Title of Submission: Graduate Program in “Integrative Insect Sciences”

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Note: Students and faculty from both programs were encouraged to participate in the creation of this white paper which has their full support.

List the current units that will be reorganized.

Graduate Program in Entomology, Department of Entomology, College of Agriculture and Life Sciences

Graduate Interdisciplinary Program in Insect Science, Center for Insect Science, Arizona Research Laboratories
Proposal to merge the Interdisciplinary Graduate Program in Insect Science and the Graduate Program in Entomology under an Overarching Program “Integrative Insect Sciences”

Nicholas J. Strausfeld and Bruce E. Tabashnik

Preamble:
The following proposal is in fidelity to a strategic vision that will capitalize on this University’s particular strengths as a research 1 institution and support the priorities that have been identified by the Strategic Plan being developed by the President, Provost and SPBAC.

It is generally understood that the Transformation process supports the value of focused amalgamations of graduate programs such that small but highly successful ones, in terms of their intellectual achievements, when affiliated can be uniquely effective in adding to the luster of this Institution and contribute to its elevation to one of the top ten public research universities.

Background:
Two small but highly successful graduate programs are those administered by the Center for Insect Science and the Department of Entomology. The Center for Insect Science and Department of Entomology together obtain a rating of #2 in the insect sciences, as calculated by The Chronicle of Higher Education. (see: http://chronicle.com/stats/productivity/page.php?primary=9&bycat=Go&secondary=69). Together, the Center for Insect Science and the Department of Entomology, to which 53 faculty contribute, rank far ahead of other peer institutions, including the Californian Universities. Because most of these other institutions have graduate training programs in Entomology/Insect Science that routinely guarantee 3-5 years of RA support to accepted applicants they are serious competition to our recruitment from among top flight students that apply to these two UA programs. The Entomology graduate program and the Graduate Interdisciplinary Program in Insect Science (GIDPINS) are each able to offer a mere one year support with no absolute guarantee of further TAships, although both the College of Agriculture and the Graduate College do their utmost to broker TAships for the following years of graduate training. Although we are able to recruit outstanding students, both programs are small because of the competition (typically UC schools and Cornell) and limited resources. As a consequence the current graduate population is 11 in GIDPINS and 20 in Entomology.

Rational for merger
1. The nature of each program: We (The Director of the Arizona Research Laboratories’ Center for Insect Science and the Head of the Department of Entomology) recognize the desirability of merging these two graduate programs such that they will offer broader interdisciplinary scope and obtain greater administrative efficiency. The rationale for the Graduate Interdisciplinary Program in Insect Science was from the outset designed to offer a unique training arena in cross-disciplinary science using insects as model systems (for example, for neuroscience research, robotics, engineering, population
studies, genetics, biomedical research). Traditionally, Entomology graduate training programs have focused on the insect itself as the biological subject, with an emphasis on the applied sciences of insect control. However, at the UA during the last two decades this narrow definition has evolved into something much broader. As a consequence graduate students in the Entomology Graduate Program pursue vector biology, insect physiology, pest management, the study of symbionts, insect ecology, pollination and other basic and applied areas.

2. Commonalities and reciprocal strengths: We recognize that the traditional definitions of entomology are largely breaking down. Certainly, in the Entomology Graduate Program one can identify many components that cross-traditional disciplines. The Center for Insect Science’s Interdisciplinary Graduate Program provides, as a principle component, overarching cross-cultural research and has done so from its very outset. Recognizing that both graduate programs are inherently interdisciplinary, it makes perfect sense to combine the two under one overarching Programmatic title. This would offer three main streams of pursuit for a higher degree: applied entomology; basic entomology and allied studies; and multidisciplinary insect science. The program will be called “Graduate Program in Integrative Insect Sciences” and it will be administered jointly by its two current Chairs and later by their elected successors. It will require but a single program coordinator. Not only will the merger provide greater efficiency but also, of cardinal importance, the merger will foster greater interdisciplinary collaboration. Insects are the result of 530 million years of experimentation and as such reveal extraordinary sophistication in their mechanical and physiological design. By merging these two programs, and offering parallel research streams we will recruit not only potential entomologists sensu stricto but also lure to a unique programmatic choice young researchers that are interested in exploiting the exquisite biological design of the Insecta for research in engineering, optical sciences, electrical and computer science, neuroscience, and biomedicine. The proximity within a graduate student body of applied entomology graduates working on, for example, pest insect dispersion with graduates working on biomechanical or neurological aspects of, for example, insect flight will be mutually advantageous from the point of research collaboration and intellectual hybridization of a high order.

3. Road Map recommendations: The Battelle Institute’s 2007 report “ARIZONA’S BIOSCIENCE ROADMAP: TOWARD 2012 PROGRESS AND DIRECTIONS FOR THE FUTURE” (see: http://www.flinn.org/docs/12-07_Rdmap_Update_exec_summary_16.pdf) lists Insect Science as one of the top six competencies of the University of Arizona, en par with Cancer Research, Plant Sciences, and Neurosciences. The Battelle Report states the key criteria for investing in these areas are: drawing on multiple core competencies and multi-institutional presence and collaborations; existing or potential industry contacts and their Development potential; and opportunity for extramural funding. The proposed Integrative Insect Sciences GIDP meets or exceeds these criteria. Thus, a major step forward in enhancing this major competency will be the merger of these two crucial graduate programs.
Summary
In conclusion, in a climate that requires bold action and with full support from program faculty, staff, and trainees in both the Department of Entomology and the Center for Insect Science, we propose the merger of their respective graduate programs. The desirability of doing so is not only to enhance interdisciplinary graduate training but to accord with the 2006 Battelle Biosciences Road Map cited above and to contribute to an aspiration shared across this campus, which is to be one of the ten best public research universities in the nation.

SPBAC Criteria
CENTRALITY. The two graduate programs address the Institutional Strategic Direction. They engage graduate students in highly interdisciplinary research and formal study as well as exposure to national and international research milieus. Graduate students learn what will be expected of them in future postgraduate roles through their regular interactions with the Center for Insect Science’s NIH-funded postdoctoral program (PERT: Postdoctoral Excellence in Research and Teaching), one of the largest minority postdoctoral programs in the country.

QUALITY OF RESEARCH, TEACHING, AND OUTREACH. The Center for Insect Science engages 29 faculty in the Graduate Interdisciplinary Program in Insect Science representing the following departments: Arizona Research Laboratories Division of Neurobiology, Department of Ecology and Evolutionary Biology, Department of Entomology, Department of Molecular and Cellular Biology, Department of Nutritional Sciences, and the Department of Plant Sciences. Graduate students in both programs are active participants in outreach, such as to local schools.

EFFICIENCY AND PRODUCTIVITY. Despite the inability to provide more than one year’s funding and thus the requirement for participating graduates to fund their research with TAships, graduate students in these two programs engage in novel and cutting-edge interdisciplinary activities, complete their degree in an average of 5.5 years, publish in peer-reviewed journals, and are pro-active in seeking independent extramural funding from outside the Program and Graduate College (GIDPINS graduate students have received 18 awards since 2004).

DEMAND. The demand for high quality training in the Insect Science is evidenced by the number of applicants to both programs, which averages 22/year (figures from 2000-2008). The demand is offset by the unwillingness of this University to provide funds that would allow these programs to fully utilize this applicant pool.

Budget Savings
Once merged, the two programs would require one program coordinator to oversee budgets, student affairs, enrollments, and other functions. This will save one full time program coordinator at a cost of approximately $50,000/pa. We will also show a modest cost saving in the outlay for student recruitments. This saving is estimated at $10,000/pa.