive molluscs in the field or in collections, allowing for more targeted and efficient management efforts. The work package could involve collaborations with local conservation organisations and government agencies to develop and implement invasive species management plans.

- **Biodiversity protection:** The project should focus on the use of the image recognition model to support biodiversity protection efforts. For example, the model could be used to monitor populations of threatened or endangered mollusc species, allowing for more effective conservation measures. The work package could involve collaborations with local and international conservation organisations to develop and implement biodiversity protection plans.
- **Data sharing and collaboration:** The project should focus on data sharing and collaboration between natural history collections beyond the ones already involved in the proposed work. This could involve the development of standardised protocols for digitising image data, as well as the creation of a centralised database or platform for sharing and analysing the data. The project could also involve collaborations with other projects or initiatives focused on biodiversity conservation or image recognition, allowing for greater synergies and knowledge exchange.
- **Technology development:** Finally, the project should focus on the development of new technologies or approaches to improve image recognition or data collection. For example, it could explore the use of machine learning algorithms to improve the accuracy and efficiency of the image recognition model, or the use of novel imaging techniques (e.g., 3D imaging) to capture more detailed data on mollusc specimens. It may also involve collaborations with universities, research institutes, or technology companies to develop and test new approaches.

5. Expected outcomes

The project will result in the digitalisation (including images) of a large number of molluscs from several natural history collections. These need to be made available through GBIF and will serve to train an image recognition model. The focus will be on Vertiginidae as these contain several EU Habitats Directive species. The field course should result in training on digitalisation and the use of image recognition of 20-25 (volunteer) malacologists. As part of the field course the image recognition model created in WP6.1 of the TETTRIs project should be tested on both collected material and specimens observed in the field.

6. Specific conditions:

- Involved partners in the proposals should have a well maintained and high quality (in reference to identification) mollusc collection ideally curated by an expert
- Involved partners need to have experience with digitisation projects and uploading data to GBIF
- The main applicant and/or the proposal's partners should be well embedded in an organisation active with the taxonomy and conservation of European terrestrial molluscs (e.g. IUCN Mollusc Specialist Group, non-professional taxonomists etc).
- Partners should have easy access to areas with high diversity in terrestrial molluscs.

General Instructions to applicants:

To be considered for funding, proposals should clearly address all three key aspects of the topic, i.e. 1) demonstrating a strong practical impact, 2) implement a collaborative approach, and 3) integrate innovative dimensions to biodiversity identification, monitoring and/or conservation.

Proposals should provide a detailed budget and timeline, as well as clear metrics for measuring project success.

Applicants should also demonstrate relevant experience and expertise in areas such as biodiversity science, citizen science, data analysis, and stakeholder engagement.

Citizen science aspects can be involved in all topics. However, Proposals focused primarily or exclusively in Citizen science engagement will fall under Topic 7.

See the Call text for further detailed information.