

## Moving the Boundaries of UQ Entomology

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The University of Queensland is unique in providing Australia's only specialist entomology teaching program. Undergraduate and postgraduate coursework degrees as well as research higher degrees are offered. Our historically low enrolment numbers in coursework subjects have allowed us to offer highest quality education but this practice is not sustainable given current funding restraints. On 1 January 1999, the two existing Departments of Entomology and Zoology were amalgamated. The Faculty and new Department of Zoology and Entomology have a verbal and written commitment to maintaining the national role and international reputation of Entomology at UQ. However a consequence of the amalgamation is that where Zoology and Entomology used to each have a set of discipline-specific subjects, the Faculty now requires one composite set of subjects. We are being forced to dramatically cut the number of Entomology subjects we can offer and are already struggling to maintain what we consider to be the core undergraduate subjects for good training of Australia's future entomologists.

To overcome these problems we are developing a flexibly delivered curriculum in Entomology at the undergraduate and coursework postgraduate levels. To date 'flexibly delivered' has equated fairly loosely with remote or external. We have been offering a few subjects to 'off-campus' students since the beginning of 1998. Included in these have been two subjects offered through Open Learning Australia. This year we are working to improve the subjects we already offer and develop additional ones. By the end of 2000 we will have our second year and core third year subjects of our curriculum available for non-classroom based enrolment.

### Nature of delivery

The flexible delivery teaching program is web-based at present and is supported by a variety of software presented on CD-ROM. Our first step towards flexible delivery was to develop detailed lecture outlines in HTML for WWW presentation. Ideas, concepts and terms are hyperlinked as an aid to learning so that students may move between related subjects to find more detail about topics of interest. In this way students are encouraged to explore other entomology subjects, even ones in which they are not enrolled, and to begin to appreciate how material presented in different subjects is interrelated. The web notes are heavily illustrated with line drawings and photographs. Most photographs are stored on CD-ROM and the images linked to the notes. Videos will be incorporated during this year. The Department has employed a graphic artist and a web page developer for two years. They have been responsible for scanning images, drawing and obtaining photographs. They have also been responsible for ensuring copyright is not infringed whenever the material needed is not our property. For some subjects the lecture notes serve instead of a textbook if a suitable one is not available. For other subjects the notes have frequent references to the prescribed textbook.

The development of practical modules is a high priority for this year. Some of our subjects are orientated towards identification and for these we are using the interactive identification software package called *LucID Professional*. This package was developed through the CAL unit of the CRC for Tropical Pest Management (CTPM) in conjunction with staff of Entomology at UQ. With the demise of the CTPM in 1998 a Category 2 Centre has been established in the Department. This has taken over the role of the CAL unit of the CTPM and is called the Centre for Pest Information Technology and Transfer (CPITT). Software packages developed by CTPM/CPITT in addition to *LucID* include:



*BugMatch series*  
*Urban Pest Manager*  
*Grain Storage Tutor*  
*Foxes and Rabbits*

*Diagnosis for Crop Protection*  
*Rice IPM*  
*Mouser*

These packages have been developed for a variety of end-users but all are adaptable for use as teaching tools. We anticipate incorporating their use into practical modules for teaching economic entomology, urban insects and taxonomy-centred subjects.

## **BioED**

Last year the Department of Entomology was successful in obtaining a CUTSD grant for a project called "BioED: Biodiversity and education in an interactive, multimedia environment". This project is based on the *LucID* program. The methods used for identifying organisms in the biological sciences have not changed during the past 200 years. The traditional method of identifying animals and plants relies upon printed "taxonomic keys" which consist of a sequentially numbered series of paired, contrasting statements which lead to an organism's name. This traditional method is time consuming, tedious and replete with problems. University students find the process dull and sometimes irrelevant to their personal educational goals. Our ability to teach students about biological classification and biodiversity has been encumbered by these outmoded educational tools. The *LucID* platform is revolutionary in that the system is computer based and any character can be selected from the main menu without proceeding through a mandatory sequence of couplets. All required information on the anatomy of organisms is built into the *LucID* system and the user may view drawings or photographs of all of the possible states for that character. When a selection is made, the organisms which do not possess that state are eliminated from the pool of possible names. With conventional, paper-based dichotomous keys, the user must proceed through the key in the specified way. If parts, structures or character states are missing, the user cannot proceed further. If character states are poorly defined or misinterpreted, then the user makes a mistake in identification. In sharp contrast, *LucID* operates as a user-friendly problem-solving exercise. Characters which are missing do not pose an insurmountable problem. Students can work at their own pace, pursue their own interests in particular groups and, through a series of set exercises, develop a proficiency of identification at several levels. After discovering the identity of a taxon, the user can then access all manner of relevant biological information included by the key builder.

BioED consists of 14 projects and will include taxonomic information on major groups of organisms (bacteria, Protozoa, arthropods, plants and frogs). BioED will be developed for specified taxa by specialists in three participating universities (UQ, The University of Sydney and The University of Adelaide) and will, we believe, reform teaching methodology in an important area of the biological sciences. The Project has three goals: 1. develop new identification tools (*LucID* keys) for CD-ROM and the Internet to enable us to teach organismal biology subjects more effectively and provide information which relies upon the accurate identification of organisms; 2. restructure and alter the way we teach subjects which rely heavily upon the identification and classification of organisms; and 3. stimulate a chain-reaction in other tertiary institutions within Australia with new and additional taxonomic keys which are easier to use.

## **Audience**

A flexibly delivered teaching program has several advantages for Entomology. First, it offers increased choice to external and internal Australian students. At present we are in the process of persuading our administration to change undergraduate rules to allow us to offer resource-based rather than classroom-based subjects to UQ internal students. Students wishing to take individual entomology subjects for vocational or general interest reasons should also be advantaged by the move

to be less bound to university campuses. By removing the geographic restrictions of campus-based subjects we are hopeful of increasing our total enrolment in undergraduate subjects. An added advantage is the removal of timetabling restrictions on student enrolments, allowing students to choose their own schedules and even enrolment times.

One of our longer term objectives is to develop a national curriculum in entomology and to foster participation from researchers or teachers in other institutions. Expertise of academics and other professionals throughout Australia could be employed to develop parts of subjects and supervise specialist components. We would then encourage teachers of undergraduate Insect Science subjects throughout Australia to utilise the Entomology program. Thus students would have access to a standardised, high quality curriculum while maintaining valuable face-to-face contact with local teachers. Entomology staff could maintain communication with staff and students in other institutions by email, videoconferencing, and/or electronic discussion groups.

For international students without a satisfactory background in entomology, the flexible delivery program has special advantages. At present many of these students are required to complete a coursework Postgraduate Diploma before gaining admission to a research higher degree. The advantages of enabling these students to complete this preliminary course in their home countries are obvious: huge monetary savings for the students and for funding bodies such as AusAID; one year less away from families; familiar surroundings in which to adjust to the standards and expectations of postgraduate work at the UQ or other Australian institutions. Because the Postgraduate Diploma is not a research higher degree, students are not eligible to apply for scholarships. For privately funded students this offers a major disincentive to enrol for a higher degree at UQ. For international students wanting a higher degree from an overseas university, but not wanting to undertake a research degree, being able to complete a coursework degree at home has similar advantages.

## Conclusion

By means of the flexible delivery teaching program at UQ we intend to maintain a comprehensive Entomology curriculum despite removal of departmental status for the Entomology program. By this means we also hope to overcome the danger of losing important subjects from the curriculum because class sizes are not large enough for those who count dollars. At the same time we will expand the boundaries of entomological training by providing access to Australia-wide and international audiences who would otherwise be required to attend classes at the St Lucia campus of The University of Queensland.

