Towards inclusive teaching practice in science education in relation to gender and sexuality

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In recent years, there has been recognition internationally of the value and importance of inclusive curriculum in tertiary teaching practice. Indeed, in the international literature there have been significant advances identifying what makes science education interesting, relevant, accessible and inclusive to all students, especially for women and those from culturally diverse backgrounds (Bianchini, Whitney, Breton, and Hilton-Brown 2002). Unfortunately, much of this work is not translated to current pedagogical practice in a tertiary science environment. The way in which concepts and activities are presented may marginalise or exclude particular students.

Less thought and consideration has been afforded to those students who identify as gay, lesbian, bisexual, trans-gendered or intersex. Is the way we present and examine biology and the natural world sensitive to an individual's identity? (Good, Haffner and Peebles 2000; Snyder and Broadway 2004). We provide a series of examples where current pedagogies in biology may exclude or marginalise students in terms of gender and sexuality and provide a framework of contextual factors which encourage all students to engage and excel in a supportive environment within the biological sciences.

References

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Odysseys in Pastryland – a bird's eye view of microevolution

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Theory based models of microevolutionary processes are difficult to test in the wild, because the data relating to the specific predictions of the model must be disentangled from the complexity of the species' overall ecology. Since the 1960s some evolutionary ecologists have been using field experiments involving artificial prey and wild predators – the ecology of the 'prey' is under the control of the experimenter, which greatly simplifies the logistics of testing specific microevolutionary models. So far, this technique – typically using prey 'worms' made from pastry and wild passerine birds as predators – has been used to test theoretical models of crypsis, directional vs. stabilising selection, apostatic selection, polymorphism, and mimicry systems (Allen, Cooper, Hall, and McHenry 1993). To date, the 'Pastryland' technique has been used by ecologists at the Universities of Reading and Southampton in the UK.Because it is a simple model of microevolution in the real world, and because individual experiments rarely require more than a few days to complete, 'Pastryland' has also been used to demonstrate the process of natural selection to tertiary science students (Allen, Cooper, Hall, and McHenry 1993). Natural selection is a powerful but very subtle theory, and is hard to grasp without some sort of real world demonstration or example. The logistics of Pastryland experiments mean that it can easily be performed as part of a tertiary field-based activity, with students intimately involved with the running of the experiment. Students are immersed in evolution by taking an active role in the process. Although the pastry 'prey' are artificial, the technique relies ultimately on the behaviour of wild predators, as a 'real' selective pressure, enhancing student concept acquisition in evolutionary theory.

Pastryland was trialed as a group field project for third year ecology undergraduates at the University of Newcastle. They tested a specific prediction about the dynamics of mimicry systems that has not yet been tested experimentally. This was the first time (to our knowledge) that Pastryland has been used within a teaching context in Australia, and we adapted the technique to make use of common wild birds in Australian urban environments. In the UK, the most important predator was the blackbird (*Turdus merula*) – in coastal NSW, the main predators are noisy miners (*Manorina*

melanocephala), magpies (*Gymnorhina tibicen*), and currawongs (*Strepera graculina*). Students also modified the experimental design to improve controls, and involved local high schools in the hope that the technique would 'catch-on' with science teachers.

References

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