

## The »Trebinje *Proteus* Observatory and *Proteus* Rescue and Care Facility«, Bosnia and Herzegovina

### Opazovalni center in center za reševanje ter oskrbo proteusov v Trebinju, Bosna in Hercegovina

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The Town of Trebinje is situated in Trebinjsko Polje at the upstream end of Popovo Polje in Eastern Hercegovina, Bosnia and Herzegovina. This area is a biodiversity »hotspot« for hypogean fauna, including the enigmatic *Proteus anguinus anguinus* Laurenti, 1768, the focal species for the »Proteus Project« in Bosnia and Herzegovina. Forward planning of objectives for the Phase 3 period (2021–2030) of the project included the creation of a multifunctional facility based on the concept of a »Proteus Observatory«. It was intended that such a combined facility would eventually be used as:

- (a) a location at which the visitors could actually see one of the most famous cave animals in the world in its natural habitat, without the use of white light and without entering the cave – a »Proteus Observatory«;
- (b) a »Rescue & Care Facility« for stray, damaged and undamaged proteus;
- (c) a research facility to study and record the behaviours of proteus;
- (d) an ecotourist visitor location; and
- (e) a demonstration centre for conservation activities and associated scientific research.

It was also realised that such a facility could not be developed quickly, due to the constraints placed upon such a plan by the inherent characteristics required by (b) above. The creation and operation of a »Proteus Observatory« such as we had in mind, would also have to be designed in strict compliance with the »Prime Directive and Ethical Code of Practice« of the »Proteus Project«. As such, it must pose absolutely no risk to the health and well-being of any proteus population and must not adversely impact its natural habitat.

A suitable natural location at which to develop the Observatory was found to be at the main entrance area of the Vrelo »Vruljak 2« cave in the Gorica urban district of Trebinje. This cave is part of the Vrelo »Vruljak« Cave System which contains a large population of adult and juvenile proteus (Lewarne et al. 2010).

After much work, the natural entrance was eventually walled up and the access hole was secured by a gate (Fig. 1). Infrared underwater lights and infrared video cameras were then installed in the underwater passages (Fig. 2) and a 12 V DC electrical supply system was fitted just inside the entrance.

This is the first such »Proteus Observatory« in Bosnia and Herzegovina or indeed anywhere within the natural geographical range of proteus, where a viable population can be observed and studied in its native habitat without disturbance either by the regular presence of human visitors or by the use of white light. In comparison with captive proteus held in other subterranean facilities such as the Experimental Ecology Station of the CNRS at Moulis, France (<http://www.ecoex>), the Tular Cave Laboratory, Slovenia (Aljančič et al. 2016), Hermann's Cave, Germany (Ipsen & Knolle 2017) or the Speleovivarium »Erwin Pichl« in Trieste, Italy (Papi & Mauri 2016), the proteus in the Trebinje facility are not physically confined to living in concrete or glass aquaria or in other artificial conditions. Consequently, the observations we record are not subject to the effects of any unnatural environmental constraints placed upon the animals. Our ability to observe and record proteus behaviours under natural conditions relies on a specific behaviour of proteus – extreme site fidelity (Gergely et al. 2015, Gergely & Lewarne 2017).

It is not unusual for proteus individuals to become forced or washed-out of their underground habitat onto the surface, especially when the underground flow rates in the karst aquifer respond to prolonged periods of high rainfall (Aljančič et al. 2016). During the process of being washed-out or forced-out, they are liable to incur physical damage, either from tiny superficial scratches or even the more major types of damage to their gills or even loss of a limb. Moreover, in such a way, injured washed-out proteus are highly susceptible to fungal infections.



**Figure 1.** The completed protected entrance to the »Trebinje *Proteus* Observatory« at the Vrelo »Vruljak 2« cave (photo: B. Lewarne).

**Slika 1.** Zaprt vhod v jamo Vrelo »Vruljak 2«, kjer je postavljen opazovalni center »Trebinje *Proteus* Observatory« (foto: B. Lewarne).



**Figure 2.** Installation of an IR camera with integral IR lights (top) and an independent stand-alone IR LED emitter array below it (photo: A. Sári).

**Slika 2.** Postavitev IR kamere z vgrajenimi IR lučmi (zgoraj) in neodvisno samostojne IR LED svetilo pod njo (foto: A. Sári).

The »*Proteus* Project« has an inherent »duty of care« to protect *proteus* and its natural habitats and this responsibility also naturally extends to those *proteus* individuals that are forced from the underground onto the surface during floods. It has been apparent to us for many years that there is a

need for a service to rescue and re-home stray *proteus* in the Trebišnjica River Basin and even to protect, treat and nurse damaged individuals in a suitable quarantine facility before returning them to a suitable hypogean location.

In 2017, we visited the Tular Cave in Kranj, Slovenia to observe and learn how Gregor Aljančič and his team were dealing with the washed-out *proteus* problem (Aljančič et al. 2016). As a result of our visit to the Tular Cave, we were sufficiently inspired to design and install the necessary infrastructure to replicate their *proteus* veterinary treatment model in the Trebinje Observatory, albeit on a much smaller scale. We also modified their procedures to adapt them to our own circumstances. This unique combined facility is now at a sufficient stage of development whereby it is fully suited to the task and now includes a quarantine or isolation aquarium, specifically designed for this veterinary purpose and which has been installed just inside the entrance of the Observatory. After our standard chemotherapeutic treatment for fungal infections has been applied to the rescued *proteus*, they are returned to the natural habitat afforded by the »Trebinje *Proteus* Observatory« in the Vrelo

»Vruljak 2« cave. Thus far, we have already successfully treated 5 stray proteus.

During our »*Proteus* Project's« educational outreach programme, the Observatorium is always rigorously advertised among the local people as being available for accepting lost or stray proteus from anywhere in the Trebišnjica river basin. We will collect such individuals from any location in the river basin to safely transport them to the »Trebinje *Proteus* Observatorium« for initial veterinary treatment prior to their return to the natural underground habitat already occupied by a thriving proteus population.

In conclusion, the »Trebinje *Proteus* Observatorium« cannot accommodate rescued proteus from any habitat location in the Trebižat or Una/Sana river basin areas in Bosnia and Hercegovina. This comes from the the »*Proteus* Project's« extensive and on-going hydrological programme which continues to demonstrate that the aquatic chemistry under all hydrological conditions is considerably different to that in the Trebišnjica river basin. Additionally, we do not wish to compromise the gene pool of the proteus populations living in one river basin area by introducing proteus individuals from other river basin areas, where they could be genetically different (Gorički & Trontelj 2006).

## References

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