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COMMITTEE OF ENQUIRY-THE FUTURE DEVELOPMENT OF THE AUSTRALIAN HONEYBEE INDUSTRY

Submission

This submission will primarily address issues 3, 4 and 5 of the Discussion Paper. It will focus on the current activities and suggested future role for the University of Western Sydney (UWS), including in a proposed national pollination centre.

Background

UWS, via its Hawkesbury campus (prior to 1988, the Hawkesbury Agricultural College), on the peri-urban fringe of Sydney, has had a long history with apiculture, dating back to 1891. It has been the premier university undertaking apicultural training in Australia, particularly since the departure of Graham Kleinschmidt from Gatton College Queensland in the late 1990s. Until recent years UWS was the only university institution to offer undergraduate level training in apiculture. It has trained a number of key apiculture industry leaders, including Dr Doug Somerville, NSW DPI and queen breeder Mr Warren Taylor.

The Centre for Plant and Food Sciences (PAFS) on the UWS Hawkesbury campus hosts the only fully functioning large research apiary facility in Australia. It comprises 200 registered *A. mellifera* beehives, an extraction plant and various laboratories dedicated to entomological research. The UWS campus comprises over 1000 hectares, and is located close to the laboratory of Australia's top honeybee inseminator, Ms Gretchen Wheen, who has collaborated with UWS for the past 25 years. The replacement value for these apiculture facilities is significant.

Undergraduate and postgraduate teaching

Until 2005, UWS has offered courses in Apiculture, primarily for undergraduate students in Diploma, Associate Diploma and Bachelors courses. Apiculture was a popular elective amongst students undertaking Bachelors degrees in horticulture and agriculture. The apiculture course was based on honeybee (*Apis mellifera*)

management, but also provided tuition in crop pollination and native bees. As such, it provided fundamental requirements for students subsequently undertaking careers in the beekeeping industry as well as in crop production.

However, apiculture ceased to be offered at UWS in 2005, following major course rationalisation in undergraduate and postgraduate courses. Numbers of students in apiculture fell to below 16 (the cut-off enrolment required for elective offerings), primarily a result of declining undergraduate enrolments in the agriculture and horticulture courses.

In addition to undergraduate training, UWS has successfully trained postgraduate students in apiculture, ever since UWS commenced postgraduate training in 1990.

Completed students are:

BSc Honours:
Michael Duncan,
Melissa Bell 2004 Evaluation of the blue-banded bee, *Amegilla holmesi,* as a pollinator of tomatoes.

Masters
Liem Nguyen N van. 1995. Effect of protein nutrition and pollen supplementation of honeybee (*Apis mellifera* L.) colonies on characteristics of drones with particular reference to sexual maturity

Dung, Nguyen. 1996. Assessment of factors contributing to Nosema disease incidence in honeybees.

PhD
Daya Howpage 1999 Pollination biology of kiwifruit: influence of honey bees, pollen parents and pistil structure.

UWS has the following postgraduate students currently enrolled in apiculture projects:

Honours
Megan Halcroft. (Australian). Investigations on the behaviour of the Australian native bee, *Austroplebeia australis*, with particular reference to its defence strategies against the African small hive beetle, *Aethina tumida.*

Masters (Hons)

Nick Annand (NSW DPI Apiculture officer). Biology and control of the small hive beetle, *Aethina tumida*

PhD

John Rhodes (NSW DPI Apiculture officer). Drone honey bee quality and semen production.

Mark Greco (PhD Australian). Investigations on Australian stingless bees for pollination of crops grown under protected cropping.

Marwan Keshlaf (International PhD from Libya). An assessment of honeybee foraging activity and pollination efficacy in Australian Bt cotton

It is clear from the above thesis topics that UWS strongly focuses on pollination by European and native bees, and native bee biology.

Research:

In addition to research activities associated with its postgraduate students, UWS was the location of the RIRDC-funded Eastern States Bee Breeding Scheme in the 1990s, one of two such schemes in Australia (the other in Western Australia). These schemes were removed from their home institutions in the late 1990s and placed in the industry.

UWS has a current RIRDC-Honeybee R&D funded project (Spooner-Hart) Sustainable control of small hive beetle through targeting in-ground stages.

UWS has apiculture research links in Australia with NSW DPI, CSIRO Division of Entomology, the University of Sydney, and the Australian Native Bee Research Centre. It also has international research links with the Swiss Bee Research Centre and the Institute for Biologie, Martin Luther University Halle, Germany.

In 2006, UWS funded a research visit by one of the world's experts on Small Hive Beetle (SHB), and bee behaviour Dr Peter Neumann. During his visit, Dr Neumann conducted an industry seminar on SHB.

In 2006, UWS hosted a visit by committee members of the Honeybee R&D Council.

In October 2006, UWS hosted a national workshop on native bees, with a strong emphasis on pollination by bees.

Recent publications in apiculture in refereed research journals include:

Greco M, Bell M, Spooner-Hart R, Holford P. 2006. X-ray computerized

chromatography as a new method for monitoring Amegilla holmesi next structures, nesting behaviour, and adult female activity. *Entomologia Experimentalis et Applicata* . 120, 71-76.

Bell MC, Spooner-Hart RN, Haigh AM. 2006. Pollination of greenhouse tomatoes by the Australian bluebanded bee *Amegilla* (*Zonamegilla*) *holmesi* (Hymenoptera: Apidae). *Journal of Economic Entomology* 99:2, 437-442

Greco M, Spooner-Hart RN, Holford P 2005. A new technique for monitoring *Trigona carbonaria* nest contents, brood and activity using X-ray computerised tomography. *Journal of Apicultural Research* 44:3, 97-100.

Howpage D, Spooner-Hart R, Vithanage V. 2001. Influence of honey bee (*Apis mellifera*) on kiwifruit pollination and fruit quality under Australian conditions. *New Zealand Journal of Crop and Horticultural Science.* 29:1, 51-60.

Howpage D, Spooner-Hart R, Sheehy J. 1998. A successful method of mass marking honeybees *Apis mellifera* at the hive entrance for field experiments. *Journal of Apicultural Research* 37:2, 91-97.

Howpage D, Vithanage V, Spooner-Hart R. 1998. Pollen tube distribution in the kiwifruit *(Actinidia deliciosa)* in relation to its reproductive success. *Annals of Botany* 81, 697-703.

Three presentations will be made by UWS students and staff to Apimondia 2007 in September. UWS has also recently contributed keynote speakers for the two most recent Australian Crop Pollination Association Inc. Annual Conferences: Mark Greco (2006) and Marwan Keshlaf (2007).

Likely future role for UWS in future development of the Australian Honeybee Industry

University of Western Sydney envisages that it will play an increasing role in research and training at a university level (undergraduate and postgraduate) in apiculture and crop pollination, particularly for future industry leaders and international students. The future of the Australian honeybee industry, as with other primary industries, will be best served by well-qualified participants. While the research work will explore

fundamental scientific issues, it will remain focussed on practical outcomes for the Australian (and international) apicultural and crop production industries.

We also see UWS taking the major role in postgraduate training and research in pollination of horticultural crops, including by non-Apis species and native bee biology and pollination in Australia. There is no mention of native bees in the discussion paper, as it primarily focuses on the European honeybee, *A. mellifera*. There is increasing interest in Australia and overseas in understanding and exploiting native bee pollinators, or even the importation of exotic species, such as bumblebees (*Bombus terrestris*). There is a significant potential for non-*Apis* bees in pollination, particularly in the rapidly expanding protected cropping (greenhouse production) industry.

An incursion of Varroa mite into Australia is predicted to devastate feral *Apis mellifera* colonies, and thus, incidental crop pollination by them. Such a situation will increase the role for non-*Apis* species in crop pollination. Research to better understand the behaviour and ecology of native bees is therefore essential.

A proportion of the pollination research will need to take place in tropical areas of Australia, particularly for field pollination by native bees, although, as discussed earlier, the rapidly expanding protected (greenhouse) cropping industry will provide further opportunities for research and training. This will become even more essential in the event of the introduction of bumblebees into mainland Australia for greenhouse pollination.

Pragmatically, this heightened profile and activity would require the appointment of a senior academic (at least at the level of Senior Lecturer) or even a Professorial Chair in Crop Pollination to UWS to develop carry out these activities. Currently, in the absence of a specialist apiculturist, Associate Professor Robert Spooner-Hart has been principal supervisor of apiculture students at UWS. However, Professor Spooner-Hart is reaching retirement age, and is likely to retire within the next 3-4 years. As outlined above, in the current funding climate, UWS would be unlikely to make a new academic appointment in apiculture/pollination unless there was some guarantee of medium-term funding support for the position, either via adequate student enrolments,

external research funding, industry support or a combination of these. The latter could be achieved by direct external funding of the position, via partial funding or subsidy.

I am happy to participate in any further discussions on the contribution that research and teaching could make to the future of development of the Australian Honeybee Industry.

Yours sincerely,

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