Progress Report

The Progress report covers the period Jun 1, 2012 to May 31, 2016; there is one year left in this cycle till May 31, 2017. Originally funded for 7 spots in 2012, we had one more spot awarded by the NIH on Apr 3, 2015 based on good matriculation outcomes of recent MARC alumni from the program + an additional specific Scholar for a 1-year period only (2015-2016) since he participated in all MARC training activities for his first year (receiving funding from another diversity program). We obtained approval from NIH for appointing him on special grounds.

Training Program Accomplishments: For recruitment each year, we receive 5-10 times more applications than available spots. The application pool is very diverse and is mostly from sophomores (chemistry, biology, psychology, biomedical engineering) with about 2 years estimated to remain before graduation. The selection process involves three rounds- research interest survey, MARC application and MARC interviews. A selection committee reviews the application package and makes recommendations to the PD/PI. The selection criteria included the candidate's GPA (~3.0 in CSULB), a major in pure, life or behavioral science, interest in biomedical research, potential to pursue biomedical research, strength of *CV,* and personal statements and commitment to research.

All trainees followed a research-infused curriculum, carried out a hypothesis-driven research project in a mentored situation and presented their research work to the MARC/Honors thesis committee and a final thesis. All participated in the off-campus summer research experience (**see Section D.2**), and many presented their work in national and/or international conferences (**see Appendix 13**). Many received competitive awards, and 4 were co-authors in publications in peer-reviewed journals. The trainees were also encouraged to articulate their goals and work with their mentors and program personnel to build their individualized development plan. There was 100 % participation in the mandatory RCR instruction through workshops, which were monitored and documented by the ORSP. There was 90% participation in all workshops, biweekly meetings and discussions. The major conclusion is that all the enrichment activities increased the confidence and the competitive spirit of the trainees.

A MARC Internal Advisory committee provided oversight for the program, having met about 5 times over the past 4 years. In his executive summary of year 3 evaluation (**found below Tables in Progress report, and in Appendix 15**), the program evaluator Dr. Dustin Thoman stated that the success of the students can certainly be attributable to the wide variety of research experiences and trainings, as well as professional development opportunities provided by the MARC program that increased their confidence and preparedness for graduate school. In addition, he indicated: "it is evident that the CSULB MARC-USTAR program has been highly successful in achieving its Year 3 goals, and in making considerable progress toward reaching its long-term aims. Given the program's success, only minor recommendations are provided to further enhance the efficacy of this program. Project leadership and staff have demonstrated a commitment to seeking and improving the project in response to feedback, and have already begun working to facilitate improvement in each of the areas of recommendation."

Trainee record: The trainees appointed during this grant period are shown below with a brief description of their projects and current status:

1. Brian Flores was appointed in 2012, graduated in 2014 with a BS in Physics and Applied Math, minor in Chemistry; worked in Dr. J. Gu's lab (Department of Physics & Astronomy, CNSM) on thin films, nanospheres, Nanomagnetism; had a SRE at the Argonne National Laboratory, IL in 2013 summer. He is currently in a PhD program at the University of Pittsburgh.

2. Rodolfo Flores was appointed in 2012, graduated in 2014 with a BA in Psychology, minor in Chemistry; worked in Dr. A. Zavala's lab in the Department of Psychology investigating the effect of methylphenidate on cocaine reward in adolescent rats; had a SRE at the University of Texas, El Paso in the NIH SMART MIND in 2013 summer. He is currently in a PhD program at the University of Texas, El Paso, Neuroscience program.

3. IsidroLanda Jr. was appointed in 2012, graduated in 2014 with a BA in Psychology; worked in Dr. J. Amirkhan's lab in the Department of Psychology on physical symptoms and psychological Stress; did a SRE at Department of Psychology, University of Cincinnati in 2013 summer; obtained an MA in Psychology at CSULB in 2016. He will start his PhD program in social personality program, Washington Univ., St. Louis in fall 2016.

4. Nnejiuw U. Ibe was appointed in 2012, graduated in 2014 with a BS in Biochemistry; worked in Dr. P. Weers' lab in the Department of Chemistry & Biochemistry on the role of apolipoproteins in lipid metabolism and innate immunity; had a SRE at the NIH/NIA Intramural Research Program, Laboratory of Molecular Gerontology; he is currently in the Tetrad PhD program at the University of California, San Francisco.

5. Armando Reimer was appointed in 2012, graduated in 2013 with a BS in Biology and Physics; worked in Dr. K. Slowinska's lab in the Department of Chemistry & Biochemistry on the application of nanotubules in cancer drug delivery; had a SRE in the Department of Chemistry and Biochemistry, UCSD in 2013 summer; he is currently in the PhD Program in the Department of Biophysics, University of California, Berkeley.

6. Yuri Trujillo was appointed in Jan 2013, exited the program in May 2013 for personal reasons.

7. Amethyst Radcliffe was appointed in 2012, graduated in 2014 with a BS in Physics, minor in Chemistry; worked in Dr. E. Sorin's lab on Folding Dynamics of the RNA Pseudoknot; had a SRE at UCLA, Institute for Pure & Applied Mathematics, Research in Industrial Projects for Students in 2013 summer; entered the workforce as a Materials Engineer and researcher at the PPG Aerospace, an Engineering Firm.

8. Rodolfo Villegas was appointed in 2013, graduated in 2015 with a BS in Biology; worked in Dr. A. Carter's lab in the Department of Biological Sciences on the synergistic effects of chemical stressors in Drosophila; had a SRE at the Cary Institute of Ecosystem Studies, NY in 2014 summer. He is currently in a PhD program in Ecology, Evolution & Behavior at the University of Nebraska, Lincoln.

9. Samuel Degregori was appointed in 2014, graduated in 2016 with a BS in Biology; worked in Dr. A. Carter's lab in the Dept. of Biol. Sciences on predation risk as a selective pressure on mammalian neonatal mass; had SRE at the REU Program, Little Cayman Research Center in 2014 summer and at NSF PIRE program, UCLA in summer 2015; he will start his PhD program in Ecology & Evolution, UCLA in fall 2016.

10. Martin Douglass was appointed in 2014, graduated in 2016 with a BS in Microbiology; worked in Dr. M. Zhang's lab in the Department of Biological Sciences on mechanism of phagocytosis in yeast; had a SRE at the SPUR-LABS Program, University of California, Los Angeles, in 2014 summer. He will start his PhD program in the Integrated Life Sciences program, University of Georgia, Athens in fall 2016.

11. Rachel Flores was appointed in 2014, graduated in 2016 with a BS in Molecular & Cellular Biology. She worked in Dr. B. Livingston's lab in the Department of Biological Sciences on conserved proteins in the echinoderm skeleton; had a SRE at the NIH-SURP, University of Massachusetts, Worcester, MA, in 2014 summer. She will start her Biochemistry PhD program at the University of Washington, Seattle in fall 2016.

12. Daniel Sallee was appointed in 2014, graduated in 2016 with a BS in Chemistry; worked in Dr. P. Weers' lab in the Department of Chemistry & Biochemistry on structure function analysis of chimeric apoAI; had a SRE at the NSF REU for Structural Biology, University of Oklahoma, Norman. He will start his Biomedical Engineering PhD program at the Oregon Health & Science University in fall 2016.

13. Alexander Salomon was appointed in 2014, graduated in 2016 in BS in Molecular & Cellular Biology; worked in Dr. K. Young's lab in the Department of Biological Sciences on seasonal changes and reproductive physiology; had a SRE at the Oregon National Primate Research Center, OHSU, Oregon in 2014 summer. He will start his Cell and Molecular Biology PhD program, University of Pennsylvania in fall 2016.

14. Justin Jacobs was appointed in 2015, graduated in 2016 with a BS in Biology; worked in Dr. J. Archie's lab in the Department of Biological Sciences on genetic diversity and differentiation in lizards; had a SRE in Department of Ecology & Evolutionary Biology NSF REU, Kansas University, in 2015 summer. He will start his PhD program in Quantitative Biology at the University of Texas, Arlington in fall 2016.

15. Kimberly Hernandez was appointed in 2014, will graduate in Fall 2016 with a BA in Psychology and a minor in Chemistry. She is working in Dr. A. Zavala's lab in the Department of Psychology in the area of Neuropsychopharmacology, assessing behavior using a reward paradigm; had a SRE with the Amgen program, Stanford University, CA. She will be applying for graduate programs in Fall 2016.

16. James Collins was appointed in 2015, will graduate in 2017 with a BS in Biochemistry. He is working in Dr. M. Schramm's lab in the Department of Chemistry & Biochemistry in organic synthesis of BODIPY-based fluorescent dyes for biological applications. He will do his SRE in the Department of Chemistry & Biochemistry, University of Oregon, Eugene in 2016 summer. He will be applying for graduate programs in fall 2016.

17. Jocelyn Ochoa was appointed in 2015, will graduate in 2017 with a BS in Chemistry; working in Dr. K. Nakayama's lab in the Department of Chemistry & Biochemistry in the organic synthesis of butrylcholineesterase inhibitors; had a SRE at the NSF REU in Merced's Applications in Modern Materials, University of California Merced, in 2015 summer. She will be applying for graduate programs in Fall 2017.

Tables 9, 10, 11 and 12 (corresponding to **NIH Suggested Tables D.1, D.2, D.3 and E, respectively**) show trainee record for the past 5, 10, 15 years, and Institutional and MARC U-STAR Underrepresented Ph.D.

Rates, respectively. Overall, we have demonstrated a significant outcome of overall objectives with a steady increase in number of successfully trainees entering graduate programs.

Table 9: Past 5 Year MARC Trainee Record (NIH Suggested Table D.1)

Row	ITEM	Yr 1 2012	Yr 2 2013	Yr 3 2014	Yr 4 2015	Yr 5 (Current*) 2016	Total
1	Number of MARC slots awarded:	7	7	7	9**	9**	39
2	Number of MARC slots appointed:	7	7	7	9	9	39
3	Number of Junior level trainees appointed:	7	1	6	3	2	19
4	Number of Senior level trainees appointed:	0	6	1	6	7	20
5	Number of trainees who left MARC program without graduating:	0	1	0	0	1***	2
6	Number of trainees who graduated with B.S. or B.A.:	0	6	1	6	6	19
7	Number of MARC alumni enrolled in Ph.D. or M.D./Ph.D. programs:	0	4	1	5	6	16
8	Number of MARC alumni completed Ph.D. or M.D./Ph.D. programs:	2	2	2	0	0	6
9	Number of MARC alumni enrolled in/completed M.D. programs:	0	1	0	0	0	1
10	Number of MARC alumni enrolled in/completed M.S. programs:	0	0	0	0	1	1
11	Number of MARC alumni enrolled in/completed post-bac programs:	0	0	0	0	0	0
12	Number of MARC alumni enrolled in/completed other higher degree program[†]:	0	0	0	0	0	0

*The most recent full academic year
[†]includes D.O. and clinical doctorate programs such as Pharm.D., D.D.S., D.M.D., D.V.M.
**An 8th spot was awarded by the NIH in 2015; in addition, we obtained prior permission from the NIH to appoint one more student for a period of 1 year since the student had had training for 1 year in a non-MARC program the previous year.
***One student completed 2 years in MARC and will graduate in Fall 2016

Table 10: Past 10 Year MARC U-STAR Trainee Record: NIH Suggested Table D.2

Row	ITEM	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10 (Current*)	Total
1	#of MARC slots awarded:	0	6	6	6	0	7	7	7	9	9	57
2	# of MARC slots appointed:	0	2	6	4	2	7	7	7	9	9	53
3	#of Junior level trainees appointed:	0	1	2	2	0	7	1	6	3	2	24
4	# of Senior level trainees appointed:	0	1	4	2	2	0	6	1	6	7	29
5	# of trainees who left MARC program without graduating:	0	0	0	0	1	0	1	0	0	1	3
6	# of trainees who graduated with B.S. or B.A.:	0	1	4	2	2	0	6	1	6	6	28
7	# of MARC alumni enrolled in Ph.D. or M.D./Ph.D. programs:	0	1	3	0	2	1***	4	1	5	6	23
8	# of MARC alumni completed Ph.D. or M.D./Ph.D. programs:	0	0	0	0	0	2	2	2	0	0	6
9	# of MARC alumni enrolled in/completed M.D. programs:	0	0	1	0	0	0	0	1	0	0	2
10	# of MARC alumni enrolled in/completed M.S. programs:	0	0	0	0	0	0	0	0	0	0	0
11	# of MARC alumni enrolled in/completed post-bac programs:	0	0	0	0	0	0	0	0	0	0	0
12	# of MARC alumni enrolled in/completed other higher degree	0	0	0	0	0	0	0	0	0	1	1

*The most recent full academic year
[†]includes D.O. and clinical doctorate programs such as Pharm.D., D.D.S, D.M.D., D.V.M.
**No cost extension years
**One student enrolled in combined program from 2010 cohort

Table D.3. Past 15 Year MARC U-STAR Trainee Record

Row	ITEM	Year 1 2000	Year 2 2001	Year 3 2002	Year 4 2003	Year 5 2004 ^	Year 6 2007	Year 7 2008	Year 8 2009	Year 9 2010	Year 10 2011	Year 11 2012	Year 12 2013	Year 13 2014	Year 14 2015	Year 15 (Current*) 2016	Total
1	Number of MARC slots awarded:	6	6	6	6	6	0	6	6	6	0	7	7	7	9	9	87
2	Number of MARC slots appointed:	6	4	7	6	7	0	2	6	4	2	7	7	7	9	9	83
3	Number of Junior level trainees appointed:	0	1	4	2	5	0	1	2	2	0	7	1	6	3	2	36
4	Number of Senior level trainees appointed:	6	3	3	4	2	0	1	4	2	2	0	6	1	6	7	47
5	Number of trainees who left MARC program without graduating:	0	1	0	1	0	0	0	0	0	1	0	1	0	0	1	5
6	Number of trainees who graduated with B.S. or B.A.:	6	2	3	3	7	0	1	4	2	2	0	6	1	6	6	49
7	Number of MARC alumni enrolled in Ph.D. or M.D./Ph.D. programs:	3	1	1	1	5	0	1	3	0	2	1***	4	1	5	6	34
8	Number of MARC alumni completed Ph.D. or M.D./Ph.D. programs:	4	0	1	0	1	0	2	2	0	0	2	2	2	0	0	16
9	Number of MARC alumni enrolled in/completed M.D. programs:	3	0	0	0	1	0	0	1	0	0	0	0	1	0	0	6
10	Number of MARC alumni enrolled in/completed M.S. programs:	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	8
11	Number of MARC alumni enrolled in/completed post-bac programs:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Number of MARC alumni enrolled in/completed other higher degree program†:	3	0	1	0	0	0	0	0	0	0	0	0	0	0	1	5

*The most recent full academic year
†includes D.O. and clinical doctorate programs such as Pharm.D., D.D.S, D.M.D., D.V.M.
^ Combined 2004 and 2005 outcomes due to no cost extension.
No grant in 2005, 2006 and 2007; in 2005 we had a NCE; which is why in year 5 of our 15 year record, we have combined 2004 and 2005

Table 12: Institutional and MARC Underrepresented Ph.D. Rates: NIH Suggested Table E

Row	ITEM	Subtotal
	MARC U-STAR Ph.D. Numbers	
1	Total Number MARC Individuals Appointed in the last 5 years[*]	16
2	Total Number MARC alumni who **ENTERED** biomedically-related[†] Ph.D. programs[¥] in the last 5 years	12
3	Total Number MARC alumni who are **ENROLLED** in or **COMPLETED** biomedically-related[†] Ph.D. programs[¥] in the last 5 years	12
4	Percentage of MARC alumni who are **ENROLLED** in or **COMPLETED** biomedically-related[†] Ph.D. programs[¥] in the last 5 years	75%
	Institutional UR[‡] Ph.D. Numbers	
5	Total Number UR[‡] B.S./B.A. alumni in biomedically-related[†] fields in the last 5 years	1570
6	Total Number UR[‡] B.S./B.A. alumni who **ENTERED** biomedically-related[†] Ph.D. programs in the last 5 years	15
7	Number UR[‡] B.S./B.A. alumni who **ENROLLED** in or **COMPLETED** biomedically-related[†] Ph.D. programs[¥] in the last 5 years	15
8	Percentage of UR[‡] B.S./B.A. alumni who **ENROLLED** in or **COMPLETED** biomedically-related[†] Ph.D. programs[¥] in the last 5 years	1%

[*] Provide numbers for individuals over the past 5 years
[†] biomedically-related areas include, biology, chemistry, physics, math, certain engineering fields (biomedical engineering) and psychology
[‡] UR, underrepresented, as defined by the NIH
[¥] includes Ph.D. and M.D./Ph.D programs

EXECUTIVE SUMMARY

The Maximizing Access to Research Careers Undergraduate Student Training in Academic Research (MARC U-STAR) program at California State University, Long Beach (CSULB) is funded by the Training, Workforce Development, & Diversity (TWD) Division of the National Institute of General Medical Sciences (NIGMS). The purpose of the CSULB MARC-USTAR program is to increase the number of underrepresented minority students entering and earning doctoral degrees in biomedical sciences. This is accomplished through the annual training of highly selective undergraduate MARC student scholars, in coordination with faculty research mentors, as well as efforts to increase the awareness of faculty at CSULB regarding the setbacks encountered by students from underrepresented groups (URG).

This report documents the Year 3 activities of the program and provides evaluation data on the impact of the program on participants. The evaluation was conducted by Dr. Dustin Thoman, the project Internal Evaluator and faculty member in the Department of Psychology at CSULB. This evaluation involved review of program documentation for all activities, observation, surveys, and interviews. This document addresses both the formative evaluation and the summative evaluation of work accomplished toward each of the specific aims and objectives defined by the project.
Program documentation and observation, as well as interviews with program staff, revealed continued formative success. The leadership team continues to function efficiently with well-defined roles. Project leaders demonstrated excellent focus on proactive strategic planning and continual program improvement in response to feedback. Project leadership has sustained the critical institutional relationships and connections with administration, advising, and staff from other projects that can all facilitate the success of CSULB MARC-U*STAR by continuing to integrate and leverage institutional resources.

Program documentation revealed a wide variety of activities conducted throughout the academic year. These activities were designed to strategically support three principal aims and five specific training objectives. The program provides support for enhanced research training experiences during the academic year, extramural training at Ph.D. granting institutions during the summer, workshops for professional development and graduate school preparation, opportunities for leadership development, workshops on minority health disparities issues, and faculty trainings regarding the setbacks encountered by URG students. In carrying out these activities, the program accomplished nearly all benchmarks, indicating successful program in Year 3.

In Year 3, the CSULB MARC-USTAR program successfully graduated one Scholar and supported him to matriculate into the Ecology, Evolution and Behavior (EEB) Ph.D. Program at University of Nebraska. Of the remaining six students, 4 participated in Extramural Summer Research Experiences and 2 remained at CSULB to continue their projects. All are on track for successful graduation and are building strong application profiles for doctoral programs next year. The success of these students can certainly be attributable to the wide variety of research experiences and trainings, as well as professional development opportunities provided by the MARC program that increased their confidence and preparedness for graduate school and the graduate school application process.

At the end of Year 3, the program also successfully recruited a new student to fill the open student scholar positions and filled an additional spot newly awarded by NIH.   Another student, who had been participating in MARC activities during the academic year, but was not funded through MARC was also added to the entering cohort of students. This gave the entering cohort 3 new students and is a total of 9 students for the 2015-2016 academic year.

The program staff helped all scholars develop and advance their Individualized Developed Plan (IDP), a tool used to tailor research training and other activities to meet the individual goals, needs, and experiences of each student scholar. All incoming scholars were integrated into individual labs with research-active and engaged faculty mentors. Surveys, interviews, and program documentation indicate that the CSULB MARC-USTAR program provided excellent support for the relationship between faculty mentors and student scholars. In addition, all student scholars were matched either with an extramural research training opportunity or with their faculty mentor's research lab at CSULB during the summer.

Based on these results, it is evident that the CSULB MARC-USTAR program has been highly successful in achieving its Year 3 goals, and in making considerable progress toward reaching its long-term aims. Given the program's success, only minor recommendations are provided to further enhance the efficacy of this program. Project leadership and staff have demonstrated a commitment to seeking and improving the project in response to feedback, and have already begun working to facilitate improvement in each of the areas of recommendation.