Request to plan a PhD in Evolutionary Biology (EB)

Need for the Program

Over the last ten years the evolutionary biology community on campus has become more and more organized, culminating in the emergence of the Crow Institute for Evolutionary Biology in 2010. This group contains ca. 70 affiliated faculty, more than 300 email listserv members, supports a web portal (evolution.wisc.edu), and sustains a rich array of programming including ambitious outreach events, a course on teaching evolution, and a weekly seminar series (the Evolution Seminar Series).

A major driver of the moves towards a cohesive EB community has been a sense among the faculty that it is necessary to better coordinate activities across campus so as to provide an enriched intellectual environment for graduate students. Additionally, it was hoped that more community cohesion would help us to recruit the best EB graduate students to campus. Indeed, for the last two years, with generous support from the Biological Sciences Fellowships Committee, the Crow Institute has worked with five graduate programs (Botany, Entomology, Genetics, Microbiology, and Zoology) to recruit prospective PhD students in a more aggressive and coordinated way. This has included a redesign of the evolution.wisc.edu website, coordinated campus visits across the programs, and a "signing bonus" comprising a gift membership in the Society for the Study of Evolution and some funds to help an accepting student attend the Society's annual meeting.

While these steps have gone a long way to improve graduate education in Evolution, they still fall far short of what could be achieved with a PhD in EB. Our goals for developing a new program include:

1) Attracting the best students in EB. The best prospective graduate students in EB are likely to include many who identify themselves as Evolutionary Biologists. These individuals may only apply to EB programs. Unlike almost all our peers, UW-Madison does not offer a PhD in EB. Thus we do not even appear in the list of NRC-rated programs in Evolutionary Biology (Table 1)

Table 1 NRC-ranked programs in evolutionary biology

BROWN UNIVERSITY	BIOMED: Ecological and Evolutionary Biology
COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK	Ecology and Evolutionary Biology
CORNELL UNIVERSITY	Ecology and Evolutionary Biology
DARTMOUTH COLLEGE	Biology-EEB
EMORY UNIVERSITY	Population Biology, Ecology and Evolution (PBEE)
HARVARD UNIVERSITY	Organismic and Evolutionary Biology
INDIANA UNIVERSITY AT BLOOMINGTON	Ecology and Evolutionary Biology
IOWA STATE UNIVERSITY	Ecology & Evolutionary Biology
MICHIGAN STATE UNIVERSITY	Ecology, Evolutionary Biology & Behavior
OHIO STATE UNIVERSITY MAIN CAMPUS	Evolution, Ecology and Organismal Biology
PRINCETON UNIVERSITY	Ecology and Evolutionary Biology
PURDUE UNIVERSITY MAIN CAMPUS	Ecology, Evolution, and Population Biology
RICE UNIVERSITY	Ecology & Evolutionary Biology

RUTGERS	Ecology and Evolution
STATE UNIVERSITY OF NEW YORK AT BINGHAMTON	Ecology, Evolution & Behavior
STATE UNIVERSITY OF NEW YORK AT STONY BROOK	Ecology and Evolution
SYRACUSE UNIVERSITY MAIN CAMPUS	Ecology and Evolutionary Biology
TULANE UNIVERSITY	Ecology and Evolutionary Biology
UNIVERSITY OF ARIZONA	Ecology & Evolutionary Biology
UNIVERSITY OF CALIFORNIA-BERKELEY	Integrative Biology
UNIVERSITY OF CALIFORNIA-DAVIS	Population Biology
UNIVERSITY OF CALIFORNIA-IRVINE	Ecology and Evolutionary Biology
UNIVERSITY OF CALIFORNIA-LOS ANGELES	Ecology & Evolutionary Biology
UNIVERSITY OF CALIFORNIA-RIVERSIDE	Evolution, Ecology & Organismal Biology
UNIVERSITY OF CALIFORNIA-SANTA BARBARA	Ecology, Evolution & Marine Biology
UNIVERSITY OF CALIFORNIA-SANTA CRUZ	Ecology and Evolutionary Biology
UNIVERSITY OF CHICAGO	Ecology and Evolution
UNIVERSITY OF CHICAGO	Evolutionary Biology
UNIVERSITY OF COLORADO AT BOULDER	Ecology and Evolutionary Biology
UNIVERSITY OF CONNECTICUT	Ecology and Evolutionary Biology PhD
UNIVERSITY OF HOUSTON	Evolutionary Biology and Ecology
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN	Program in Ecology and Evolutionary Biology
UNIVERSITY OF KANSAS	Ecology and Evolutionary Biology
UNIVERSITY OF LOUISIANA AT LAFAYETTE	Environmental and Evolutionary Biology
UNIVERSITY OF MARYLAND COLLEGE PARK	Behavior, Ecology, Evolution, and Systematics
UNIVERSITY OF MASSACHUSETTS AMHERST	Organismic and Evolutionary Biology
UNIVERSITY OF MEMPHIS	Ecology and Evolutionary Biology
UNIVERSITY OF MICHIGAN-ANN ARBOR	Ecology and Evolutionary Biology
UNIVERSITY OF MINNESOTA-TWIN CITIES	Ecology, Evolution, and Behavior
UNIVERSITY OF MONTANA - MISSOULA	Organismal Biology & Ecology
UNIVERSITY OF NEBRASKA - LINCOLN	Ecology, Evolution & Behavior
UNIVERSITY OF NEVADA RENO	Ecology, Evolution and Conservation Biology
UNIVERSITY OF TENNESSEE	Ecology and Evolutionary Biology
UNIVERSITY OF TEXAS AT AUSTIN	Ecology, Evolution, and Behavior
WASHINGTON UNIVERSITY IN ST. LOUIS	Evolution, Ecology and Population Biology
YALE UNIVERSITY	Ecology & Evolutionary Biology

2) Increase our visibility and national prominence in EB. By sustaining a high quality graduate program, UW-Madison will be more "on the map." We have many well-regarded Evolutionary Biologists on campus, and many very successful scholars in EB recieved their graduate education at UW-Madison. With a PhD program, UW-Madison would quickly emerge as a nationally recognized program

3) Provide a curriculum that is designed to prepare students for a range of careers in EB. While students can study EB at UW-Madison, they must currently do so in a program whose curriculum is focused on some other area of study. While this breadth is of benefit, it would be optimal for EB students to take a program of study that aligns with their research focus.

4) Build more cohesion among EB students on campus. While the Crow Institute helps students connect across departments, a graduate program in EB would provide even stronger links to an already exciting intellectual environment.

5) Help our graduate students get more meaningful credentials. Students in EB might reasonably want to graduate with a degree whose name resonates with their interests. For somebody studying EB at UW-Madison, this is currently not possible.

6) Compete for training grant support. Currently UW-Madison is not able to apply for federally-funded training grant support specific to EB.

Overview of proposed joint PhD program

We propose developing a PhD program that would be taken jointly with one of several pre-existing PhD programs. The EB graduate program would always be taken as a second course of study for students who are also enrolled in a partner PhD program. This mechanism uses the UW-Madison Graduate School Joint Degree structure:

"A joint degree consists of one graduate degree with two programs. A student completing a joint degree writes one thesis or dissertation and receives one diploma."
(http://www.grad.wisc.edu/education/acadpolicy/guidelines.html#112)

Alternative models considered

Before deciding to pursue the joint graduate degree structure, three other models were considered.

1) A free standing PhD Program in EB administered by the Crow Institute. Such a new program would compete with existing programs for resources and for the best students. Moreover, due to a lack of TAship, institutional funds, or training grants we failed to develop a viable financial model, which could provide competitive packages.

2) A cross-program curricular alignment, wherein different programs would each establish a similar option/track in evolution that would require the same suite of core courses. While a track was established in Botany and one is under development in Genetics, this approach has severe limitations because of the great differences between the curricular requirements of the existing programs. Also, while this structure may help recruit EB students who already have an interest in, say Genetics programs, it will not help us recruit students who are looking mostly at EB programs.

3) A joint Ecology and Evolutionary Biology (EEB) program established as a parallel to the Cellular and Molecular Biology program (CMB). This program would be a fantastic addition to the campus graduate training landscape: it would match the most common structure seen in peer institutions and would provide a logical counterpart to CMB. Also, this structure would establish allies in the Ecology community, which is similarly lacking a graduate training program. This approach

could work if the Graduate School saw fit to take ownership and provide an initial base of financial support. However, the Graduate School declined, indicating that it feels that its obligation is to oversee and regulate all programs on campus and that directly running programs is not desirable (they view CMB as an historical anomaly). We considered other possible homes L&S or GNIES, but these units do not have the resources to support a new EEB program without cutting back on existing programs.

Learning outcomes and curriculum of the proposed Joint EB program

Goals:

1) Train students to be future evolutionary biologists, which requires a solid foundation in the core areas of the field, research that applies evolutionary principles, and exposure to allied fields of knowledge.
2) Prepare students to be knowledgeable in evolution outreach and education
3) Provide suitable assessment and accreditation of the achievement of these educational goals

Curriculum ideas:

1) Student must be in or be admitted into one of the allied graduate programs, the "primary program." Our current expectations is that students in the EB program will have identical requirements to other students in their home program: that they will simply add the EB requirements on their existing requirements. However, these details will need to be worked out in consultation with the partner programs. We foresee that the primary program of students in the EB program will usually be one of the following currently existing programs.
    a. Anthropology
    b. Botany
    c. Entomology
    d. Genetics
    e. Geoscience
    f. Microbiology
    g. Zoology
2) Prerequisites. While there are no absolute prerequisites, students are expected to have a solid background in the biological sciences and allied physical and quantitative sciences. We will favor students who, within biology, have a strong background in genetics, ecology, and systematics/paleontology, including a general undergraduate evolution course. We will also expect students to have strong quantitative/computations skills, as indicated by coursework or other experience in statistics, mathematics (typically including calculus), and/or computer science.
3) Required courses. Note courses may be used to fulfill requirements in both the EB program and the primary program. In special circumstances (e.g., a student has already taken all available courses in area c) these requirements may be modified by the EB Graduate Program Steering Committee.
    a. A course in population, quantitative, ecological, or evolutionary genetics
    b. A course in phylogenetics or systematics

    c. One additional evolutionary biology course (broadly construed) at the 400-level or above
    d. Students will be required to take two semesters of Evolutionary Biology Seminar (Genet 9xx). This course will be developed for the fall semester and will involve attending the Evolution Seminar Series and then participating in an associated discussion meeting.
4) Minor. Since students will be acquiring breadth by fulfilling the requirements of the primary program, no minor will be required. We will encourage those participating primary programs that require a minor to allow the EB secondary program to fulfill that requirement.
5) Teaching. One semester of teaching or the equivalent outreach activities in lieu of classroom teaching. Because a teaching requirement is shared with most potential primary programs, for most students no additional teaching will be required by virtues of participating in the EB. The EB program will strive to help students find funding in support of teaching or extensive outreach engagement.
6) Outreach. Involvement in at least four hours of outreach involving contact with K-12 teachers or the general public.
7) The student's advisor and one additional member of their dissertation committee must be graduate trainers in the EB program.
8) To advance to candidacy the student must satisfy the candidacy requirements of the primary program and complete the course requirements for EB candidacy and take an oral preliminary examination in evolutionary biology. The tentative plan is to require that at least four EB trainers meet with the student, preferably before the end of their fifth semester, to assess their general evolutionary knowledge. Depending on the requirements of the primary programs, a single oral examination (possible with 1-2 extra EB trainers) might satisfy both programs' preliminary examination requirements.
9) Thesis proposals must be submitted to the EB Graduate Program Steering Committee to confirm that it contains substantial evolutionary biology content. In the event that there is some doubt, the EB Graduate Program Steering Committee will meet with the student and their advisor to discuss the proposal.
10) The EB Graduate Program Steering Committee will review progress on an annual basis.
11) One research presentation in a campus seminar series is required per year once a dissertator. The evolution seminar will be configured to provide a venue for dissertator presentations. Off-campus presentations may be used to fulfill this requirement if approved in advance by the EB Graduate Program Steering Committee.
12) The dissertation defense shall include a public lecture and an oral examination with the student's dissertation committee. Members of the dissertation committee who are EB trainers will need to sign a warrant to indicate that the dissertation contains adequate evolution content to warrant the awarding of a joint degree.

Governance

1) All trainers in the EB program will be members of the graduate faculty (i.e., tenured or tenure-track professors) at the University of Wisconsin, Madison.
2) The Director of Graduate Studies in EB will be drawn from among the EB trainers and will be nominated by the Director of the Crow Institute. The nomination is subject to confirmation by a vote of the Evolution Coordinating Committee. The Director of Graduate studies will serve for a three-year term and will act as chair of the EB Graduate Program Steering. An individual may serve no more than two consecutive terms as Director of Graduate Studies with a three-year hiatus required before being eligible to serve in this capacity again.
3) In addition to the Director of Graduate Studies, the EB Graduate Program Steering Committee will be composed of four EB trainers, the graduate student services coordinator, and two EB graduate students. No more than two members of the EB Graduate Program Steering may be drawn from a single department. The Graduate Steering committee will be appointed by the Director of the Crow Institute in consultation with the Director of Graduate Studies. The EB Graduate Program Steering Committee will oversee student progress and will be responsible for conducting program reviews.
4) The Director of Graduate studies, with help from the Director of the Crow Institute, will constitute an admissions committee that will screen applications and recommend to the Steering Committee the applicants to admit.
5) Curriculum revisions will be proposed by the EB Graduate Program Steering Committee but will be subject to approval by a vote of all the EB trainers.
6) At the formation of the program an initial list of EB trainers will be proposed and approved by the Crow Institute's Executive Committee. Thereafter, trainer status will be granted by the EB Graduate Program Steering Committee based on criteria that they will specify. Trainer status will need to be renewed every five years by an affirmative vote of the EB Graduate Program Steering Committee.

Congruence with the institutional mission and strategic plan

Advance research: The proposed program will allow us to recruit to campus excellent graduate students who will advance the research mission not only of their departmental research groups, but also the broader EB community.

Globalization: The program will likely draw international and domestic graduate students, thereby exposing all students to a diversity of outlooks and cultures. Many students will undertake international field work as part of their dissertation research.

Serve underserved communities: The program will develop minority recruitment strategies and will support AOF students. Some outreach events will serve minority populations, as illustrated by the Crow Institute's recent involvement in a Science Outreach event targeted at Hispanic students.

The Wisconsin Idea: The commitment to outreach means that the program will have a greater impact on the broader community than is normally the case for an academic graduate program.

Relationship to other programs in the system, region, and nation

While UW-Milwaukee offers a concentration in Ecology, Evolution and Behavior within their Biology graduate program, there are no Evolutionary Biology graduate programs in Wisconsin. This contrasts with all our neighboring states, which have such programs (see Table 1).

Resource requirements

The eventual program will need a graduate student services coordinator, and some limited funds for administration. Since the Crow Institute is administratively housed in Genetics, the student services coordinator would presumably be situated within the offices of the Department of Genetics. The program would compete for flexible graduate student recruitments funds through the Biological Fellowships Committee.

List of key program faculty (likely founding trainers)

A Program Committee will be formed, drawing on continuing members of the Crow Institute. This committee will approve trainers. This partial list of faculty indicates some of the individuals who would likely become trainers in the new EB program.

Ané, Cécile	Statistics
Baum, David	Botany
Berres, Mark	Animal Science
Bleiweiss, Rob	Zoology
Broman, Karl	Biostatistics & Medical Informatics
Brunet, Johanne	Entomology
Cameron, Ken	Botany
Carroll, Sean	Genetics
Currie, Cameron	Bacteriology
Dewey, Colin	Biostatistics & Medical Informatics
Doebley, John	Genetics
Emshwiller, Eve	Botany
Gasch, Audrey	Genetics
Geary, Dana	Geoscience
Gianola, Daniel	Animal Science

Givnish, Tom	Botany
Goldberg, Tony	Pathobiological Sciences
Graham, Linda	Botany
Hawks, John	Anthropology
Hittinger, Chris	Genetics
Ives, Anthony	Zoology
Kelly, Clay	Geoscience
Larget, Bret	Statistics
Lee, Carol	Zoology
Lindroth, Rick	Entomology
Loewe, Laurence	Genetics
McFall-Ngai, Margaret	Medical Microbiology & Immunology
McIntyre, Pete	Zoology
Orrock, John	Zoology
Payseur, Bret	Genetics
Perna, Nicole	Genetics
Peters, Shanan	Geoscience
Sober, Elliott	Philosophy
Strier, Karen	Anthropology
Sytsma, Ken	Botany
Waller, Don	Botany
Yandell, Brian	Statistics
Yin, John	Chemical & Biological Engineering
Young, Dan	Entomology

Letters of support

See attached.

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June 19, 2012

Prof. David Baum
Department of Botany

David,

I write to state formally that the Genetics graduate program supports the proposed campus-wide PhD degree in Evolutionary Biology contained in your "Planning5" document dated 6/5/2012. The disciplines of genetics and evolutionary biology are closely related, and your proposed academic program for a PhD in Evolutionary Biology overlaps strongly with our program for the PhD in Genetics. The learning and curriculum goals outlined in your "Planning5" document are quite compatible with those of the Genetics graduate program. Indeed, many current Genetics graduate students are already *de facto* students in evolutionary biology, and their accomplishments in the area of evolutionary biology deserve appropriate recognition.

As you know, the Genetics graduate program is presently finalizing a revised course curriculum for the Genetics PhD degree. Our proposed revisions, which await only approval by the Laboratory of Genetics faculty, incorporate elective courses into the Genetics "core" PhD curriculum. In the new curriculum, Genetics graduate students who wish to receive both a Genetics and an Evolutionary Biology degree have a clear path to doing so. For such students, the elective courses would be those required of Evolutionary Biology students.

We previously discussed my concerns that that a joint Genetics plus Evolutionary Biology PhD not have excessive formal course requirements over and above those of the Genetics PhD, but your edits contained in the "Planning5" document address those concerns quite well. Thus, we are eager to be a partner in your emerging plans, and I'm confident that any operational details can be worked out satisfactorily by both graduate programs.

We wish you success with the proposed Evolutionary Biology graduate degree.

Sincerely,

Philip Anderson

Michael R. Culbertson

Philip Anderson
Professor of Genetics
Director of the Genetics graduate program

Michael R. Culbertson
Professor of Genetics
Chair, Laboratory of Genetics

microbiology doctoral training program
University of Wisconsin-Madison

David Baum, Ph.D.
Professor of Botany and Director
JF Crow Institute for the Study of Evolution
University of Wisconsin
425 Henry Mall

Re: Microbiology Doctoral Training Program support for the joint Ph.D. program in Evolutionary Biology

May 7, 2012

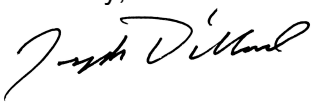
Dear Dr. Baum,

The Microbiology Doctoral Training Program (MDTP) is pleased to support your proposal for a joint Ph.D. degree program for Evolutionary Biology. The MDTP Steering Committee met today and discussed the details of the joint Ph.D. plan. The committee voted unanimously to support this initiative.

MDTP already has guidelines for participation of our students in joint Ph.D. programs. See Section C. 1. in the MDTP Guidelines (http://www.microbiology.wisc.edu/cs_pg_3.php) Joint Degrees "Course Requirement for the Microbiology Ph.D. Degree." These guidelines indicate requirements for admissions, thesis advisor, thesis committee, preliminary exam, and thesis research that are the same as those for other MDTP students. Thus students pursuing a joint degree in Microbiology and Evolutionary Biology will have to complete all of the MDTP requirements plus those of the Evolutionary Biology program. Since MDTP already has these guidelines in place, the inclusion of joint degree students should go smoothly.

MDTP will continue to work with Evolutionary Biology on recruitment of Ph.D. students interested in this research area as we have done this past year. We hope that the creation of this new joint Ph.D. program will raise awareness of the strong research in evolutionary biology here at UW and bring highly-talented students to our Ph.D. programs. We wish you the greatest success with this initiative.

Sincerely,



Joseph P. Dillard
Director, Microbiology Doctoral Training Program

Cc: Rod Welch, MM&I Chair
Rick Gourse, Bacteriology Chair
John Mansfield, Incoming MDTP Director
Cathy Davis Gray, MDTP Coordinator

THE UNIVERSITY of WISCONSIN MADISON

May 17, 2012

Dr. Kenneth M. Cameron
Professor, Department of Botany &
Director, Wisconsin State Herbarium (WIS)
Email: kmcameron@wisc.edu

Dr. David Baum
Chair, Crow Institute for Evolutionary Biology
UW-Madison

Dear David,

Last week the faculty, staff, and graduate students who serve on the Department of Botany's Graduate Program Committee reviewed a draft version of the Crow Institute's "Request to plan a PhD in Evolutionary Biology (EB)". I serve as Chair of that committee and also as Chair of the University's Biological Division Curriculum Committee. On behalf of the former, I can share with you that all who reviewed the proposal expressed their great enthusiasm for it. It is well conceived, planned, and thorough.

In particular, as a doctoral program administered jointly with at least one other on campus, it is especially attractive. Several of our current Botany PhD students indicated to me that they would immediately enroll, and felt that earning a joint degree with the word 'evolution' associated with it, would make them more competitive on the future job market.

As the Crow Institute continues to develop this program, please know that the Botany Graduate Committee is willing to assist with curriculum design, revision, and review. We wholeheartedly offer our fullest support of this proposal.

Sincerely,

Ken Cameron