

**Bindura University of Science Education  
Biological Sciences Department**

**Report on the Diversity in Science Grant  
Biochemical Society UK  
September 2023**

**1.0 Background**

The Biological Sciences Department (BSD) at Bindura University of Science Education (BUSE) in Zimbabwe applied for a Diversity in Science grant from the Biochemical Society in 2022. The project was to host rural high school students in the laboratory and teach them about several molecular biology techniques that are required according to their Advanced Level syllabus. Due to resource scarcity, rural students often do not have access to laboratory facilities where they can be taught molecular biology techniques. We received an amount of £250.00 from the Biochemical Society to support the initiative, in addition to another support that we received from BUSE.

**2.0 Project implementation and results**

The BSD hosted one rural high school, Bradley High School from Mashonaland Central Province, on 26 May 2023 at the BUSE Astra Campus Laboratory. The students started by a briefing on safety issues and general rules of a standard laboratory. The workflow of the techniques was then described, starting with DNA extraction all the way to viewing DNA in a gel viewer. The activities were carried out as follows:

**2.1 DNA Extraction**

We used DNEasy plant DNA extraction kits for DNA isolation. The students followed a protocol given on the kits. The techniques students learned include use of micropipettes, centrifuges and vortex mixers.

**2.2 Agarose gel electrophoresis**

Students prepared 1 % agarose gel by dissolving the agarose powder in TBE buffer solution under heat. A DNA staining dye, ethidium bromide, was also added to allow visualization of the DNA in a transilluminator. The students cast the gels in appropriate gel trays. After solidification, the trays were placed in electrophoresis tanks with TBE buffer. Students loaded their extracted DNAs as well as size standards into the wells of the gel and ran the electrophoresis. Students learned techniques of making gels, setting up a gel electrophoresis tank and use of electronic balances.

**2.3 Visualization of the DNA**

After about an hour of electrophoresis, the students took their gels to the transilluminator for viewing. Students who successfully extracted their DNA were able to view it while a few were not able to see clear smears of their DNA. Students learned how to use a transilluminator for gel viewing.

### **3.0 Strengths of the project**

The students who attended the research day learned some new techniques in molecular biology they would not have acquired had they not visited the BUSE Astra Campus Biology lab. The techniques will assist them especially on their Advanced Level practical exam at the end of the year. Although a few students could not clearly observe DNA at the end due to some problems during the workflow, they, indeed, learned the techniques as well.

### **4.0 Areas of improvement**

The BSD trimmed the number of rural schools to host to just one due to the limited budget available, both from the Biochemical Society and from BUSE. DNA digestion using restriction endonucleases, an important step in the workflow, was skipped due to shortage of reagents. There is need for the BSD to look for other sources of funds to compliment what will be available so that the number of schools is increased in future and that all steps are carried out. The BSD may also kindly request for an increased allocation from both the Biochemical Society and BUSE in future so that the number of schools is increased.

### **5.0 Conclusions and future direction**

The BSD at BUSE hosted one rural high school for a research day at the Astra Campus Biology laboratory. The students carried out a number of molecular biology techniques, from DNA extraction to visualization. The BSD believes these techniques will help students on their Advanced Level exams. In future, the BSD intends to increase the number of participating schools so that the benefit of the research day can be realized by a large pool of students. In that endeavor, the BSD will source for more grants to compliment whatever will be available to support the research day activities. In addition, the BSD is planning to make the research day a yearly event.

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