GRADUATE COUNCIL MEETING
October 19, 2006
3:00pm, Gilkey 109

Present: Koenig (chair), Filtz, Francis, Gitelman, Grosskopf, Harter, Jovanovic, McLain, Proebsting, Rettig, Russ-Eft, Unsworth, and Warnes

Absent: Blythe, Unsworth

Guests: Jim Carrington

1. Minutes from October 5, 2006

The minutes from the October 5, 2006 meeting of the Graduate Council were approved as written.

2. Graduate Council Review of Molecular and Cellular Biology

Tom McLain (Forestry) presented the report of the Graduate Council review of the Molecular and Cellular Biology (MCB) program. Jim Carrington, director of the MCB program, expressed his gratitude for the helpful review. He disagreed, however, with the problem of finding faculty to teach MCB courses. MCB courses are team-taught. When one of the faculty members is unavailable, the class sessions taught by that person are usually reassigned. When this is not feasible the remaining sessions can be expanded to provide a full course. This year, there is no problem because the five people hired through a university initiative have arrived and each will teach within the MCB program as part of the initial work assignment.

Goran Jovanovic (Engineering) praised the report for its focus on the future. The MCB program is a visionary way to make good use of university resources and move OSU toward its goals.

Shawna Grosskopf (Liberal Arts) asked how resources are distributed to the participating departments. Carrington explained that this has operated through an Interdisciplinary Allocation Model (IAM) and that this has been very useful for the MCB program. Sally Francis (Graduate School) cautioned that the IAM was based on a university Budge Allocation Model (BAM). A budget re-basing process has suspended the BAM, which is requiring different processes for providing funding for interdisciplinary degree programs.

3. Graduate Admissions

Bruce Rettig (Graduate School) reminded the Council that it had received a report from external consultants on graduate admissions on May 18, 2006. One of the proposals was to move graduate admissions from the Office of Admissions to the Graduate School. In order to plan the necessary reorganization, three people from the Graduate School

(Francis, Rettig, and Janet Morandi) and four people from the Office of Admissions visited the University of California at Davis and the University of California at Berkeley in July. Although both of those universities have excellent graduate schools that include graduate admission, current planning at OSU includes modification of our processes to follow innovative and compelling practices in the Graduate School at UC, Davis.

Rettig suggested that we consider two practices at UC, Davis. One is that they do not set a specific number of credits for a PhD, deferring instead to each program to provide those requirements. Also, PhD programs of study are not filed with the Graduate School. Rettig also shared two other practices. At Ohio State University and the University of Washington, doctoral students can complete minimum requirements for the PhD with fewer credits (a minimum of two full years of full-time study rather than three) if the students have a prior master's degree. Finally, the University of Washington does not transfer credits to their doctoral degree programs.

Rettig indicated that the most time-consuming part of the analysis of doctoral programs of study come from analyzing transfer courses. In most cases, reducing the number of credits from the current 108 to 72 if a student had completed a prior master's degree would eliminate the need to transfer credits. Individual programs could still require student to meet all local requirements, but they would accept the responsibility for determining whether courses taken elsewhere would allow them to waive some particular course requirements.

McLain said that any change that was designed to ease workload in the Graduate School by shifting responsibility to individual programs would be resisted in the current environment. Before any of the changes Retting suggested would gain acceptance, a case needs to be made that this would advance the interests of the programs.

4. Other Business

Darlene Russ-Eft (Education) indicated that students in her college have had repeated problems with selecting a Graduate Council Representative. She asked whether the current processes could be reexamined. Grosskopf said she has never been asked to serve as a GCR. McLain indicated that he has not been contacted recently. Rettig agreed to raise this issue with staff to determine whether current procedures were working adequately.

Grosskopf asked when the Economics and Applied Economics proposals would be considered again. Rettig responded that Hal Koenig (Business) has submitted a list of issues to the proposing units and that no responses have been received to date.

Meeting adjourned.

Attachment below: Report of the Graduate Council Review of the Molecular and Cellular Biology Program.

OSU GRADUATE COUNCIL
Review of the
Molecular and Cellular Biology Graduate Program
June 2006

I. INTRODUCTION AND CONTEXT

The interdisciplinary and interdepartmental program in molecular and cellular biology is responsible for the programs leading to the PhD in Molecular and Cellular Biology (MCB), the MS in MCB and the MS in Applied Biotechnology. The MCB program is a confederation of about 100 faculty from many academic departments who more or less collectively establish, participate in and oversee a curriculum, degree requirements and other activities related to the common good. The group is led by an Interim Program Director who reports to the Dean of the Graduate School. Until FY05, program funding was largely piecemeal with base funding from the College of Science and donations from many others, including the Center for Genome Research and Biocomputing (CGRB). FY05 brought a new funding model with base and productivity funding from the Graduate School. Other potential changes coming to this program include the impact of new resources from the Provost=s Initiative in Computational and Genome Biology (CGBI) in which the MCB program is a central element, and a planned change in strategic focus. As a result, the MCB program has begun a period of significant transition.

The OSU Graduate Council conducted a regular decennial review of this program on June 9, 2006. The following served as team members:

Internal Reviewers:
Dr. Thomas McLain, Wood Science & Engineering (Chair)
Dr. Carlos Martins-Filho, Economics
Dr. Farah Ibrahim, Teacher and Counselor Education

External Reviewers:
Dr. Tom Adams, Director of Yield and Emerging Technologies, Monsanto Company
Dr. Mary Beth Mudgett, Asst. Prof of Biological Sciences, Stanford University

Dean Francis, Associate Dean Rettig, and Assistant to the Dean Serewis also attended the program review sessions.

The MCB program interim director and staff prepared a comprehensive self study of the program which was distributed to the team in advance of the on-site review. The self-study was prepared in accordance with the Graduate Council Program Review Guidelines and is included in this report by reference.

During the site visit the team members met with Professor James Carrington, the Interim MCB Program Director, the MCB program staff, Deans (or their representatives) of the Graduate School, Science, Agricultural Sciences, Pharmacy, Veterinary Medicine, and Health and Human Sciences who have active involvement with the MCB program, the MCB Committee Chairs and the Genetics program leader. The team also held open separate meetings with about 25 MCB faculty and twelve current PhD students. The team toured some of the core laboratories of the Center for Genome Research and Biocomputing that are commonly used by most, if not all, MCB students and faculty.

The goals of the Graduate Council Review are to evaluate the program goals and mission, the adequacy of support resources, the level of performance of the faculty and students in achieving the program goals and the outcomes that result from the existence of the program. The review team focused primarily on the PhD program which has been in place longer than the relatively new MS in Applied Biotechnology. The MS in MCB degree is not promoted by the program and is a fall-back credential. The MCB program asked that the following be assessed as a part of the review process:

1) The MCB strategic plan and program direction,
2) Funding and expenditures, recommendations for sustainability and growth,
3) Growth of the program, recommendations for increasing diversity,
4) Quality of courses and plans to evolve content and instructor participation,
5) Relevance of the program within an OSU and employer context.

II. PROGRAM INPUTS

A. Program Mission, Goals and Strategic Plan

The mission of the MCB program is to thoroughly prepare students for careers in forefront areas of biomedical, environmental, and agricultural science by focusing on research and education in fundamental aspects of mechanistic biology. This mission is clearly aligned with that of the University and supports several of the key themes identified by President Ray as central to the future of OSU.

As an interdisciplinary and interdepartmental center, MCB seeks to develop a community of interest around a PhD program that serves the needs of many faculty and students, specifically with research; and to a lesser degree, the opportunities offered by a professional masters program in applied biotechnology.

The MCB Program has developed a strategic plan that focuses on goals in three areas: funding, student recruitment, and curricular change. The review team explored those plans in some depth and this report will address those specific goals and plans in subsequent sections. Overall, the team was pleased to see that the MCB faculty have thought seriously about the future of the program and are proposing some substantive changes that respond to a fluid operating environment and the success with Provost's Initiative funding. There is considerable faculty engagement and interest in this program as evidenced by history of involvement and participation in this review. We could not, however, tease out the degree to which broad MCB faculty have ownership of the planned changes. In addition, it is not clear that the members of the MCB Advisory Board (largely supporting Deans) are fully aware of the future plans.

The overall goals of the strategic plan and direction are appropriate. Computational and Genomic Biology are an excellent core for a modern multifunction/multidiscipline program in Molecular and Cellular Biology and this central theme should provide an appropriate mechanism to drive the program's future.

B. Students

MCB PhD program characteristics were reported for academic years 2001-2006. Six students matriculated each year from 2001-2004 and 8 students each year from 2005-2006. The two additional GRA slots available in 2005 and 2006 were funded through the CGBI. Overall, the student body is fairly equal in gender distribution, with domestic students accounting for the majority compared to international students (~25%). A cohort of students was selected from an applicant pool that varied from year to year (~107 applicants/yr). Applications fell from 2002 to 2004, possibly due to the introduction of an

application fee in 2002. Applications are now on the rise (120 applications in 2006) and are expected to increase in 2007. The graduate placement scores seem to be competitive with peer institutions. Students rejected from the program had similar or slightly less competitive profiles, indicating that other factors (reference letters, research interests and/or interviews) were likely the deciding factors for acceptance.

The characteristics for the MS in Applied Biotechnology were reported for academic years 2003-2006. Applications to this program have steadily increased, with 5 matriculated students in 2006. The representation among the MS students is similar to that of the PhD pool; however in 2006 4 of the 5 students were international. The graduate placement scores for the MS students were lower than those for the PhD students, especially in the verbal and quantitative skills.

The MCB program successfully recruits white domestic students from the Pacific Northwest and a few international students from Asia/Pacific Islands resulting in a poorly diverse pool. This problem is ubiquitous in this field at many universities without significant funds for targeted recruitment and is well recognized by the MCB faculty.

C. Faculty

The MCB group consists of a group of 100 faculty from 6 colleges and 16 departments at OSU, demonstrating that diverse interests and expertise are melded into one modern graduate program. From 2001-2005, 23 PhD students completed dissertations under the mentorship of 20 faculty. One PhD student was mentored by two faculty, providing some evidence that interdisciplinary training is happening in the MCB program. It was encouraging to find through discussion with faculty and students that additional interdisciplinary research and interactions were appearing in MCB graduate work. Such activities were not highlighted in the report. Within the MCB group, 36 faculty are actively involved in student advising on graduate committees. Approximately 25% of the MCB faculty have participated in the instruction of the graduate core courses, although commitments varied from 2001-2006. It is difficult to know the impact of such changes on course content and quality. The deans, faculty and students all remarked that fluidity in the instructor base poses inherent short-term and long-term challenges (e.g. financial, programmatic, and minor quality issues, respectively).

D. Graduate Curriculum and Degree Requirements

MCB PhD students are required to complete 36 units of graduate-level coursework, including 8 required core courses: *MCB 511- Research Perspectives in Molecular and Cellular Biology; MCB 525-Techniques in Molecular and Cellular Biology; MCB 553-Structure and Function of Eukaryotic Cells; MCB 554-Genome Organization, Structure and Maintenance; MCB 555-Genome Expression and Regulation; MCB 556-Cell Signaling and Development; MCB 557-Scientific Skills and Ethics; and MCB 610- Internships* (i.e. 3 laboratory rotations). This is on par with core requirements in MCB PhD programs at peer institutes.

The MCB graduate core curriculum is currently moving to integrate and emphasize training in computationally intensive, genome-centered biology. The Committee sees this curriculum development as an essential determinant that can distinguish this progressive MCB program from peer MCB programs that fail to implement new technology in PhD coursework. In the past year, *MCB 554-Microbial Genetics and MCB 555-Eukaryotic Genetics* were updated and renamed to *MCB 554-Genome Organization, Structure and Maintenance and MCB 555-Genome Expression and Regulation*, respectively. In short, the curriculum was changed to consolidate material between prokaryotes and eukaryotes and to provide a more genome-view of biology and to emphasize system-wide topics. It is too early to tell the impact of these changes. However, the instructor in charge, as well as the MCB

curriculum committee and faculty present, enthusiastically supported the changes and reported that the material was well received this year and that the course will continue to undergo slight changes in subsequent years to solidify content. MCB 557 will be reintroduced into the curriculum in 2007 to fill pre-existing gaps in writing instruction as well as ethics training pertinent to work in the biological sciences. In addition, it was mentioned that the cell biology course (MCB 556) will be taken over by two instructors in an attempt to make it a more integrated class.

Key funding for new curriculum development and instructors was obtained through the CGBI which was led by past-MCB Program director Steve Giovannoni and current CGRB director Jim Carrington. Five junior faculty were hired in 2006 under the initiative. These new faculty are currently setting up their research laboratories and are exempt from teaching for one year. By the academic year 2007-2008, it is projected that some of the new hires will create 2 new courses in computational biology and bioinformatics for graduate students in the MCB program. The other faculty will participate in the existing core classes. Details regarding faculty commitment and course content were not provided, but there was conversation that coverage will include instruction in systems biology, genome evolution, and computational biology at both the practical and theoretical levels. Discussion with the current MCB faculty revealed that they were not very informed about the planning or vision of the new courses, indicating that the broader faculty are not actively involved in curriculum design or decision-making.

The MCB curriculum has introduced the concept of "tracks" as a mechanism to identify high impact research areas and to consolidate faculty specialization across campus. The MCB vision is that tracks may help in student recruiting, obtaining competitive training grants, and enrich the training of the students (e.g. focus course work, identify suitable mentors, and build community activities). In 2006, the Host-Microbe interactions and Molecular Pathogenesis track was initiated with clear leadership, curriculum, faculty cohesion, and a website. Three other tracks have been conceptualized, although leadership and course objectives have not materialized. The impact of these tracks and the proposal is difficult to assess at this time. Peer institutes have tracks and successfully coordinate research areas and visibility. Thus, it is expected that such tracks may identify research strengths within the MCB program. Once formally instated, the tracks should be evaluated to determine if they are achieving the goals set by the MCB program.

E. Administration, Financial and Organizational Support

The MCB program is administered as an interdisciplinary and interdepartmental program of the OSU Graduate School. The Interim Director, Jim Carrington, reports to the Dean of the Graduate School and is advised by an Advisory Board comprised of supporting Deans plus the VP of Research. Very little paid FTE is dedicated to leadership and administration of the program. Faculty voluntarily choose to associate with the MCB program and contribute a portion of their time to the group's success and to teaching students. Historically, this volunteer arrangement has generally worked but with some challenges to maintaining consistency with core curriculum and course teaching. The new initiative will fund new faculty who will have a portion of their time explicitly dedicated to the success of MCB community needs which should ease some of these pressures. It is, however, a program that will be sensitive to the presence of strong leadership of disparate faculty interests and solid administrative commitment from academic deans.

Dr. Carrington's leadership and administrative acumen was widely acknowledged and praised throughout the site visit. His leadership with the successful Provost's Initiative proposal has been especially important to setting new directions for the MCB program. He also facilitates a significant interaction between MCB and CGRB which is integral to the success of the strategic plan. His presence and participation in the College of Science leadership meetings is critical to the coordination of MCB program

directives with new initiatives and decisions being made within participating departments. The interim nature of his position suggests that an important leadership decision may be in the near future. However, it should also be noted that as director of the CGRB, and administrator of the Provost's initiative on Computational and Genome Biology, Dr. Carrington will maintain an active interest in the program's direction.

The group of deans and representatives that met with the team was strongly supportive of the MCB program, and stated that it was the best program on campus applying modern molecular and genome-wide approaches in the biological sciences. The deans acknowledged that the university needs a MCB program that is inherently interdisciplinary to coordinate state of the art research technology with translational research being conducted on campus. Their overall enthusiasm of the MCB program suggests that a strong base of campus-wide support for the program is in place. This group, however, feels that they are underutilized as an advisory group and could be more effective with a greater participatory role. Given the likely budget environment of the next several years, a greater engagement of this group could be critical to any leadership transition and success with achieving strategic goals.

The new Graduate School funding model, and the Computational and Genome Biology Initiative provide greater financial stability and resources for the program than in prior years. In addition, the director continues to be entrepreneurial in securing donations and the return of some productivity funds from participating departments. These represent a sizable portion of the MCB budget and the distribution of these funds appears to have been carefully thought out, although the degree of budget transparency to MCB faculty was not clear. These funds are used to support first year students and other expenses in new ways that are critical to the development of the program.

The review committee is concerned that a significant percentage of this program=s budget (44%) is composed of voluntary contributions from participating units. These voluntary contributions are committed on a year to year basis and can therefore be more volatile than other sources of funding, especially in times of tight budgets. Given the deans= stated support for the program, the committee recommends that efforts be made to guarantee that these voluntary contributions become a permanent part of the programs= budget. A key issue will be sustaining the funding level through the university rebasing process and positioning the program to successfully compete for a significant training grantBtargeted for 2011Bat the end of the CGBI Initiative.

In summary, from a budgetary perspective, long term sustainability or growth of the MCB program will depend on: a) a stable funding stream from the participating Colleges and Graduate School; b) direct program support for first year students through GRAs; c) an equitable (across participating departments) and transparent mechanism that recognizes and/or rewards the contribution of faculty to teaching in the program.

F. Facilities, Equipment and Other Infrastructure

Because of the nature of the MCB program, it does not have equipment or facilities. The MCB students, however, all have access to the core laboratories of the CGRB which are extensive and appear to be well maintained and managed. The CGRB facilities include an excellent computational core that is broadly used and continues to develop through MCB faculty grant support in a way that should enable achievement of the programs goals in computational biology. While modest in scale, the core equipment required for genomics research are up to date and are being used creatively to ensure that scientists trained in the MCB program have been exposed to technology that will serve them well in future careers. This creative leveraging of CGRB resources is allowing students to have a much broader experience than

if they were limited to departmental lab facilities and equipment. The CGRB facilities should be maintained as a central part of the MCB training experience.

The program relies on the participating faculty to provide additional facilities, academic infrastructure, offices and other equipment that will enable student success. Those are widely decentralized and vary in nature and extent. Based on student achievements, the overall support appears to be adequate.

III. PROGRAM PRODUCTIVITY AND OUTCOMES

A. Curriculum and Mentoring

The MCB program succeeds in delivering the core curriculum courses each year. However, this is an interdisciplinary program mostly fueled by faculty interest and FTE for teaching is not supplied by the MCB program. Some colleges and programs incorporate MCB program teaching support into faculty position descriptions, but many do not. Hence, the curriculum has been largely delivered by volunteers who have put their personal stamp on the course leading to some inconsistency in content from year to year. That is not necessarily bad since it may keep the course content fresh, but since the MCB courses are also populated by non-MCB students there may be less overall program oversight of curricula than might be found in a departmental-based system. There may be limits on the teaching pool if junior faculty foresee vulnerability in terms of promotion and tenure. The new hires funded by the Provost=s Initiative will have a component of their position identified to support of the MCB program which may mitigate this problem in the future, especially since they will develop and deliver new courses that are critical to the success of the MCB strategic plan. Volunteers will still be at the core of the curriculum in the future.

The major incentives for faculty participation are their interest and the chance to work with very gifted students interested in applying state-of-the-art molecular and genomic tools to their established research programs. The dean=s of the participating colleges at OSU (Pharmacy, Agricultural Sciences, Forestry, Science, Health and Human Sciences, and Vet Medicine) judged the MCB program to be successful based on student success. An external reviewer questioned whether the MCB core program was limited to only graduate students. The answer is that seniors can take the courses, but as a matter of course very few actually do. The program faculty indicated that they are not seeking Ato grow their own@ MCB graduate students, preferring to seek talented students from the Pacific Northwest and the surrounding regions. However, the team suggests that proactively mingling introductory graduate courses and senior undergraduate courses through the 400/500 slash system might create some beneficial synergies and increase the talent pool for OSU and peer programs.

A key curricular issue, according to the deans, is difficulty in getting diverse constituents on campus to fully commit to the MCB program. One concern voiced was the there must be insurance against barriers in home departments that discourage long-term teaching commitments to the MCB program. They also noted that the curriculum was missing some core elements necessary to set up a multiple tracks approach (e.g. defined tracks, coursework, faculty participation, and track leadership). The students expressed a preference for the current set-up and opined the narrower track concept did not appeal to them. However, it was also clear that the current students did not have a good understanding of the proposed tracks system. The faculty felt that tracks would help focus the program and increase its competitiveness. The faculty and students both noted that MCB students have greater insight into other related disciplines than the average single science subject students.

Considering that the curriculum is in a state of transition, it was surprising to find that a course on

biostatistics was not being considered for the MCB core. Discussion with the faculty indicated that there was not an appropriate existing course. A new MCB faculty member indicated that a planned new course in evolution and genomics will be statistically rigorous. This may serve the needs of some students, but a course dedicated to statistical analysis using biological datasets seems highly relevant for the vision of the MCB program.

B. Student Success and Perspective

The student=s reported that the average time for completion of a degree was approximately five years. This matched with program statistics of 5 years, 4 months to complete the program. The students felt highly supported financially, socially, and academically. All students were planning to continue biological research as postdoctoral scholars in academia or research scientists in industry. The students noted that they had picked OSU=s program because it provided flexibility, the core courses appealed to them, they felt the program was broader, and they were able to do rotations in different labs. Most noted that they had identified this program from on-line searches. The students felt that they had a broader base of knowledge than the average science student. Although the students were spread out over all the participating disciplines in terms of office space they were comfortable with their respective Ahomes@ and did not feel that they were not accommodated by MCB. They all had space in the MCB program but this was not where they Ahung out.@ They felt fairly confident of their identity as an MCB student and as a member of the department that was providing direct support.

The students reported that they do not have a formal mechanism to get feedback from the general MCB faculty, but were generally satisfied with the advising they received from the program director, their major professor and graduate committee members. The students reported that their core courses gave them a very good preparation, and their committee is very helpful in designing an adequate preparation program. Although all students expressed great enthusiasm for *MCB 525-Techniques in Molecular and Cellular Biology*, most felt that the course needed to be updated. This was also echoed in faculty discussions. Students suggested implementing new information regarding: (1) experimental troubleshooting, (2) data analysis and application, and (3) accessing/downloading bioinformatics tools for data manipulation. Faculty suggested the implementation of modern techniques commonly used by MCB students. Two students indicated that training in computer programming (Perle) would have benefited their research program. They also noted that the ethics course through the Philosophy department was nearly useless for their purposes. They wanted an ethics course with greater direct relevance to their area of study. We note that the MCB program is responding to this complaint and has identified an MCB faculty member to develop and deliver an ethics and skills/techniques course next year. Students also felt that they would like more information in their course work that pertained to grantsmanship, writing skills, Power Point presentations, and career development options (academics vs. industry) near the end of the PhD program.

Some students noted a preference to have their advisory committee active from year one. They noted that the professor of the MCB525 course was available to advise the students during the first year and that was very helpful. Some students noted that they liked the flexibility in the program; if they took initiative they always got support. The student=s also noted that the interim coordinator was always available. The students noted that the idea of having 100 faculty members available to them was very inviting and encouraging.

Some students expressed desire for the MCB program to improve the communication about the program and graduate school requirements, so that they would have a clearer idea of what they were expected to fulfill and by when. This may not be specific to MCB but could reflect differing departmental requirements. (Colleague non-MCB students working in the same lab will have different requirements

which may lead to some confusion.) However, other students felt like they were in charge of learning the requirements and this wasn't a problem. Some also felt that Graduate School website was difficult to navigate. One issue the students brought up was a desire to understand the process of bringing in faculty they wanted to work with into the MCB program. They stated that they were told it was a simple process, but they did not know what it entailed. They also wanted to know current faculty research interests. Although information regarding participating MCB faculty research programs is available on the web, the students indicated that they would have a better idea of the current research questions if individual websites were routinely updated with this information.

C. Student and Faculty Scholarly Productivity / Awards and Honors

MCB graduate students typically publish the results of their dissertation research in high quality scholarly publications with 41 journal articles listed as being published by 17 students since 2001. In addition, students stated that it is common to attend more than one conference during their graduate tenure and it appears to be common for students to present at these meetings (>80 presentations since 2001). Overall this productivity seems adequate. However, there are no publications listed for several of the 23 students who have graduated since 2001. It is not clear if this is a matter of bookkeeping, or if it represents a more troubling trend of issuing PhDs to students that have not completed publishable scholarly work.

On the whole, there appears to be a sufficient number of faculty receiving grant funding to support a vibrant program. This was reflected by the fact that students said they had no problem finding laboratories that could provide financial support. Given the large size of the faculty it is difficult to sort through how many are major contributors and how many really act more as bystanders. The program would benefit from a thorough review of faculty contributions and resources to better understand how this large group of "volunteers" can contribute to achieving the programs goals.

Both faculty and students have been honored with numerous external and internal awards reflecting an active group of scientists making contributions in research and teaching. The University should be proud of the contributions this group is making.

D. Student Financial Support, Retention, Graduation Rates, Employability

MCB PhD students receive an annual stipend of $22,000 at 0.49 FTE plus a tuition waiver. Under a new strategy, the first year of support is covered by the MCB program and subsequent years by MCB faculty research grants and/or departmental teaching assistantships. The ability to support first year students with GRAs (starting 2005) is seen as critical for success in recruiting graduate students and enabling them to participate in rotations through different labs. Graduate students stipends seem to be competitive with peer programs.

Currently, 6 TA positions are funded; however, 7 TA positions are required for MCB graduate support. Obtaining more TA funding is essential to support the students in their second year, and may be a factor for retention in the program, especially considering the desired growth in the program. The MCB faculty clearly indicated that they are committed to securing available TA positions for MCB graduate students; however, a constant source of TA funding is imperative.

Comments from graduate students suggest that funding is generally available (at least for the small number of PhD students in the program) and the Committee detected no concerns regarding continued funding for the expected length of study. As such, it was surprising to learn that the two alumni surveys returned indicated that students had to self-fund part of their studies (< $10,000). Success with securing a Training Grant will be critical for longer term success.

The program did not provide specific information on attrition rates, but anecdotal evidence suggests that attrition from MCB is no greater than might be expected from any PhD program. The average time in residence to degree completion is about 5 years and 4 months.

In the last five years, students (23/32) trained in the MCB PhD program were placed in competitive academic and research institutes (e.g. University of Washington, Yale, Los Alamos National Laboratory, University of Geneva, Siga Technologies, NIH) demonstrating that the program is generating highly trained and ambitious scientists. Only one MS student was reported to continue in research at an institute. The committee did not meet with any MS students to adequately evaluate their training and productivity.

Students in the MS in Applied Biotechnology do not receive financial support from the MCB program, but may be supported by employers or TA positions. The long term success of this new program under this type of financing arrangement is uncertain although current enrollment trends suggest that there is a steady demand. Growth in this program appears to be limited by the availability of paid internships. Because this is a new program there is insufficient information on attrition or other productivity measures to draw inferences at this time.

E. Program Growth and Diversity

The review team is impressed with the steps being taken to expand the size of the MCB program as a result of initiative funding, and concur that these are desirable and appropriate. In the long run, growth of the program will require new resources and probably a more central role on campus. Success with obtaining a new training grant will be important, but we tend to agree that a vision of a metamorphosis of MCB into a broader umbrella graduate program to serve the life sciences community could be catalytic to greater OSU success.

A lack of diversity is a concern among faculty and students. While there is a fairly good gender balance among the students, this is not true for the faculty where women are under represented. There was also a notable absence of women speakers as part of the seminar program. The program should take a hard look at these types of opportunities as a means of providing balance to the program and developing further opportunities for mentoring underrepresented groups. This is a historic problem and is slowly changing; MCB leaders and faculty should continue to make this a high priority in alignment with University goals. Among students there are few non-dominant groups represented. The program was overwhelmingly White and Far East Asian with a few international students, also from Asia.

We concur with the program priority of increasing student diversity in the MCB PhD and MS in Applied Biotechnology programs. We do not, however, have new ideas and insight into how to achieve that beyond the steps that are proposed by the MCB leadership. We suspect that they will need to cast their recruiting net well beyond the Pacific Northwest to improve their chances of additional student interest. If they find a promising and qualified underrepresented student applicant for the PhD program then they might consider making funding that student a high priority and whether the targeted fellowship funds from the Graduate School could be helpful. Longer term, a key could be to help fill the pipeline with underrepresented students by specifically nurturing undergraduates. We did not explore the steps being taken to diversify the MS degree program, but it may be reasonable to enlist the help of employers in that effort.

D. Real or Perceived Barriers to Greater Success

While the MCB program has been quite successful to date and has taken dramatic steps towards increasing its effectiveness in the future, significant challenges remain and will need to be addressed if the lofty goals of the program are to be achieved. There is a perception among the faculty of variability in rewards for their participation in the program. Some faculty feel they are supported by their departments and credited for their service while others feel the service is appreciated but not credited, or more often, not recognized. Whether or not these are real or perceived differences, it contributes to bit of a "can't do" attitude when it comes to such critical things as structuring the curriculum. The volunteer nature of the faculty is a strength but also a challenge since it is more difficult to align the faculty on such things as core competencies and shared goals. This seems to be currently addressed by a core group of highly committed faculty that has made this program their priority, and they have accomplished a lot. However, this puts the program at some risk with nothing to ensure this commitment will be maintained in the future.

There is also a significant challenge with aligning a large volunteer faculty on a clear purpose for the program. For many, this appears to be just another avenue to troll for students for their laboratories and when questioned, they did not articulate any distinction between MCB students and others in their laboratories. Pragmatically, this is to be expected, but to achieve a stated goal of receiving a training grant by 2011 will require clear consensus on defining the unique attributes of an OSU MCB graduate. The vision of providing multi-disciplinary training rather than simply representing a multi-departmental confederation is a good one and would position students well to be competitive in the job market. However, it may not be a vision that is universally shared by the faculty.

As mentioned above, stability of core funding, especially dollars used for supporting graduate students could be improved. The program leadership is not currently allowing this to be a barrier but a tremendous amount of energy is spent gathering a small amount of money to keep this going.

IV. SUMMARY AND RECOMMENDATIONS

The decennial graduate program review of the Molecular and Cellular Biology program revealed a successful interdisciplinary graduate education program with strong administrative, faculty and student support, especially for the PhD program. The program enjoys strong leadership and is benefiting from a new funding model and a university-level initiative that is the catalyst for significant strategic change, now underway. The core curriculum is strong and undergoing change to reflect new priorities and advances. Student satisfaction is very high with the PhD program. We are not able to assess that for the relatively new MS program. There is a dedicated core group of faculty who make this program work, supplemented by a larger group of interested participants.

Currently students appear to be gaining adequate and appropriate training to move on in their careers, especially at the PhD level. The coursework-only-MS program is relatively new and a recent faculty hire is now putting greater attention to advising, curriculum and program support activities. We suggest that a more meaningful assessment of the program should be made in several years.

In some cases, the MCB PhD program has begun to provide a framework for a truly multi-disciplinary education. This effort is in early stages and should accelerate since students that have truly developed the ability to work fluidly across disciplines will have a definite competitive advantage in the workplace. The program goals to develop core capabilities in computational and genomic research as a theme to unite disparate research efforts are a good beginning. However, the faculty as a whole need bring more focus

to this. There was very little ability by the faculty to articulate what made an MCB student unique within the overall graduate program at OSU.

Long term sustainability or growth of the MCB program will depend on: a) a stable funding stream from the participating Colleges and Graduate School; b) direct program support for first year students through GRAs; c) an equitable (across participating departments) and transparent mechanism that recognizes and/or rewards the contribution of faculty to teaching in the program; and d) faculty success with grantsmanship and recruiting high quality students.

This report contains numerous observations and opinions about various aspects of the MCB program that aren't summarized here. This is a successful implementation of an interdisciplinary education model. We offer the following recommendations to improve upon that success.

Recommendations

1. The MCB program leadership should take steps to more proactively engage the Advisory Board in the future of the program.

2. Regular consultative meetings of the participating MCB faulty should be conducted to ensure support and/or understanding of the new program directions and to regularly discuss broad programmatic issues.

3. Clear expectations should be placed on MCB faculty that make their enrollment in the program meaningful. This could include participation in core curriculum, participation on development of "tracks", participation in planning committees covering programmatic issues, and other contributions to training MCB students.

4. An annual report of the program accomplishments and goals should be prepared and distributed widely to faculty and administrators.

5. Departments hiring new faculty with clear interest in MCB and related technology should explicitly define faculty job descriptions so that a portion of the individual's teaching and mentorship duties are officially committed to the MCB program. In return, OSU departments will be able to attract or retain exceptional scientists requiring modern technology and students with this interest.

6. Continue to make improving student and faculty diversity a high priority. Develop a written diversity action plan to share with the MCB Advisory Board, the MCB faculty and OSU administration.

7. The MCB Program Director and the Dean of the Graduate School should establish methods of assessing whether program and course student learning objectives are achieved. Review of student evaluations of instructors should be one component of oversight. The Dean and Program Director should consider exit interviews and other techniques to gain meaningful feedback on program quality.

8. Develop stronger mechanisms to align department/college incentives with the success of the MCB program and reward faculty for their 'voluntary" contributions.

9. Define unique requirements that make the MCB program "multidisciplinary". For instance, a

truly “multidisciplinary MCB PhD student” at OSU is expected to: (1) complete course work in molecular and cellular biology with a strong emphasis on computational biology, mathematics, and systems biology; (2) be able to conduct research using modern research tools available through the CGBI; (3) complete a research dissertation answering fundamental biological questions at the genome level and (4) be prepared for an increasingly complex job market that values scientists that can work across classical disciplines.

10. Continue to improve the current MCB curriculum to better serve the training needs/requests of the MCB students, such as: updating MCB 525, implementing more formal opportunities for learning grant writing and making oral presentations, and by integrating new courses that will uniquely train MCB PhD students and distinguish them from their graduate peers (e.g. computational biology, biostatistics, programming, genome evolution, systems biology).

11. Given that the focus of the MCB PhD program is shifting to a greater emphasis on more numerically and computationally intensive subjects and research, the degree requirements should reflect course requirements or mastery of graduate level statistics or mathematics.

12. The MCB faculty should identify a core group of individuals to serve as mentors to MCB graduate students in the first year. Formal advising is expected to help the students identify programmatic needs early in their career, identify research labs for rotations, and provide a mechanism for faculty to recruit students with similar interests into their labs.

13. Financial support of students is critical to long term success. The MCB program should expand their efforts to ensure that GRA and TA funding, supplemented with fellowships, is available to support a strong and diverse student population. Faculty energy should be invested toward developing gifting opportunities and securing industry-supported fellowships and internships for both PhD and MS students.

14. Given the deans= stated support for the program, the committee recommends that efforts be made to guarantee that these voluntary contributions become a permanent part of the programs= budget.

15. The participating MCB faculty dedicated to graduate training should formally commit to teaching in the MCB courses, and that commitment should be reflected in faculty position descriptions. Such an obligation is essential to maintain a rigorous, consistent graduate curriculum from year to year. Teaching contributions should be formally acknowledged and supported by the participating departments.

16. The MCB program should publish and/or document examples of interdisciplinary research activities at OSU. It will be critical to be able to demonstrate clear evidence of integrated and multidisciplinary graduate research in order to secure a training grant in the near future.