**BRITISH SCHOLARSHIP TRUST REPORT**

**Project specification:**

**Title:** Diatoms as indicators of environmental change in ancient Lake Ohrid

**Grantee:** Dushica Zaova, Faculty of Natural Science and Mathematics in Skopje, North Macedonia

**Supervisor:** Anson W. Mackay, University College London in London, United Kindom

Planet Earth is home to millions of species, each of them possessing different adaptive mechanisms for surviving the changes in the environment. Studying those mechanisms over very long time-scales is possible by using fossil species from ancient lake sediments. One notable example comes from the Mediterranean Lake Ohrid, holding a 1.7 Ma (Ma=million years) long sedimentary record with excellent preservation of fossil species from which diatoms (one-celled algae encased in a glass shell) are the dominant group. Among them, endemic species such as *Cyclotella cavitata* are shown to have persisted in the lake for very long time-periods during the Quaternary (or the past 2.6 million years). Interestingly, variation in the species morphology is very evident, and this variation is likely in response to the changing environmental conditions. Tracking such variation in the species is important and contributes to understanding the impact of climate-driven environmental changes and predicting responses to such future climate change scenarios. And this topic forms the basis of my research, and reason for coming to UCL.

Studying those processes requires complex analyses and a large number of experts, especially in the field of Palaeoecology. Supported by the British Scholarship Trust I gained that opportunity and visited the Environmental Change Research Centre (ECRC) at UCL (University College London) Geography, which is known for its outstanding and world-leading research in that field. During the visit, I significantly improved my work and knowledge through a large number of activities conducted at the University, which I deltail below.

1. Mentored by Prof. Anson Mackay, I was able to undertake new statistical analyses (on already collected data) using advanced numerical techniques. To do this, I learned to use new statistical programs such as C2 and Canoco 5. The results help me to better understand the factors affecting the diatom morphology and also gave me an idea for creating additional analyses which will help in finding solutions, ideas, and possible responses to my research questions.
2. I was also received training in how to use a Scanning Electron Microscope by the technician Jim Davy (in the Department of Earth Sciences at UCL) and thus I have the opportunity to create photos of the investigated diatom species. These photos help me to better analyze the morphological variation in the species and thus allow more robust statistical analyses. Using the SEM at UCL allowed me to obtain high-resolution, publication quality photomicrographs of a number of relict and endemic taxa from Lake Ohrid. These will be invaluable in helping me undertake robust diatom identification back in Macedonia. Some of photographed species are showing unique morphological characters and will be described as a new species in a book for taxonomy, ecology and biostratigraphy of a fossil diatom species from Lake Ohrid.
3. Within the first week of being at UCL, I gave a seminar on their weekly Physical Geography seminar series. This was very well received, and was followed by an invitation from Prof. Chronis Tzedakis to be included in the Palaeoclimate Reading Club. Discussing many palaeoecology-related papers with professors and students from the UCL and beyond, I gained an opportunity not only to increase my knowledge in this field but also to meet many experts and establish future international collaborations with them. In addition, many topics have been discussed with Prof. Viv Jones and Prof. Helen Bennion resulting in finding reliable answers for diatom community responses on environmental changes from Lake Ohrid and also for other high-altitude lakes i.e Sulzkarsee in Austria.
4. During my vitit in UCL I also had the opportynity to attend the alumni event “Conservation Conversations: Past, Present, Future” and to meet researchers who have graduated at the UCL in Conservation and Aquatic Conservation Ecology and Restoration, as well as past and present members of the UCL Nature and Conservation Society. Presenting their research and biological conservation issues was highly inspiring for me.
5. My visit in UCL also resulted with a new collaboration with other visitors of UCL i.e Prof. Cesar de Castro Martíns from the Center for Marine Studies in Brasil (Centro de Estudos do Mar, Universidade Federal do Paraná), who was also a visiting professor at ECRC, UCL at this time. New analyses including organic contaminants have been proposed in order to better understand the recent and past environmental changes in Lake Ohrid and their impact on the morphology of certain species in the lake.
6. Having in mind the complexity of the research, especially for the part of evolutionary biology and species adaptation, many additional answers, ideas and suggestions were required. All of them were found at the Natural History Museum in London, where Dr. David Williams proposed creating cladistics which is a method of hypothesizing relationships among species, by using the program TNT (Tree analysis using New Technology). Those analyses and the established collaboration with Dr. David Williams will have significant importance for answering my Ph.D. research questions and also will benefit the overall scientific knowledge in the field of evolutionary biology.