

## **A Proposal to the Andrew W. Mellon Foundation**

The Organization for Tropical Studies requests \$350,000 from The Andrew W. Mellon Foundation to continue providing fellowships for students participating in the OTS Undergraduate Study Abroad Program. Over the next two years, a diverse group of students from across the United States and Costa Rica will have a unique opportunity to participate in a field-based study abroad program in tropical ecology.

### **Organization History and Mission Statement**

The Organization for Tropical Studies (OTS) is a nonprofit consortium of more than 60 universities, colleges and research institutions from the United States, Costa Rica, Perú, México, South Africa and Australia. OTS was founded in 1963 with a mission *to provide leadership in education, research, and the responsible use of natural resources in the tropics*. OTS conducts graduate and undergraduate educational programs in tropical biology, coordinates and facilitates field research, owns and operates three field stations (La Selva, Las Cruces, and the Palo Verde Biological Stations) in contrasting life zones in Costa Rica, and works in cooperation with governmental and partner agencies on issues of conservation, environmental education, and natural resource management.

### **Education Programs**

Since 1963 OTS counts more than 6,300 alumni as beneficiaries of its undergraduate and graduate programs. OTS employs a field-based and problem-driven pedagogy. Typically, OTS courses travel to different ecosystems within a country and are taught by faculty who are research scientists with extensive tropical experience and a dedication to education. OTS courses are renowned for their comprehensive coverage of key principles of tropical biology and their intensive introduction to scientific field methods, contrasting tropical ecosystems, and cutting-edge research.

#### *Graduate Education Program*

Beginning with one graduate course in the “fundamentals of tropical biology,” OTS now offers up to twelve courses a year for U.S. and Latin American graduate students. As a complement to these field-based courses, research fellowships are also available to graduate students beginning their research careers and pursuing their doctoral theses. During its 47-year history, OTS has offered over 300 graduate level intensive field courses. In addition to annual courses in tropical ecology in both English and Spanish, OTS offers a tropical plant systematics course that rotates each year between English and Spanish. OTS has also taught an Amazon ecosystem course in Peru and courses in tropical coastal ecology in Mexico with collaborative partners from both countries. Five years ago OTS launched a new program of short graduate level field courses in specialized topics for students seeking more advanced field training. Thus far, such courses have focused on specific taxa (bats, lichens, ferns, herpetology, butterflies), applied fields (agroecology, conservation & biodiversity genetics, adaptive management, and avian influenza) and habitat types (tropical estuaries, and wetland ecology). These courses have been unique in that regardless of the language of instruction (English or Spanish), most are filled with an even balance of North American and Latin American participants. Such diversity provides an opportunity to enhance and encourage lifelong international partnerships.

### *The OTS Undergraduate Program*

In 1997, OTS recognized that an important opportunity existed for an academically rigorous program in tropical biology for undergraduates and initiated the Undergraduate Study Abroad Program (USAP). The objectives of the OTS Undergraduate Program are to introduce students to: 1) a diversity of tropical habitats, both natural and disturbed; 2) scientific principles that guide research in tropical ecology; 3) a broad spectrum of U.S. and international scientists and their research interests; and 4) a variety of research techniques. In addition, the program provides students with: 1) Spanish language and its application in science; 2) representative environmental challenges facing developing tropical nations; 3) cultural features of contemporary Costa Rica; and 4) the historical, economic and political forces that have shaped Latin American society. As part of its undergraduate offerings, the consortium offers semester abroad programs every spring and fall, a summer course in tropical biology, and a program of research experiences for undergraduates at the OTS research stations.

The OTS Undergraduate Tropical Biology Semester Abroad Program in Costa Rica is accredited by Duke University and consists of four courses: *Fundamentals of Tropical Biology*, *Field Research in Tropical Biology*, *Environmental Science and Policy in the Tropics*, and *Culture and Language of Costa Rica*. Instruction is based on a pedagogy of field orientation and research that provides direct, hands-on learning opportunities for the students. Classes are conducted at the OTS field stations, as well as at other complementary field sites in Costa Rica, over a 15-week semester. Numerous experts participate as short-term faculty and guest lecturers, and home-stays enable students to stay with Costa Rican families in both rural and urban settings.

Likewise, the OTS Undergraduate Semester Program in South Africa's Kruger National Park is also accredited by Duke University and is structured around four courses: *South African Ecosystems and Diversity*, *Field Research Skills*, *Conservation Management of Protected Areas in South Africa* and *History through Culture of South Africa*. The South African program focuses on savanna ecosystem ecology and conservation within and outside of protected areas. Students are also exposed to the country's vast cultural diversity, its history and the challenges of an emerging democracy. A unique aspect of this course is the cultural experience achieved by a mix of students from the United States and South Africa.

Most recently, OTS launched a new semester abroad program in *Tropical Medicine and Public Health in Costa Rica* that provides an outstanding opportunity for students considering careers in public health, medicine, and other health-related areas. A 15-week program emphasizes both the scientific and social issues of tropical medicine, public health, ethnobiology, global health, and research topics in these subjects. Instruction focuses on the highly regarded OTS method of field based, hands-on learning.

One summer course, a four-week *Tropical Biology* is also offered on an annual basis by OTS and is accredited by Duke University. This course provides an academically rigorous field experience to students who, for one reason or another, are unable to devote a full semester to studying tropical ecology.

In addition to the undergraduate courses, OTS, with funding from the National Science Foundation, offers three summer Research Experiences for Undergraduates programs (REU) for U.S. students. Under the supervision of research mentors, students work on independent research projects and receive stipends for their participation. OTS has an eight-week program at La Selva, an REU at the Las Cruces Biological Station targeted to Native Americans and

Pacific Islander students (NAPIRE), and a six-week experience in South Africa. Complementing the REU at La Selva is an REU experience for host-country participants funded by the Costa Rican-United States Foundation (CR-USA).

The NAPIRE program is of particular importance to our diversity efforts because historically Native American students have had the lowest enrollment of any group in our programs. As a result, OTS initiated a special program in 2005 to serve as an introductory course that introduces students to field ecology. Unlike traditional research experiences, the NAPIRE program curriculum includes an examination of the history and culture of indigenous groups, such as the Guami Indians, in Costa Rica and Panama, and investigates how various environmental issues influence their development and way of life in tropics. Faculty mentors from tribal colleges and Pacific Island institutions serve as mentors to assist students develop individualized research projects and facilitate their completion of the program. NAPIRE is also intended to serve as a feeder to other OTS programs by encouraging students to pursue longer research activities, such as the semester program. The program has proved successful and has maintained full enrollment over the past several years.

### **Background and Overview of OTS' Diversity Efforts**

In 1999, OTS established the OTS Scholars in Ecology Program with the goal of addressing the dearth of underrepresented groups (African Americans, Hispanics, Pacific Islanders and Native Americans) participating in OTS courses and activities and continuing their studies in ecology and environmental science. The best and brightest students are recruited from throughout the United States and are awarded scholarships on a competitive basis to participate in the OTS study abroad programs in Costa Rica and South Africa. In 2001, OTS received its first award from the Andrew W. Mellon Foundation to diversify the OTS undergraduate semester program. The overarching goals for OTS' diversity efforts complement those of the Mellon Mays Program: increase enrollment of underrepresented minorities in the OTS undergraduate program; provide fellowship recipients with hands-on research opportunities; encourage fellowship students to pursue advanced degrees in ecology and environmental sciences-related fields; and improve a student's international experiences in Spanish and the culture of Latin America. A unique component of the Mellon support has allowed OTS to extend scholarship support to host-country participants, which greatly enriched the undergraduate program for all students and increased significantly the bicultural interaction.

In addition to fellowships for undergraduates, the Mellon grant also enabled OTS to establish a National Fellowship Advisory Committee (NFAC) to provide guidance to the Scholars in Ecology Program. In November 2004, the OTS Board of Directors concluded that a more comprehensive strategy for achieving diversity at all programmatic and organizational levels of OTS was needed. A new committee called the Advisory Committee for Academic Diversity (ACAD) was created to replace NFAC. The Advisory Committee for Academic Diversity supports OTS diversity efforts in multiple ways: First, ACAD is an important element in strengthening the relationship between OTS and historically black colleges and universities, tribal colleges and universities, and Hispanic-serving Institutions, since a significant number of minority students attend these schools. Second, ACAD members serve as mentors and role models for students. Third, the chair of ACAD serves as a member of the OTS board of directors and provides feedback directly to board members about diversity issues at OTS. Lastly, ACAD assists OTS with evaluating key elements of programs and activities.

In 2004, Howard University became the first historically black college to join the OTS consortium and has continued to play a very important role in our diversity efforts. Howard University was

the site of the OTS symposium on *Fostering Diversity in the Environmental and Biological Sciences*. Student presentations were made by alumni of the OTS Scholars in Ecology program and panel discussions were held on identification, recruitment and retention of minorities in ecology and related fields. Dr. Ray Petersen, professor emeritus at Howard, is the immediate past chair of the OTS Advisory Committee for Academic Diversity and a former member of the OTS board of directors. Dr. Petersen also served as mentor for the NAPIRE program and was the advisor for Mellon fellow, Thomas Hardy. Relationships with Howard faculty and administrators have yielded a high number of students at the undergraduate level and most recently, we are seeing a number of Howard students participate in the OTS graduate program. Howard faculty members have also collaborated on grant proposals with OTS through the National Science Foundation. Dr. Clarence Lee, administrator for the Howard University Louis Stokes Alliances for Minority Participation has provided financial support for Howard students to attend OTS programs.

In 2007, ACAD published a manual of best practices based on information presented at the Minority Scholars Symposium at Howard University. The *ACAD Manual of Best Practices* emphasizes developing strategies that encourage and facilitate undergraduate students to pursue graduate school and professional careers in ecology and the environmental sciences.

OTS has been recognized for its outstanding work in this area. The Organization of Biological Field Stations (OFBS), an international consortium of field stations, honored OTS with its first annual human diversity award in 2007 for increasing participation of students from underrepresented groups in ecology and the environmental sciences.

### **Summary of Results from Previous Support**

In 2007, the Organization for Tropical Studies received a renewal from the MMUF program for a new three-year grant to continue its efforts to diversify the Undergraduate Semester Abroad Program. As a result of opening the program to summer students, over the past three years, the current Mellon grant has provided, thus far, fellowships to 37 of the best and brightest students from the United States, Costa Rica and South Africa. This brings the total number of OTS Mellon Fellows since 2001 to 73; 53 are U.S. minorities, with 18 from Costa Rica and 2 from South Africa. Since awards were first made fall 2002 (year 1 of the project was devoted to start-up activities), Hispanic Americans continue to be the largest group, representing 34 percent of the scholars, African Americans are next at 29 percent, followed by Costa Rican Nationals at 25 percent, with Native Americans and Pacific Islanders at 4 and 1 percent, respectively. South Africans, who were just recently added to the Costa Rica program as part of the goals for the current grant, are 3 percent of the students. Bi-racial students, Asians and other ethnicities combined to round out the total at 4 percent.

More broadly, the Mellon grant has been an important part in increasing diversity throughout the OTS Undergraduate Program. U.S. minority students are more than 25 percent of the total undergraduate population, which is a dramatic increase from previous years before Mellon support when minority students were only a fraction of the student population. Mellon funding currently accounts for about one-third of the U.S. minority students in the undergraduate program. If you add Costa Rican students funded by MMUF and South African students funded by MMUF and the Mellon Liberal Arts program, Mellon funding is responsible for nearly 50 percent of the diversity in the OTS Undergraduate Program. The goal in future years is sustain this momentum in the OTS undergraduate portfolio and with the inclusion of minority-serving institutions such as Howard, University of Puerto Rico, and Florida International University, extend the results to the OTS graduate program.

### *Tracking and Analysis of Participants*

OTS has a structured system for tracking the progress and career trajectories of program participants. Alumni are contacted at regular intervals to go to the OTS website and provide updated information on their academic and professional activities. The link can be accessed at [http://www.ots.ac.cr/contactos/surveyXen\\_.edu.php](http://www.ots.ac.cr/contactos/surveyXen_.edu.php) and is available in both English and Spanish. With access to better technology, the website will undergo changes shortly to accommodate more data sets such as student publications and other information that provide a more comprehensive assessment the role our programs have on students' academic lives and career choices. Also, each OTS program has its own Facebook site where students engage on a regular basis with OTS and other alumni. See attached tracking data on individual U.S. minority students participating in the program since the first scholarship awards were made in 2002.

An analysis of tracking data for the 53 U.S. minority students, who are the primary target group for this project, indicates 35 of the 53 students have completed their undergraduate degrees. Of these students, nearly 30 percent are enrolled in either a master's or Ph.D. program in an ecology-related field; of that, one student has completed his Ph.D. and is working as a faculty member at a university in Virginia and he also serves as a research mentor at one of OTS' field stations in Costa Rica. A similar percentage is found for the ones choosing to pursue medical school or other health-related fields. About 8 percent are working for an environmental organization and 2 percent chose to work in the health field. The remainder of students tracked represents recent graduates in the process of applying to graduate schools, students enrolled in master's programs in science education and those students whose current status is unknown.

### *International and Cultural Diversity*

Another important impact of the OTS Mellon Program has been the incorporation of host country students. Inclusion of Costa Rican students and recently South Africans has greatly enhanced the cultural and academic experiences for all students. Working and living together with Costa Rican and South African students increased the level of interaction U.S. students received, particularly in the culture and customs of Costa Rica, which helped to broaden their perspectives and provide them with the necessary confidence and skills to compete in an increasingly global environment.

In addition, instructors for the OTS Undergraduate Program observed that the presence of a diverse group of students created an environment in which students learned from one another about the history and cultural practices of each nation, and for the most part showed remarkable tolerance and sensitivity. International students quickly became part of the larger group rather than forming blocs from their respective nations. Students from such different backgrounds contributed a wider variety of perspectives in debates about the interactions of developed and developing nations, the rights of native people, the role of scientists in society, and many other topics, both in formal class discussions and in everyday interactions. The international students questioned the tacit assumptions of the Americans and helped them expand their understanding of global issues. International students also arrived with a different academic background, stronger in some subjects than that of the Americans. Through their social and academic contributions to the group, international and U.S. minority students studying together are an integral component of the program.

## **Justification for Continued Funding**

Funding from the MMUF program remains critical to the overall diversity efforts at OTS, to encourage more minority students to consider a wider array of career options in the biological sciences besides those in the medical and health-related fields. The OTS Mellon program has been successful in achieving this goal with nearly 40 percent (30 percent in grad school and 8 percent working) of the participants who graduated pursuing graduate degrees in ecology and or working in ecology or environmental organizations. Recent data show the number of minorities earning degrees in the biological sciences is increasing but the number from fields related to ecology and environmental sciences have not shown significant increases (ACAD Manual of Best Practices, 2007). These data are reinforced by a report on *Women and Minorities in Ecology* (2006) that shows membership in the Ecological Society of America is less diverse in comparison to other math and science fields, even though there has been a steady rise in the minority population. Therefore, the need still exists for a sustained, targeted effort to recruit and retain these underrepresented students in ecology-related disciplines.

Moreover, because of the global ramifications of ecology for humans and the environment, people of all cultural and ethnic backgrounds are necessary to contribute to a greater understanding of important environmental issues such as global warming and tropical deforestation. By bringing multiple perspectives, a diverse pool of scientists will utilize multidisciplinary and integrative approaches more effectively to address these critical world problems.

## **Proposed Program Activities for 2010-2012**

The Organization for Tropical Studies requests continued support from the Andrew W. Mellon Foundation for the OTS-Mellon Scholars in Ecology Program. Over the next two years, a diverse group of students will receive either full or partial fellowships targeted to African American, Hispanic American, Native American, Pacific Islanders and Costa Rican students to participate in the OTS Undergraduate Study Abroad Program in Costa Rica. Fellowships will include up to the full cost of tuition, room and board, and international airfare to and from Costa Rica. In addition to fellowships, OTS also requests funds to provide language training, when needed, for US students in Spanish and English for Costa Rican students.

*The goals of the program are:*

1. To increase enrollment of African American, Hispanic American, Native American, Pacific Islanders and Costa Rican students in the OTS Undergraduate Program
2. To provide fellowship recipients with hands-on research experience with scientists in the field of tropical biology
3. To encourage fellowship students to pursue advanced degrees in ecology and environmental science-related fields
4. To develop a bi-cultural exchange of ideas and academic development

### *Student Recruitment and Fellowship Selection*

The recruitment of US students for fellowships into the semester abroad program will be done by targeting:

- Minority-serving institutions;
- Colleges and universities that currently receive Mellon Mays Undergraduate Fellowship funds; and
- OTS member institutions, particularly those that serve high percentages of minority populations.

The colleges and universities with a representative on the ACAD will continue to serve as focal points for recruitment. Having a point person on campus will allow students to receive appropriate information, support and recognition for participating in the program. In addition, OTS has an undergraduate enrollment management department that employs three recruiters, one of whom is dedicated to working with minority students and minority-serving institutions.

The OTS recruiters make personal visits to campuses and offer informative sessions about the program. The OTS Enrollment Management staff will be responsible for implementing the recruiting strategy and will maintain an informational packet, highlighting fellowship opportunities through OTS. This material will be distributed nationally to the schools described above. OTS will also disseminate information on the fellowship program through its website, as well as in its electronic and print publications.

OTS staff based in Costa Rica, including the OTS Education Director, will assist with recruitment of Costa Rican students into the program. Staff members will visit the major universities to offer information sessions on the program. OTS regularly maintains an informational board on the four campuses of its Costa Rican member universities. These boards will also serve to disseminate information on the fellowship program.

### **Program Sustainability**

For the last several years, OTS has been establishing a framework to ensure the long-term sustainability of its Scholars in Ecology Program. There are three critical elements of this framework: 1) fellowship support, 2) maintaining an effective recruitment program, and 3) mentoring program.

#### *Undergraduate Fellowships*

The lack of financial aid in the form of scholarships and fellowships is a major barrier for minority students attending college at the undergraduate level (Barlow and Villarejo, 2004). Thus, minority students are less likely to consider study abroad experiences. Many minority students, particularly those attending small minority-serving colleges are the most vulnerable, as they do not have the personal resources to cover the OTS tuition (at the level of Duke University's undergraduate tuition), nor do most of their home institutions have the resources to support these activities. Providing these students with adequate fellowship support becomes critical to their participation in international activities.

To ensure the long-term sustainability of fellowship funds for minority students, OTS has been actively engaged in an education endowment campaign. The Mellon Foundation awarded OTS a \$1.5 million challenge grant, when complete will total \$3 million and provide more than \$150,000 per year in fellowships. To date, almost \$1 million has been raised and we expect a steady payout to begin within two years. Consistent with OTS' mission, a portion of this payout will be dedicated to minority student fellowships. OTS has set a target of trying to maintain current levels of participation by U.S. minority students in the undergraduate program.

Fellowship support from the endowment will be used to help achieve this goal, though the exact amount will vary from year-to-year for several reasons. For example, the funding will depend on the number of students accepted to various programs, the student's financial need, amount of restricted funding available from other foundations and organizations, and any changes in the endowment due to fluctuations in the financial markets. However, as a general guideline, OTS expects to use about 20 percent of the anticipated payout of \$150,000 to go towards undergraduate fellowships for U.S. minority students; 27 percent will go to South African students; 33 percent to the graduate program, which may also include minority students; and the remainder for a general pool of students who are financially disadvantaged.

In addition to the endowment, OTS is partnering with other organizations such as the National Science Foundation Louis Stokes Alliances for Minority Participation (LSAMP), Hispanic Scholarship Institute, and Duke Energy Foundation to support fellowships for minority students in the OTS Undergraduate Program.

### *Recruitment*

As discussed above and with the support of the previous Mellon Foundation grant, OTS' Enrollment Management office now has a designated person working to sustain our recruitment success by targeting schools and organizations with significant minority enrollment to ensure a steady flow of students are maintained in the undergraduate program, such as working with the UNCF/Mellon Program, the Hispanic Association for Colleges and Universities, and building upon the success OTS has achieved in recruiting to students into the undergraduate program from targeted Liberal Arts Colleges.

Members of the Advisory Committee for Academic Diversity (ACAD) will continue to play an important role in helping to recruit and maintain a diverse population of students in the undergraduate program and other OTS programs and activities.

### *Mentoring*

The final critical element required to ensure the long-term sustainability of the OTS Scholars in Ecology Program is an active mentorship program that draws home institutions and faculty closer to OTS and study abroad institutions. Members of the ACAD committee are committed to continuing their role in the mentoring process. In addition to ACAD members, OTS will continue to work closely with the Fellows' home institutions to identify long-term faculty sponsor and representatives on their home campuses. Complementing this strategy will be a continued effort to encourage faculty members from underrepresented groups to develop research projects at OTS field stations, creating a cadre of faculty from minority groups who know OTS, have worked in a tropical environment, and can serve as mentors for the OTS Mellon Program.

### **Project Administration**

Dr. Liana Babbar, OTS Education Director, is responsible for overseeing all activities related to the education program. The OTS Undergraduate Program is Vivian Melendez who oversees the students' academic and social life in Costa Rica and is responsible for both the semester and summer programs. The OTS Enrollment Management Director and recruiters will carry out student recruitment and dissemination of information on the OTS Undergraduate Program. They will travel throughout the United States visiting college campuses and meeting with faculty and undergraduate candidates. The Advisory Committee for Academic Diversity will help recruit students and evaluate the strategies and efforts of OTS in implementing this project.

## **Conclusion**

The long history of OTS in educating students in tropical biology places the organization in a key position to engage underrepresented students in scholarly work in tropical biology and train them in field research. The success of the last nine years of the Scholars in Ecology Program confirms that the OTS hands-on method of learning science by doing science can be applied successfully to all students. The program described here would enable OTS to continue to make a positive impact on the lives of African American, Native American, Hispanic American, Pacific Islander and Costa Rican students who pursue research and academic careers in the ecology and environmental science-related disciplines.

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