Practical microscopy workshops for Gambian schools

PAGEANT (Projects Aiding Gambian Education and Natural Talent) is a charity that was developed by Pippa Howard and her husband Ian after a holiday to The Gambia, in West Africa. In 2009, a Vice President's fund award was given to 'Practical Microscopy for Gambian Schools'. Pippa and other participants report on what actually happened during their visit in February 2010…

The project provided equipment and four one-day workshops of instruction in practical microscopy. All the microscopes and associated materials were bought in the UK with the funds provided by the Royal Microscopical Society and then taken out to The Gambia, West Africa, by the team members, so that every participating school could have equipment to keep. Each workshop was run at a different school, with sessions in the morning and afternoon for the teachers and then a final session for them to pass on the knowledge they had gained to classes of children from that host school. Each workshop lasted for one day and the entire programme was completed in eight days, allowing us to have a rest day between workshops to recover after teaching in temperatures of 35 to 40 °C.

The team of participants was gathered from a wide range of backgrounds – and a wide range of experience of working in Africa. For some it was their first or second visit, while Pippa and Ian Howard have been visiting The Gambia at least twice a year for the past ten years. This report includes contributions from several of the team members so each part is written from their personal point of view.

First – Kathy Groves describes the set-up:

My friends tell me I need to get out more, so this year I decided to take an early holiday in The Gambia in West Africa. Two weeks of sunshine in February can't be bad. The main reason for going though was to carry out a project with some friends who have formed a charity supporting education out there. The charity, called PAGEANT, was started by Pippa Howard, who is the microscopist for Cobham Technical Services in Leatherhead.

Pippa and I applied successfully to the RMS for a grant to carry out four workshops for secondary school science teachers in The Gambia, teaching them in a practical way about using microscopes in their lessons with their students. We used the grant to buy 80 low-magnification Edu-Lab Junior Microscopes of the pattern approved by the RMS for beginners, 40 Trekker field microscopes, and ancillary equipment including wind-up torches to provide the light (there is no electricity or water in most schools), pipettes, magnifying glasses, slides, bug boxes etc. We also took four second-hand conventional student microscopes for better resolution and higher magnification – one for each workshop.

We were joined by Dr Peter Evennett, who is an Honorary Fellow of the RMS, a retired University Lecturer and long-time expert in teaching microscopy; his wife Dr Katherine Evennett, a retired head of science of a teacher-training college; Bob Skipper, a chemist and colleague of Pippa's; Ian Howard, co-founder of the charity, and some of my family including my sister-in-law who is a retired teacher.

Each workshop took place in a different host school and was attended by 20 teachers from 10 different schools. The morning involved explanations about how to use microscopes and a practical session on the living world. For this we had gathered as many flowers,

grasses, insects and pond-life as we could. In the afternoon, there was a session on the manufactured world, covering foods, printing, electronics and anything man-made we could find. There is not a great deal of manufacturing in The Gambia so these things were not easy to find. Potatoes from the hotel, tea and coffee, rice, etc., all came in useful.

In the final part of the day, we asked the teachers to show students from the host school what they had learned. They then took back to their schools all the microscopes and equipment, which they were very pleased with. This will make a huge difference for them as they have virtually no equipment at all. In nearly all schools in The Gambia, science is taught from the blackboard.

Packing and transporting several hundred kilos of equipment to The Gambia and then sorting into sets for each school was quite an interesting task in itself. The faces of the other passengers when we checked in at Gatwick and then getting it all on the roof of one minibus at Banjul airport are memories I won't forget. Overall the pleasure in seeing the faces of the teachers and students when they looked down the microscope and saw things they couldn't see with their eyes was worth it.

Next, Peter and Katherine Evennett:

Our impression of the schools in The Gambia was that most of the teachers were extremely keen to learn, but they had very little equipment and little idea of how to use it or what to use it for. Because of the temperature, the classrooms generally had no windows and were thus extremely dusty from the fine sandy soil outside, making our insistence on covering the equipment after use most important. The wind-up torches proved excellent for illuminating the small microscopes, and the teachers enjoyed charging them as much as the children did. The Junior Microscopes had a single magnification of 20 x and 9 mm diameter field of view, similar to the RMS-approved Motic MS2: our use here confirmed the great suitability of this design for use by adult beginners as well as young children.

The discus-shaped Trekker (see www.looksmall.com/trekker.asp) has built-in illumination for reflected light, but use by transmitted light in the classrooms proved more of a challenge. Because of the cloudless skies and continuous bright sun, the roofs have an overhang that much reduces the light inside. We managed to put this to our advantage though, by taking the microscopes outside, just to the edge of the overhang, where, with careful movement we were able to achieve a useful transition from bright-field to dark-field images and obtained excellent images of unstained tiny organisms in increased contrast.

In his hunt for suitable specimens around the hotel, Bob Skipper came across an overflow pipe dripping into a narrow gulley, which was therefore permanently wet and contained green slime. A few scrapings of this, with a little of the water, provided rotifers and

other 'minibeasts' for our demonstrations to all the schools over the eight days. Most of the teachers had never heard of such organisms or seen microscopic life of any kind before, so this caused great excitement. One was so enthusiastic that she immediately asked for some of our specimens and planned to show them to her class the next day. Using the conventional student microscopes again brought problems of illumination inside the classrooms, so we set up the microscope on a bench (or two chairs, one on top of the other) outside, and pointed the mirror to the blue sky through a gap between the buildings and the trees.

We visited a couple of the compounds where most of the population live in extended family groups – usually with no electricity, and in many cases without even a water tap. No car, dishwasher or television, of course their principal piece of modern technology was the ubiquitous mobile phone! Despite these living conditions at home, the children attended school immaculately dressed in spotless shirts or blouses, ironed, we were told, with an iron heated by charcoal. We were struck too by the sea of smiling young faces that greeted us at each school we visited and by the pleasant nature of everyone we met.

The lack of funding for education means that 'free' schooling ends at Grade 6 at the age of about 12, and students wishing to progress further must somehow find the money. This is where Pippa and Ian's sponsorship scheme does such valuable work. Their sponsors are currently supporting the education of 228 young people, at what seems to us the relatively modest cost of between £90 and £200 per year. We felt we should sponsor two students and would encourage readers of infocus to do the same through PAGEANT.

Now, Bob Skipper:

Only a six hour flight from Gatwick but The Gambia did feel a world away. Not being well-travelled outside Europe, the Gambian landscape, people and climate all came as rather a culture shock after a dark and

frosty departure from the UK. Fortunately, with the help of the others on the trip, coupled with the very open and friendly nature of the Gambians themselves, it took very little time to settle and feel at ease.

My initial impression was that of an obviously poor country but one in which considerable importance was given to maintaining a high level of personal appearance, with smart and colourful dress being the norm. This was in spite of the seemingly hopelessly on-going battle against the red dust; my memories of The Gambia all carry a reddish tint.

Before going to The Gambia I was concerned about how I would manage with the lack of resources and facilities at the schools, but I found the schools all to be happy and positive places. The teachers may lack most of the modern teaching aids bar a blackboard and chalk, but there was clearly a thirst for learning amongst both children and teachers. I particularly remember an innovative use of wire and beads to construct models of the orbits of the electrons in the different elements of the periodic table. The electron clouds hung incongruously from the beams supporting the corrugated metal roof, a space which in a previous school had been taken by a noisy pair of nesting house sparrows. I can also remember the hand-drawn but clearly labelled depictions of various chemical procedures on one classroom wall, an illustration of glassware almost certainly never seen by the students.

The workshops themselves were a great success, obviously enjoyed by all those who attended and I include myself amongst them. There was some understandable nervousness as the teachers first entered the workshops with the neat rows of microscopes and other equipment laid out before them.

This was followed by quiet attentiveness as they listened to Peter carefully outline the theory and the "dos and don'ts" of the equipment in front of them. During the subsequent hands-on sessions this slowly gave way to the noise of cooperative chatter as the teachers discovered the use and teaching possibilities of the microscopes and other teaching aids.

During the period when the teachers were passing on some of their new-found knowledge to a selected group of students, the room became an excited babble of children's voices, a measure of the power simple microscopes have to engage minds with the world around them.

The use of microscopes was initially very unfamiliar to many of the teachers but most were very quick to understand how to use both types of microscope with which they were provided, and quickly started to experiment for themselves. I can clearly recall announcing with confidence that at a magnification of x 35 (using the Trekker), cells could be seen in plant material but there was no possibility of seeing the cell nuclei, only to be proved wrong by one teacher within a few minutes!

Pippa asked me to attend this workshop because she knows of my interest in botany and my familiarity with microscopes. I was, however, rather nervous of casting myself in the role of an instructor but the pleasant and eager manner of the Gambian teachers made it a positive pleasure.

Finally, Pippa:

These workshops succeeded better than I had dared to hope, entirely due to the expertise and enthusiasm of the teaching team we had managed to get together. I will remember the small microscope lab that was set up by Peter, Katherine and Bob in the pool bar of the hotel for a long time – and so will the many hotel guests and staff who became so fascinated by what was happening that they had to join in and, of course, became enthralled.

We are also indebted to the headmasters and science teachers of our host schools, who arranged to put classrooms at our disposal, contacted the visiting schools, organised the lunch (and breakfast in some cases!) and greeted us with friendliness and enthusiasm – our thanks to them all. We could not have managed at all without Wandifa, Yankuba and Abdoulie, our tireless Gambian agents, who carried, set up, packed and unpacked, acted as lab assistants and organised all our transport – thank you so much.

Since returning to the UK after the February trip, I have received several emails from Gambian headmasters, thanking us for the workshops and saying how much the instruction and equipment means to them. Some have asked me to find UK schools that have a science club, with whom the Gambian schools could exchange ideas and experiences.

Probably the most telling things of all are the remarks from those taking part. One of the school children said: "When I view the specimens under the microscope, I can see them more clearly than when I use my naked eye… I would have disputed if somebody told me that there is an organism lying under that microscope without viewing it. But after viewing it I'm convinced that organisms exist which we cannot see with our naked eyes."

Or, as another student put it more bluntly, "Most of us think what teachers teach us about science is lies…. but we have now been given the opportunity to view specimens under the microscope, which really thrilled us."

As one of the teachers said: "I could remember only explaining the microscope and its use to students without being able to put it in practical use. I teach my pupils about micro-organisms like bacteria and amoeba, which I had never seen myself. Now that we have microscopes, I trust I can know and teach about these things better."

For more information on PAGEANT, visit www.pageant.org.uk.