

Final Report

The anticipated result of the research was to discover and create effective enzymes which may increase the competitiveness of Europe and enrich the European Research Area. Some of our research results from this project were published (three in peer-reviewed journals, three as proceedings, and three M.S. theses) and more are expected (two manuscripts, one proceeding, and one Ph.D. thesis). Dr. Schara's work is also published as a four-minute video highlight on the biotechnology and bioengineering web site, facebook page, twitter account as well as on Youtube (<http://youtu.be/H9JAI8uc-D0>). Dr. Schara's published data have already been incorporated into graduate and undergraduate courses entitled Applied Protein Engineering and Protein Design, respectively. Collaborative agreements have been started related to the applied part of this research program. For example, a microbial biosensor is developed based on immobilization of some of our selected oxygenase variants onto gold-plate working electrode to detect phenolic compounds by amperometric methods at the host. A relationship is currently being developed with a small company, who is interested in expanding their R&D in enzyme discovery, isolation, purification, and production.

Apart from the scientific results, the professional reintegration of Dr. Schara into the scientific establishment in Europe, which is the main objective of this project was successfully accomplished. The reintegration grant allowed Dr. Schara to become a more independent researcher and strengthened her career tremendously. She believes that she has improved her organizational, management, and decision making skills. During the project period, Dr. Schara was involved in writing eleven additional proposals: six were granted, four were rejected, and one is currently under review. Among all, four of them were cooperation type proposals. She received a "grant recipient award" from the host for identifying and securing sources of funding for team research. As their advisor, she has mentored four graduate and six undergraduate students in her laboratory. She trained all of her students in the lab on a one-to-one basis as well as advised, encouraged, and mentored them to further their careers after graduation. Three of Dr. Schara's students successfully defended their M.S. thesis; two of them started their Ph.D. program by receiving a scholarship from the Council of Higher Education (training program for academic candidates) and the other student is currently working in a scientific company as a product manager. One of her junior undergraduate student recently received a grant support for one year (National Research Project Support for Undergraduate Students) and one of her senior undergraduate student received a graduate scholarship to continue her master studies. Dr. Schara has participated in four conferences and has set up new collaborative agreements with five more faculty members during the reintegration period. Dr. Schara has been involved in teaching undergraduate and graduate level bioengineering courses, five of which were newly offered during the project period. She was also invited to teach the class entitled "Protein Design" in other universities; such as Aarhus University, Denmark; Istanbul Kultur University, Turkey; Bingen University, Germany; and Lisbon University, Portugal. She was specifically invited to Bingen University so that she could be a positive influence to their female students since they were starting to drop out of college. Dr. Schara has also been seeking opportunities to participate in outreach programs. She gave short lectures on protein engineering topics to high-school students and teachers several times and encouraged them to get involved in research. Furthermore, she hosted several high-school teachers in her laboratory for a period of a week on several different occasions. Teachers learned about the recent developments in protein engineering and had a chance to have hands on experience with these techniques. After these dissemination activities, there was an increase in the number of student enrollment in her department. Evaluation results reported by the university showed that she has been a role model, especially for female students. Dr. Schara's research group was also invited to give lectures by the Ministry of Food, Agriculture, and Livestock, Republic of Turkey as well as involved in setting up a

Biotechnology Workshop. She has also been the bioengineering undergraduate advisor in her department, and assisted about seventy students from diverse backgrounds in selecting classes, and advised them of prerequisites before registering for classes each semester. Dr. Schara values diversity and is aware of the challenges faced by underrepresented populations within her university. She mentored and advised several foreign undergraduate students from countries such as Africa, Saudi-Arabia, and Bulgaria. She tracked their progress each semester and provided advice in academic matters. She also believes she has had a positive influence on them because of her caring personality and cross-cultural abilities. Two of her African students recently got accepted to continue their studies in England. Her Bulgarian student is currently working to get her M.S. degree at Marie Curie University, France. One of her Arabic students has applied for a grant in order to start-up his own company. Dr. Schara has also been the ERASMUS (European Community Action Scheme for the Mobility of University Students) coordinator of the Genetics and Bioengineering Program. She has been contacting with relevant universities in Europe for possible exchange collaborations, assisting incoming and outgoing students of diverse backgrounds and levels of knowledge. In addition, Dr. Schara recently sent her application package for the associate professorship position to fulfill one of her long term career objectives. Dr. Schara was invited twice to give a seminar about her Marie Curie fellowship success story. In her seminar, she showed how the program was crucial for her studies and strengthened her career. She still encourages and advises young researchers to apply for this wonderful program. More information can be found at Dr. Schara's personal web site (<http://www.fatih.edu.tr/~gschara/>).

In all of these efforts, Dr. Schara and her team are still targeting to be at the frontier of enzyme discovery and engineering programs in the country and continually try to develop their knowledge in this field. Dr. Schara is also interested in being a part of a research project in order to understand the barriers women and under-represented minorities face in science. As an educator, Dr. Schara strongly believes in providing high-quality training environments and passing her knowledge to the next generation of researchers which is essential to the health of Europe's research enterprise.