

Dedication

This manual is dedicated first and foremost to those who have received the least attention for their unflagging efforts in support of **Base Pair**, but without whom the program would be sorely lacking. The administrative professionals of the Department of Pharmacology and Toxicology, Pam Banks, Gail Howell, Margaret Nicholas, Ann Pace, Judy Quick and Stella Smith, have been indispensable to the success of **Base Pair** and sincere appreciation is extended to them for their energy, initiative and good cheer in the face of often massive work loads.

Recognition must also be accorded to the numerous individual mentors, whose time, diligence, patience, intelligence and compassion have afforded **Base Pair** the national recognition that it enjoys today.

Finally, thanks must be given the highest levels of the University of Mississippi Medical Center administration, for the visionary and continued support of **Base Pair**.



“Picturing DNA” from <http://www.geneart.org-genome-title.htm>

Base Pair

Handbook and Orientation Manual

This manual was prepared as a guide to mentors, teachers, students, and parents who are involved in the **Base Pair** program. Mentoring is a difficult avocation, but one that is inherent in the philosophy of all scientists, and one that can bring enormous satisfaction to those who have the opportunity to observe the growth and development of their protégés. The information offered in this booklet is drawn from many sources, including prominently the “*Project SEED – Student, Mentor and Coordinator Handbook*” developed by the American Chemical Society (www.acs.org/education/SEED.html). It incorporates many of the guidelines espoused in the document “*Mentoring: Elements of Effective Practice*” produced by the National Mentoring Working Group convened by the United Way of America and The National Mentoring Partnership (http://www.mentoring.org/framesets/frmset_resources.html).

The intent is to allow individuals wishing to participate in the **Base Pair** access to nationally accepted “best practices” related to mentorship activities.

Base Pair

Mission Statement

“To utilize the intellectual excitement inherent in a University Medical Center setting as an impetus for professional advancement of high school students and educators, as well as serving as a model for invigoration of secondary school science education.”

Visit *Base Pair* at <http://basepair.library.umc.edu/>

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WHAT IS *BASE PAIR*?

Base Pair, initiated in 1992, is a successful biomedical research mentorship program that pairs faculty from the University of Mississippi Medical Center (UMC) with public high school students and educators. Oriented to interact primarily with participants from the largest public school district in the state of Mississippi, the Jackson Public School District (JPSD), the program has expanded to enlist students and/or teachers from school districts throughout central Mississippi, including Byram, Clinton, Madison, Mendenhall, and Northwest Rankin. This biomedical research mentorship program allows each student to experience the scientific field in a "hands-on" manner under the guidance and supervision of a faculty researcher at UMC.

In preparation for this mentoring, **Base Pair** created a novel, graduation credit-accruing high school course, *Biomedical Research*, that prepares students for laboratory research at UMC during the academic year. Sanction of this course by the Mississippi Department of Education permits any public high school in Mississippi to adopt the course. Currently, though, this course is only offered at Murrah High School in the JPSD. Mentors subsequently host students in active research, in their laboratories, during afternoons for a full semester. Teacher professional development during the summer and science curriculum enhancement activities throughout the year complement student participation to create a highly coordinated impetus for communication of contemporary biomedical science ethical concerns, techniques, and philosophies.

Base Pair has had the good fortune to have been (1994-2003) and to continue to be (2003-2007) funded by three consecutive awards from the prestigious Howard Hughes Medical Institute (<http://www.hhmi.org>), the largest private supporter of science education initiatives in the world. Through their Precollege Science Education Initiative for Biomedical Research Institutions, the Institute has awarded nearly \$1.3 million to support the **Base Pair** program.

Base Pair seeks to cultivate career awareness of high school students in areas related to health care/biomedical research, to train such students to function as effective "Communicators of Science" to lay persons, and to advance science curriculum development within the target school district. Additional funding support has been provided by the National Science Foundation and local groups, including Health Futures and the Community Foundation of Greater Jackson.

Success in communicating science is highlighted by the fact that over four dozen scientific abstracts or publications have been co-authored or presented by high school students in professional scientific forums, while over a dozen teachers have accomplished similar professional goals. In addition, a web site, <http://basepair.library.umc.edu>, serves as a focal point to enhance communication with the general public and helps users locate web-based and library resources relating to biomedical research and mentorship. The program actively uses innovative communication devices, such as videophones, to impart greater flexibility for interactions among mentors, students and teachers. As of August, 2004, 117 students have participated or are participating in **Base Pair**. Of these, 57% have been African-American, and 64% have been women. Of those eligible (15 remain in high school), only a single student has not yet continued to an undergraduate experience. As of August, 2004, 58 of those eligible have chosen a science major. Thirty-two have completed undergraduate training, and of those, 26 have either enrolled in graduate training or have entered a science-related career. Eleven have entered a Ph.D., M.D. or an M.D./Ph.D. training program. A total of 33 teachers have participated actively in **Base Pair** training. Moreover, through curriculum development activities and participation in Web-based

mentoring groups, the positive educational impact of the program has reached literally hundreds more students and educators.

WHAT HAS *BASE PAIR* ACCOMPLISHED?

SCIENTIFIC CITATIONS

The fundamental purpose of *Base Pair* is to engage high school students and teachers in meaningful, productive biomedical research. Fulfillment of this objective proffers additional advantages, including enhancement of secondary school academic expectations and orientation of students towards diverse biomedical careers. As evidence of this, a substantial number of *Base Pair* students and teachers have established *bona fide* professional scientific credentials as co-authors and presenters of their research in one or more scientific forums. These credentials can be considered an important component of each participant's lifetime resume. A listing of these products is provided below.

Base Pair Student Citations, 1994-2004

Abstracts and Presentations

1. Siegel, S.**, Collier, B.J., Hardy, C.L. Growth factor-dependent adhesion of a murine multipotential progenitor cell to fibronectin (FN). *J. Miss. Acad. Sci.* 39: 36, 1994.
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3. Song, Y., Su, D., Evans, K.**, Mamoon, N. and Wellman, S. Production of histone H1 variants in, and purification from *E. coli* cells. *J. Miss. Acad. Sci.* 41: 43, 1996.
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5. Summers, S.**, Petrini, M. F., Patel, R. and Norman, J. R.: Comparison of respiratory parameters during weaning from mechanical ventilation. *J. Miss. Acad. Sci.* 41: 57, 1996.
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14. Burke, S.**, Tucci, M., Tsao, A. K. Hughes, J., Benghuzzi, H. A.: Physiological response associated with targeted delivery of androgenic hormone using traumatized rat femurs as a model. *J. Miss. Acad. Sci.* 43: 45, 1998.
15. Washington, N. T.**, Ray, L.: Neonatal outcome of infants born to mothers with systemic lupus erythematosus at UMC. *J. Miss. Acad. Sci.* 43: 48, 1998.
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17. Nick, T. G., Lawrence, L.**, Bracey, J.**: Quantifying the predictive information on health-risk behaviors. *J. Miss. Acad. Sci.* 43: 63, 1998.
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33. Cornelius, K.** A discussion of glutaminy cyclase in the rat brain. *J. Miss. Acad. Sci.* 47: 24, 2002.
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47. Lampton, A.** , McDaniel, L.S. Expression of variant PSPAs in *Streptococcus pneumoniae* WU2 *J. Miss. Acad. Sci.* 49: 68, 2004.

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49. Howell, G., Butler, J.**, Rockhold, R. Synthetic alkaloids from *Solenopsis invicta* (imported fire ant) venom exert cardiovascular actions. *J. Miss. Acad. Sci.* 49: 80, 2004.
50. Worthy, R.**, King, D.S, Harrell, K. Morton middle school fifth grade versus Forest middle school fifth grade: Which school has the higher blood pressures, height percentiles, and BMI percentiles? Presented at the Ninth Annual SHRP Research Day, 2004.

Manuscripts

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2. Summers, R. L., Anders, R. M., Woodward, L. H., Jenkins, A. K.**, Galli, R. L. Effect of routine pulse oximetry measurements on emergency department triage classification. *American Journal of Emergency Medicine*, 16: 5-6, 1998.
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Base Pair Teacher Citations, 1994- 2004

1. Rockhold, R.W., King, T.*, Dick, L., Planck, J. *Base Pair*: A research mentorship program between Jackson Public Schools and the University of Mississippi Medical Center. *J. Miss. Acad. Sci.* 39: 75, 1994.
2. King, T.*, Rockhold, R. W. *Base Pair*: Evolution of a mentorship-driven curriculum. *J. Miss. Acad. Sci.* 40: 83, 1995.
3. King, T.* and Rockhold, R. W: *Base Pair*: A mentorship-driven curriculum with physiological enhancements. *J. Miss. Acad. Sci.* 41: 87, 1996.
4. King, T.*, Planck, J., Rockhold, R. W. Evolution of a mentorship-driven curriculum beyond biomedical research. *J. Miss. Acad. Sci.* 42: 82, 1997.
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6. Rockhold, R. W., Johnson, W. Technology Plan – Jackson Public School District. *J. Miss. Acad. Sci.* 42: 82, 1997.
7. Farrish-Aseeri, H.* and Rockhold, R. W. *Base Pair*: Development of environmental science course content. *J. Miss. Acad. Sci.* 43, 82, 1998.
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9. Cook, C.* and Rockhold, R.W. Introducing biotechnology themes into a high school biomedical mentorship program. *J. Miss. Acad. Sci.* 45: 91, 2000.
10. Rockhold, R.W. and Cook, C.* *Base Pair*: A biomedical research mentorship collaboration among a medical center, a high school district, a state academy of science and a private foundation. Presented at the 2000 American Association of Academies of Science annual meeting and science innovation exposition. February 21, 2000.

11. Redhead, K.* and Rockhold, R.W. A high school humanities course incorporating biotechnology issues. *J. Miss. Acad. Sci.* 45: 93, 2000.
12. Rockhold, R.W. and Cook, C*. **Base Pair**. A biomedical research mentorship initiative at the high school level. *The Pharmacologist*, 43: 102, 2001.
13. Cook, C*. and Rockhold, R.W. **Base Pair**. Biomedical research mentorship for high school students – A teacher’s perspective. *J. Miss. Acad. Sci.* 46: 80, 2001.
14. Rockhold, R.W., Bender, S. *, Scarff, T., Chambliss, D., Allen, F., Fahmy, N., Srinivasan, A., **Base Pair** “SOARS”s with help from the National Science Foundation (NSF). *J. Miss. Acad. Sci.* 47: 86, 2002.
15. Rockhold, R., Cook, C.*, Bender, B.* **Base Pair**. A decade of mentorship collaboration enabling high school students in biomedical research. EB 2003 meeting, April, 2003.
16. Rockhold, R., Bender, S. *, Butler, J.**, Cook, C. **Base Pair** and the community science forum (CSF): Using the power of the child to educate the village. *J. Miss. Acad. Sci.* 49: 114, 2004.

* *Base Pair* Teachers

** *Base Pair* Students

Other Program-Related Publications

1. Rockhold, R.W. Mentorship and Science Education: The **Base Pair** Initiative. *J. Miss. Acad. Sci.* 43: 167-173, 1998.
2. Rockhold, R.W. Teaching the “techno-vampires”: challenges in matching technology literacy with contemporary teaching methods. Symposium presented at the 2001 Mississippi Academy of Sciences meeting, *J. Miss. Acad. Sci.* 46: 79, 2001.
3. Rockhold, R.W., Chambliss, D., Fahmy, N., Neral, S. and Srinivasan, A. **Base Pair**. Math/science education reform through teacher professional development. *J. Miss. Acad. Sci.* 46: 80, 2001.
4. Rockhold, R.W. **Base Pair**. A high school biomedical mentorship program. Presented at: Best Practices for Communicating Science and Technology to the Public, Gaithersberg, MD, 2002 http://www.nist.gov/public_affairs/bestpractices.

SUMMER RESEARCH INSTITUTE

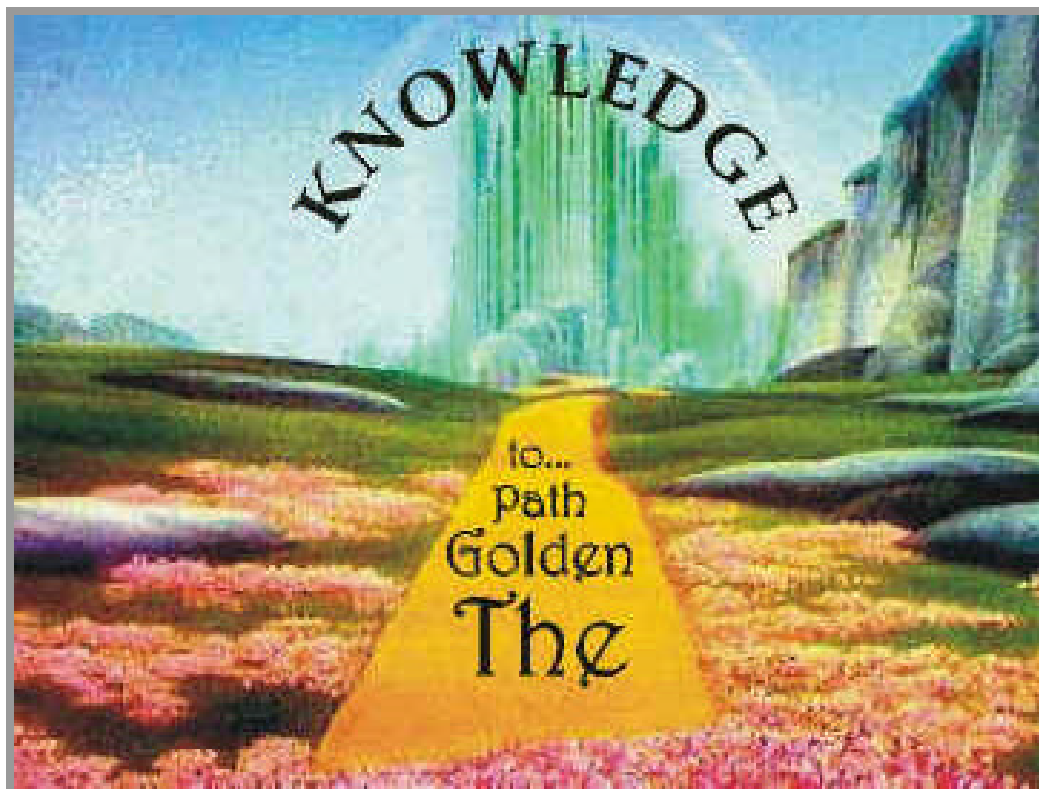
Each summer, a teacher professional development activity, the **Base Pair** Summer Research Institute, is held on the UMC campus. Teachers are recruited from school districts in the Jackson Metro area for a six week series of biomedical lectures, laboratory proficiency training exercises and curriculum development activities. Teachers are also given training and advice on preparation of teacher-initiated grant proposals to provide continued financial support for their classroom endeavors. The course typically begins in late June and ends at the end of July. Up to six teachers are recruited for each class for which continuing education credits are awarded. Participants are hired as temporary employees of UMC and must submit to background checks and mandatory drug testing prior to employment. Further information is available from the Program Director.

TEACHER GRANTS

One aspect of summer teacher training offered by **Base Pair** is instruction in grant writing. The objective is to provide high school teachers with additional opportunities to support enhanced educational and laboratory-based activities in their classrooms, over and above that which can be provided through existing school funding. At this writing, fully 89% of all teacher-initiated grant proposals written following this training have been funded by external funding agencies and over \$40,000 new dollars have been acquired to support advanced science education activities.

WEB SITE

An interactive web site, hosted through the University of Mississippi Medical Center's Rowland Medical Library (<http://basepair.library.umc.edu>), serves as the portal to deliver information about **Base Pair** to anyone with Internet access. In addition, this site is configured to provide detailed and comprehensive information and links concerning mentoring in a biomedical research institution.



As one example, “The Golden Path to Knowledge” is the entry page to a comprehensive series of links to information regarding information research, global databases, and sites dealing with both biomedical research issues and mentoring.

TELEMACHIAN NOTES

Beginning in June, 2001, a quarterly newsletter, entitled *Telemachian Notes*, was initiated. This newsletter is mailed to every participant and alumnus of **Base Pair**, as an additional means of maintaining communication with current and former participants. Increasingly, the preparation and production of this are being delegated to each **Base Pair** class.

COURSE

The science course, *Biomedical Research*, is designed to prepare high school students to participate in graduate level research activities in a university or medical center, under the direct supervision of a faculty mentor. It also provides instruction in the processes of information research, electronic communications, oral and written presentation, and use of contemporary computer-based presentation software. It is fully accredited with the Mississippi Department of Education for one Carnegie credit towards high school graduation and can be offered by any high school in this state.

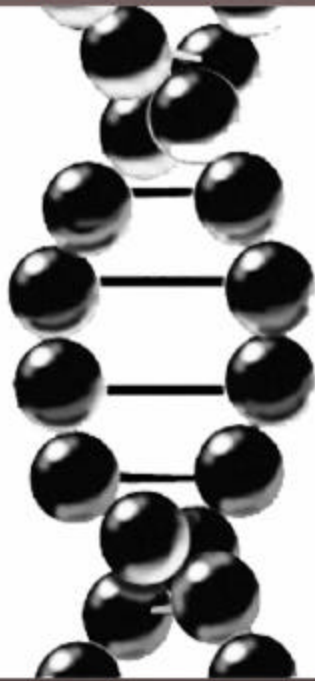
STUDENT ORIENTED ACADEMIC RESEARCH (SOAR)

In 2002-2003, a new educational program, called Student Oriented Academic Research (SOAR) was implemented in Jim Hill High School by Ms. Susan Bender under the direction of the then Jim Hill Principal, Dr. Earl Watkins. The SOAR program engages mainstream students with an interest in science in a two-year course of academic study and development of a research project that will be completed at that school site. An offshoot of the **Base Pair** program and developed under the auspices of a supplemental K-12 Higher Education Partnership (KHEP) grant from the National Science Foundation, SOAR is intended to serve as a vehicle for expansion of **Base Pair**-initiated concepts of inquiry-based and laboratory-oriented science learning. SOAR is poised to enroll close to 50 students for the 2004-2005 academic year. Plans to expand the SOAR program progressively to at least three other JPS school sites between 2003 and 2007 are being developed.

COMMUNITY SCIENCE FORUM

The Community Science Forum (CSF), initiated in 2002-2003, is a novel venue that addresses two major objectives of the **Base Pair** program, i.e. to prepare students to function as effective "Communicators of Science" to the general public, and to more directly involve the general community in science education. The CSF is a series of evening seminar-style presentations, held on the UMC campus and prepared and presented by high school students in the **Base Pair** and SOAR classes. The subjects for the CSF have been and will continue to be issues and controversial topics where contemporary biomedical/biotechnological science activities have a direct impact upon the society in which the students live and in which the general public has a critical stake in decision-making. Parents, other students and members for the community at large are invited. In October, 2002, the **Base Pair** class presented the inaugural session on the topic of "*West Nile Virus*", a particularly timely subject as the Jackson Metro area was experiencing the first season of human impact from this newly emerging, insect-borne, disease. This was followed in March of 2003 by a series of four presentations by the Jim Hill SOAR class on aspects of "*Bioterrorism Agents*". Again, this was an issue of direct relevance to the community in light of emerging terrorist threats and the need for public awareness in the wake of terrorist attacks on September 11, 2001. Presentations during 2003-2004 centered on the subjects of "*Health Risks for Type II Diabetes Mellitus*" (October, 2003) and "*Weight Wars: Diets, Weight Management and Obesity*" (April, 2004). The initial CSF activity for the 2004-2005 academic year will be participation by **Base Pair** and SOAR students in the 2004 American Heart Association Heart Walk.

BASE



PAIR

SCHEDULE FOR ACADEMIC YEAR 2004-2005



August 4, 2004	First day for JPSD teachers
August 9, 2004	Students report
August 16-29, 2003	Information research orientation at UMC and parent orientation to Base Pair (date to be announced)
September 6, 2004	Labor Day holiday (JPSD, UMC)
September 14, 2004	Parent/Teacher Conference Day (JPSD)
November 12, 2004	Teacher Professional Day (JPSD)
November 22-28, 2004	Thanksgiving Holiday (JPSD, UMC)
December 13-17, 2004	Selection of mentors by JSPD students
December 17, 2004 to January 4, 2005	Winter Holiday Break (JPSD)
January 6, 2005	UMC reception for students, mentors and parents
January 5-7, 2005	UMC orientation for JPSD students
January 17, 2005	Martin Luther King Holiday (JPSD, UMC)
February 18, 2005	Professional development day (JPSD)
February 21, 2005	Parent/Teacher Conference Day (JPSD)
February 17-18, 2005	Trip to Mississippi Academy of Sciences meeting in Oxford, MS
March 21-25, 2005	Spring Break
May 24, 2005	Last day for students (JPSD)
May 26 - 30, 2005	Student project presentations at UMC (tentative)

CLASS ROSTER FOR ACADEMIC YEAR 2004-2005

First Year Students

1. Lillian Brady
2. Joshua Champion
3. Bethany Faison
4. Sakeli Hall
5. Gina Hamilton
6. Kimystian Harrison
7. Lila Hudson
8. Bennie Jacobs, Jr.
9. Rachel Lockhart
10. Channing Sly
11. LaRue Sutton

Second Year Students

Mentors

- | | |
|----------------------|--------------------------|
| 1. Antoinette Dawson | Barbara Alexander, Ph.D. |
| 2. Jonathan Priester | Stan Smith, Ph.D. |
| 3. Tribetta Spires | William Bennett, Ph.D. |
| 4. Raven Worthy | Deborah King, Ph.D. |

MENTORS

This portion of the handbook is provided to assist mentors and inform potential mentors. Mentors are essential to the success of **Base Pair** and must expect to devote a significant amount of time and direction to a mentored student. Mentors are compensated for their efforts by access to funds for purchase of laboratory/academic supplies, as well as by the personal satisfaction of assisting in the intellectual development of a young person interested in scientific research.

Any UMC faculty member who has an active research program, whether clinical or basic in nature, may participate as a mentor. Mentoring purely to provide students with an opportunity to “shadow” clinical activities, unrelated to a research project, is discouraged.

WHAT ADVANTAGES ACCRUE FROM MENTORING A *BASE PAIR* STUDENT?

A mentoring relationship is the basis for scientific education, particularly in the academic arena. Thus, mentoring is a professional imperative, as emphasized by the comments of Eugene Garfield, “*Mentoring is the major way in which scientists can nourish the taproot upon which future scientific achievement depends for its growth and full flowering.*” (*The Scientist*, Dec. 7, 1992). However, mentoring of a **Base Pair** student imposes unique constraints on the mentoring relationship in a laboratory environment. These constraints include most critically a relative lack of advanced technical knowledge on the part of the student, the necessity for interaction with a student who is unfamiliar with the routine, rigor and ritual customary to a professional working environment, and a relative lack of time for direct laboratory work by the student. Nevertheless, over a period of almost a decade and with a sample of 108 mentored students, the consensus among mentors at the University of Mississippi Medical Center is that the mentoring program has been decidedly positive for the individual mentor, the mentor’s laboratory, and the Medical Center. Personal satisfaction in assisting the intellectual growth of students is an important criterion cited by mentors who repeatedly host students in their research endeavors. Community recognition, both the lay community and the Medical Center community, has been significant for **Base Pair** mentors. Professional productivity, while modest by some standards, has been achieved in many instances for those mentors who have co-authored scientific manuscripts, abstracts and presentations with a student (see citation list for a full record). Finally, with the support of the Medical Center administration and external funding agencies (most notably the Howard Hughes Medical Institute), hosting a **Base Pair** student has provided mentors with additional funds for maintaining their research operations. Currently, a mentor can request up to \$1,500/student in supply funds. Limited additional funding is available under special circumstances for purchase of small items of equipment, travel reimbursement, and publication costs. These monies are not specifically demarcated for support of a student project, but rather are intended to reimburse mentors for their time and effort in hosting a student.

ARE YOUR ACTIVITIES AMENABLE FOR MENTORING A *BASE PAIR* STUDENT?

Students participate in *Base Pair* as part of their regular high school curriculum and are subject to the attendance requirements of the Jackson Public School District and the Mississippi Department of Education. Their curriculum devotes two class periods to *Base Pair* activities, each weekday, for the entire school year. They are expected to be available for activities at UMC between the hours of 1:45 and 3:30 p.m for the period of January 10, 2005 to May 30, 2005. However, it is reasonable to expect that it may require between 10 and 15 minutes for students to shuttle between Murrah High School and UMC. They effectively have 90 minutes each weekday for activities at UMC. Recognizing the constraints that this limited period of time places on the pursuit of research, in most cases, a student will need to be assigned to assist in some aspect of an ongoing project in which you and your research staff are engaged. It is frequently difficult to design a separate and unique experimental problem for each student. Some of the most successful mentor-student pairings have been those in which the student learns to function as a member of a research team and learns the “research ropes” through cooperative pursuit of your laboratory’s research goals.

A mentor should consider the following criteria when evaluating whether their laboratory would serve as a good host for a *Base Pair* student:

- **Can a realistic laboratory experience be provided in 90 minutes, 5 days/week?**
- **Is such an activity appropriate for a high school science background?**
- **Can the mentor and/or laboratory staff devote regular time to the student?**

WHAT ARE THE QUALIFICATIONS OF A *BASE PAIR* STUDENT?

Most ***Base Pair*** students are selected from the Jackson Public School District Academic and Performing Arts Complex (APAC) program. The APAC program includes some of the highest achieving students in the district and generally provides a higher than average science background. Students most commonly participate during their junior year, although many seniors also are selected. On rare occasions, freshmen or sophomore students have participated and performed well. Each student will have participated in a one semester preparatory course at Murrah High School. That course introduces students to the UMC Rowland Medical Library information database and basic search strategies, provides advanced training in the most basic laboratory and presentation skills, and provides each student with a general knowledge of the research interest of potential mentors. The program has included at least two students from Murrah High School who were selected to be Presidential Scholars. One ***Base Pair*** student has progressed to the Westinghouse Science Competition as a semi-finalist. Based on research performed at UMC, many students have garnered regional and national attention in science fair competitions and have been awarded numerous scholarships for their work. However, many of these students have continued to work on their projects beyond the one semester nominally arranged for ***Base Pair*** activities. As mentioned earlier in this document, over three dozen presentations, published abstracts or full-length scientific publications have been produced with a ***Base Pair*** student as presenter or co-author. A complete list of these citations has been provided earlier in this document.

WHAT EXPECTATIONS SHOULD YOU HAVE OF A *BASE PAIR* STUDENT?

The basic assumptions concerning a ***Base Pair*** student are that they will be:

- **enthusiastic,**
- **curious and intellectually dynamic,**
- **well-behaved,**
- **punctual,**
- **expected to keep the mentor informed of absences,**
- **prepared to accept a reasonable degree of independence in daily activities, and**
- **willing and prepared to engage in directed, yet independent, study.**

WHAT ARE YOUR RESPONSIBILITIES AS A *BASE PAIR MENTOR?*

Your primary responsibility is to engage a student in a meaningful research experience, including taking active responsibility for technical and safety training. It is important that you clearly define the expectations that you have for your student. The student will need to be tutored to enhance their understanding of the laboratory activities and the way in which their project fits into those activities. Each mentor must take responsibility for allocating time to provide adequate guidance and supervision of their student. It is not unreasonable to engage technical staff, graduate students and post-doctoral fellows in the supervisory process, but, as a mentor, you are expected to devote personal time to meeting with the student. Each student is required to finish the academic year with a formal oral presentation of their experiences in the laboratory. That presentation will take place in a formal setting at which mentors, students, and parents are expected to attend.

In summary, the basic mentor responsibilities include:

- **clearly and formally defining expectations for each student,**
- **providing technical and safety training, with continued oversight in these areas,**
- **providing career guidance,**
- **meeting program deadlines,**
- **assisting student in preparation and delivery of a final report,**
and
- **listening and providing advice.**

ADVICE FOR NEW MENTORS

The following material is taken from the American Chemical Society Project SEED Handbook and may be useful as a guide to those considering participation as a **Base Pair** mentor:

For most people, good mentoring, like good teaching, is a skill that is developed over time. Here are a few tips for beginners:

Listen patiently. Give the student time to get to issues that are sensitive or embarrassing.

Build a relationship. Simple joint activities—walks across campus, informal conversations over coffee, attending a lecture together—will help to develop rapport. Take cues from the student about how close the relationship should be.

Don't abuse your authority. Don't ask students to do personal work, such as mowing lawns, baby-sitting, and photocopying.

Nurture self-sufficiency. Your goal is not to “clone” yourself but to encourage confidence and independent thinking.

Establish “protected time” together. Try to minimize interruptions by telephone calls or visitors.

Share yourself. Invite students to see what you do, both on and off the job. Talk about your own successes and failures. Let the student see your human side, and encourage the student to reciprocate.

Provide introductions. Help the student to develop a professional network and build a community of mentors.

Be constructive. Critical feedback is essential to spur improvement, but do it kindly and temper criticism with praise when deserved.

Don't be overbearing. Avoid dictating choices or controlling a student's behavior.

Find your own mentors. New advisers, like new students, benefit from guidance by those with more experience.

BASE PAIR MENTOR CHECKLIST

ITEM/TASK	DATE NEEDED
1. Submit summary (abstract) of research activities/ student opportunities to Program Director	Early September
2. Anticipate/respond to student requests for interviews	Mid-October-November
3. Expect confirmation of student appointment	Early December
4. Attend parent-student (evening) reception	January 6, 2005
5. Student joins laboratory	Week of January 10
6. Establish clear policies for student involvement For example: <ul style="list-style-type: none">• Who will function as daily lab “tutor”?• How will student and mentor communicate?• What schedule for regular meetings?	Second week in January
7. Submit orders for mentor reimbursement	Anytime, January to June
8. Determine schedule for final student presentation	Late March/early April
9. Attend final student presentation at SHRP Research Day event	Late May (date tentative)

MENTOR POOL 2004-2005

B.T. Alexander, Ph.D.	Physiology	Pregnancy and blood pressure
R. C. Baker, Ph.D.	Pharmacology	Cellular Signaling
H. A. Benghuzzi, Ph.D.	SHRP	Novel Drug Delivery Systems
D. B. Couch	Pharmacology	Drug-induced DNA Damage
R. J. Duhe, Ph.D.	Pharmacology	JAK Kinases and Cancer
D. G. Fowler, Ph.D.	SHRP	Computer-Assisted Biomedical Training
D. Hildebrandt, Ph.D.	Surgery	Antihypertensive Drug Development
R. S. Hines, M.D.	Ob/Gyn	Implantation Biology/In Vitro Fertilization
D. S. King, Pharm.D.	Hypertension	Cardiovascular Risk Factors and Health Promotion
A. Lerant, M.D.	Anatomy	Brain development
L. S. McDaniel, Ph.D.	Surgery	Molecular Biology of Bacterial Infections
O. McDaniel, Ph.D.	Surgery	DNA Testing in Disease and Transplantation
R. W. McMurray, M.D.	Rheumatology	Molecular Immunology
G. Megason, M.D.	Pediatric Hematology	Stem Cell Related Research
T. G. Nick, Ph.D.	SHRP	Statistical Analysis of Health Data
M. T. Norcum, Ph.D.	Biochemistry	Protein Synthesis & Electron Microscopy
N. Penton-Eklund, D.M.D.	Dentistry	Tobacco and Dental disease
M. F. Petrini, Ph.D.	Physiology	Pulmonary Diseases
A. D. Puckett, Jr., Ph.D.	Dentistry	Biomaterials research
L. I. Ray, M.D.	Rheumatology	Pediatric Rheumatic Diseases
J. F. Reckelhoff, Ph.D.	Physiology	Diabetes Mellitus & Sex Hormones
R. W. Rockhold, Ph.D.	Pharmacology	Drug Abuse & Brain Function
B. P. Rogers, Ph.D.	Nursing	Immune Responses to Biomaterials
A. K. Salahudeen, M.B.B.S.	Medicine	Transplant Organ Preservation
V. O. Segrest, M.L.S.	Library	Information Research
A. R. Sinning, Ph.D.	Anatomy	Molecular Biology of Heart Growth
D.L. Smith, M.D.	Medicine	Anti-Infectives
C. F. Streckfus, D.D.S.	Dentistry	Cancer Detection
D. C. Sullivan, Ph.D.	Medicine	Molecular Biology of Fungal Diseases
A. K. Tsao, M.D.	Orthopedic Surgery	Biomaterials and Bone Healing
P. J. S. Vig, Ph.D.	Neurology	Brain Cell Culture
S. E. Wellman, Ph.D.	Pharmacology	Drug-Induced Histone Interactions
Annette Wysocki, Ph.D.	Nursing	Pathophysiology of chronic wounds
L. D. Zardiackas, Ph.D.	Dentistry	Biomaterials

STUDENTS AND PARENTS

This section of the handbook is intended to provide information to students and their parents concerning participation in the student component of the **Base Pair** program. An additional source of information is the **Base Pair** web site (<http://basepair.library.umc.edu>).

The Program Director is Rob Rockhold, Ph.D. Any questions, comments or concerns related to participation in **Base Pair** should be directed to this individual. He can be contacted through the following means:

Mailing Address

Rob Rockhold, Ph.D.
Professor,
Department of Pharmacology and Toxicology
Associate Professor (Research),
Department of Emergency Medicine
University of Mississippi Medical Center
2500 N. State St.
Jackson, MS 39216-4505

Telephone (Day)

(601) 984-1634 (24 hour voice mail)

(601) 984-1637 (**FAX**)

Telephone (Evening)

(601) 898-1122

E-mail

rrockhold@pharmacology.umsmed.edu

PARENT INFORMATION

Parental involvement is fundamental to academic success in any venue, but is particularly relevant to **Base Pair** activities. Parents must recognize, and support, the academic and behavioral challenges offered by participation in **Base Pair**. The level of academic performance demanded and facilitated by Mr. Jeff Stokes, the lead teacher at Murrah High School, is extremely rigorous, and often requires a substantial investment of a student's time in development of independent projects. Many of these will require access to World Wide Web databases and/or information sources available through the Rowland Medical Library at the Medical Center. The understanding and support, by parents, of the time requirement for student participation in **Base Pair** is essential. Transportation and attendance issues related to activities at the Medical Center, allocation of a student's time between **Base Pair** activities and other curricular and extra-curricular studies, including after-school jobs, may require specific attention and assistance from parents. An overnight field trip, by the **Base Pair** class, to the annual meeting of the Mississippi Academy of Sciences (to be held in Oxford, MS during February of 2005) is planned. This event has been a component of **Base Pair** since its inception and has been well received by students and parents in the past. Students are accompanied by the lead teacher, but any parent who is interested in participating as a chaperone should contact the Program Director.

Parental attendance is requested at three events, an informal evening information and orientation session for **Base Pair** students (both first and second year) and their parents in late August, 2004, a formal evening reception offered early in 2005 on the Medical Center campus, and at the end-of-year oral presentations by students, which will also be held on the Medical Center campus (see the program calendar for specific dates). Invitations for these events will be forthcoming. Formal evaluation, by parents, of the program has always been requested.

WHAT IS BASE PAIR?

Base Pair is an academically-based, graduation credit-accruing program in which high school students have an opportunity to engage in meaningful biomedical research on the University Medical Center campus and learn about careers in biomedical and health care research. It pairs students from the Jackson Public School District (and more rarely, from other high schools in the Jackson Metro area) with active research faculty from the University of Mississippi Medical Center. Academic training takes place primarily at Murrah High School, with some sessions on the Medical Center campus. All research activities occur on the Medical Center campus. A maximum class size of 15 students can be supported with current external funding from the Howard Hughes Medical Institute. Typically, each class consists of 8-12 first year students and 3-7 second year students.

First Year Students: Students must be enrolled in the Mississippi Department of Education-approved preparatory course, *Biomedical Research*, (or an acceptable substitute) prior to engaging in activities on the Medical Center campus. Currently, this course meets for two consecutive 50 minute class periods, five days per week on the Murrah High School campus

during the Fall semester. Mr. Jeff Stokes is designated as the lead teacher for the **Base Pair** program and is responsible for all Murrah-based teaching and for supervision of all **Base Pair** student participants. Ms. Cindy Cook at Murrah serves as a facilitator for the program. The purpose of *Biomedical Research* is to prepare the student to participate safely and productively in the intensive, independent adult atmosphere of a Medical Center research laboratory. Laboratory, electronic information research, and presentation skills are emphasized in an academically rigorous course offered in the high school setting. Maintenance of a research journal, use of Powerpoint software, and frequent, detailed writing assignments are among the criteria used to evaluate (grade) student performance. Students are expected to use the information research skills to become familiar with the research interests of potential mentors and to relate those interests to other members of the class as part of their regular, graded course activities. Students are also expected to initiate contact with up to three Medical Center researchers with whom they have an interest in working. That contact will facilitate the formal selection process, in which both a student and a mentor agree to work together. Selection is normally completed prior to the year-end holiday vacation.

Beginning in 2004-2005, **Base Pair** students will also become involved in preparing and presenting at least two Community Science Forum events as well as submitting material for inclusion in the quarterly newsletter, *Telemachian Notes*.

Medical Center-based **Base Pair** research activities for students normally begin with the commencement of the high school academic calendar in January. Students are expected to be available for activities at the Medical Center between the hours of 1:45 and 3:30 p.m for the period of January 4, 2005 to May 30, 2005. This is an attendance policy of the Jackson Public School District and the Mississippi Department of Education. Any absence must be communicated both to a student's mentor and the high school attendance coordinator. Students are expected to be under a mentor's supervision at all times while at UMC. If a mentor is not available, students will report to the Rowland Medical Library for directed study until the end of their normal UMC attendance period. However, it is reasonable to expect that it may require between 10 and 15 minutes for students to shuttle between Murrah High School and the Medical Center. Transportation is currently provided by bus for students between the high school and the Medical Center. Parking for students is also available for no cost in the Veteran's Memorial Stadium parking lot on North State St. or in pay parking garages on the Medical Center campus. Thus, students effectively have 90 minutes each weekday for activities at the Medical Center.

It is important to recognize that, although two class periods each day is a major commitment on the part of a student and the school district, meaningful biomedical research is exceedingly difficult to perform in this limited period of time. Recognizing the constraints that this limited period of time places on the pursuit of research, a student will, in most cases, be assigned to assist in some aspect of an ongoing project in their mentor's research laboratory. It is frequently difficult to design a separate and unique experimental problem for each student. Some of the most successful mentor-student pairings have been those in which the student learns to function as a member of a research team and learns the "research ropes" through cooperative pursuit of mentor's research goals. Parents should be willing to consider the possibility that some students may need to spend additional time, after normal school hours and/or on weekends, to complete critical experiments with their mentors. The time demands for a program such as **Base Pair** are such that students are often counseled, during the application process, that participation in other after-school programs and jobs is discouraged.

Academic Responsibilities

Base Pair, as a component of the APAC program, seeks out academically superior students and must maintain the highest academic standards. Participation in the academic courses associated with **Base Pair**, which are detailed below, is subject to assignment of specific academic responsibilities and deadlines. Adherence to these, and to the JPSD attendance

requirements, must be maintained. The grade that is achieved by each student will be earned by the degree of completion of these requirements. **It is possible to obtain a less than satisfactory grade (i.e., lower than a B), which is weighted according to the APAC expanded scale.** Both students and parents must be aware of these responsibilities and deadlines and recognize the additional commitments required by the program. It is particularly important to note that the academic responsibilities are equally important in the second (UMC mentorship) semester of the first year and during the second year, should a student participate in that component.

At the present time, **Base Pair** student participants at Murrah High School enroll in three academic courses. These are *Biomedical Research* (one Carnegie credit, two semesters), *Molecular Biology* (1/2 Carnegie Credit, Fall semester), and *Field Studies* (1/2 Carnegie credit, Spring semester). Each course is graded by the **Base Pair** lead teacher at Murrah High School and is academically rigorous. Students and parents can expect that completion of numerous independent projects, which require information to be obtained through the Rowland Medical Library at the Medical Center and/or through accessing resources available on the World Wide Web, will be required.

Second Year Students: Most commonly, junior and senior high school students are chosen to participate in **Base Pair**. In some cases, a student who begins participation as a junior may wish to engage in a second year of research activities at the Medical Center. To do so, that student must reapply for a second year, with formal agreement from their mentor, and must present evidence of an ongoing research project in which they are participating. Second year students are expected to devote two class periods, each day for a full year (both Fall And Spring Semesters), to working at the Medical Center in that mentor's research laboratory. Supervision by the **Base Pair** lead teacher will continue. Students will be expected to meet on a regular basis with that teacher at Murrah High School and will also be expected to prepare and present/submit assignments as defined by the lead teacher. Student grades will be determined by performance on such assignments as well as on the performance of the student in the mentor's laboratory.

WHO IS QUALIFIED?

Any student at Murrah High School may apply. Students from other JPSD high schools may also apply, but issues of transportation and enrollment in *Biomedical Research* (presently offered only at Murrah) must be worked out to the satisfaction of the appropriate JPSD staff and the Program Director. The same criteria are applicable to students from outside the JPSD who wish to enroll in **Base Pair**. Most commonly, students are selected to participate in **Base Pair** during their junior or senior year. A firm grounding in Biology and Chemistry is essential for students to become fully engaged in the process of biomedical research. High level skills in written and spoken English, and in reading are essential, as is the ability to utilize basic personal computer software (word processing, Powerpoint, spread sheets, etc.) and navigate the Internet with both insight and discrimination. Demonstration of a keen sense of curiosity and a strong record of academic proficiency are critical to selection into **Base Pair**. Each applicant must also undergo a personal interview with the Program Director and/or the lead teacher during the selection process. The final choice for selection remains the prerogative of the Program Director alone.

WHAT ARE TYPICAL PROJECTS?

Virtually all aspects of laboratory-based biomedical research have been encompassed by students working in the program. Gene transfection, protein and nucleotide separations, bacterial and mammalian cell culture, experimental animal surgery and handling, psychological testing, computer modeling, immunology, tissue transplantation and histological procedures are common to many of the projects in which students have engaged in past years. Students have worked under supervision of mentors in the Schools of Medicine, Graduate Studies, Nursing, Dentistry and Health Related Professions. Parents are referred to the list of student co-authored abstracts, presentations and publications provided earlier for more detailed descriptions of **Base Pair** student research.

Work in Medical Center laboratories carries potential risks not found in the normal high school environment. These include physical, chemical and radiation hazards, as well as exposure to experimental animals and blood-borne pathogens. The University of Mississippi Medical Center maintains a strict policy for formal training of employees, students and volunteers in such risks, and operates under state and national guidelines for purchase, handling and disposal of risk-related material. In addition, **Base Pair** mentors accept the responsibility for informal training of students in their laboratories, each of which may have unique hazards associated with it. Further training is provided by introduction of students to on-line training in laboratory and biomedical hazards, such as the *Safe Science* site provided by the Howard Hughes Medical Institute (<http://www.hhmi.org/research/labsafe/>). Parents should feel welcome to discuss any possible concerns with the Program Director.

WHAT ARE THE BENEFITS FOR PARTICIPATION IN *BASE PAIR*?

Base Pair offers students a highly engaging, rigorous, and well supervised introduction to contemporary biomedical research – the science for the new millennium. Students will receive both didactic and hands-on training in contemporary biological, chemical and information research techniques – for which academic credit towards high school graduation will be provided. Exposure to issues of biomedical research and clinical ethics, as well as training in advanced communication and presentation skills will accrue. Students will be trained both to understand the science in which they are engaged and to communicate the societal impact of that science with clarity to persons who have not had the benefit of such training. The concept of training **Base Pair** students to become “Communicators of Science” to the lay public is fundamental to the program. Students generally gain better discipline skills, as well as enhanced composure, confidence and self esteem by functioning as advanced students in an adult working environment. Many students (approximately one-third of all participants) have been sufficiently successful in their research as to serve as a co-author/presenter of their work in a professional scientific forum. Citations of such scientific presentations become part of the formal scientific literature and are credentials that will follow a student throughout his/her career – whether that career is directly related to science or not. Finally, and by no means of the least importance, the unique nature and

national stature of the **Base Pair** program is looked upon extremely favorably by college and university admissions officers.

In summary, the principal benefits for participation in Base Pair are:

- **advanced science training,**
- **career orientation,**
- **training as “Communicators of Science”,**
- **enhanced discipline and esteem,**
- **academic graduation credit, and**
- **the possibility of scientific presentation/publication.**

WHAT ARE THE RESPONSIBILITIES OF STUDENTS IN *BASE PAIR*?

A **Base Pair** student must be prepared to embark on a year-long period of rigorous academic learning, both in the classroom, in the mentor's laboratory and particularly, as a result of independent, inquiry-based study. They must be willing to accept personal responsibility for their conduct, both during classroom activities at Murrah High School and at the University of Mississippi Medical Center. Attendance issues are of paramount importance. Students remain under State laws pursuant to school attendance, even during the time spent on the Medical Center campus. The **Base Pair** mentors devote a considerable portion of their time in supervision of the student participants. Students must be prepared to communicate on a regular basis with their mentors/mentor's laboratory staff and keep those individuals apprised of the student's schedule and any absences, planned or otherwise.

In summary, the basic assumptions concerning a *Base Pair* student are that they will be:

- **enthusiastic,**
- **curious and intellectually dynamic,**
- **well-behaved,**
- **punctual,**
- **expected to keep the mentor informed of absences,**
- **prepared to accept a reasonable degree of independence in daily activities, and**
- **willing and prepared to engage in directed, yet independent, study.**

BASE PAIR STUDENT LIST 1992-2005

Adams, Rander (Giovanni)
Akponwei, Camille
Alam, Ayesha
Alexander, J. Douglas
Alleyne, Janelle
Alleyne, Thelma
Archie, Brittney
Aregood, Jennifer (Joy) (Mrs. Jason Pierce)
Arrington, D.J.
Ballard, Gwendolyne
Bird, Joshua
Blackwell, Holley
Bourne, Jessica
Bracey, Jenelia Krishaun
Brady, Lillian
Brent, Cheryl
Brown, Krystalyn Joi
Bullock, John E.
Burks, Stephanie M.
Butler, Ann Taylor
Butler, Jonathon
Butler, Jordan
Campbell, Jasmine
Causey, Bill
Champion, Joshua
Coppenbarger, Lee Ann
Cornelius, Kimberly Michelle
Davis, Monica
Dawson, Antoinette
Edwards, Ta-Tijera
Evans, Kathryn (Mrs. Cory Schneider)
Faison, Bethany
Forbes, Jeri Michelle
Fortier, Octavia
Franklin, Cortlandt
Gibson, Angelea
Gilbert, Roderick J.
Graham, Tanitia
Greer, Brian Lee
Hall, Sakeli
Hamilton, Gina
Hardy, Lathan III
Harrison, Kimystian

Haymans, George
Henson, Monica
Hudson, Ava
Hudson, Lila
Irving, Morenike F.
Jackson, Octavia
Jacobs, Bennie, Jr.
Jenkins, Ayanna
Jenkins, Colibri Necole
Lampton, April Rozell
Lampton, Anderson
Larkin, Brianna Rose
Lawrence, Lakeshia
Lewis, Kyle
Li, Vivian
Lobb, Collin Jethro
Lockhart, Rachel
Magee, Marcus Carvel
Marsh, Timothy Edward
May, Jeffrey
McCarty, Chaffron
McClure, Allison Brooke (Mrs. Timothy Marsh)
McCool, Jason
McKinsey, Duriel
McMahan, Roger (Andy)
Mickens, Frank
Miller, Lance
Mitchell, Maegan
Moffett, Shemeka
Moore, Edward C.
Nguyen, Trung Ba
Oatis, Andromeda Jineane
Owen, Colin
Pace, John
Paige, Crystal Rochelle
Palmer, Corey Leigh
Palmer, Lena
Pates, Adam
Peters, Princess Michelle
Powell, Vernita
Prewitt, Greta
Priester, Jonathan
Priester, Melvin III
Quilter, Benjamin
Richardson, Austin
Rightmeyer, John (Jake)
Robertson, Candace
Robertson, Paul G.
Salahudeen, Amin
Sampson, Candice Marie

Schimmel, Elizabeth
Schwartz, Antony (Tony)
Seto, Christina
Sherwood, Erik
Siegel, Sandra
Simpkins, Ralene D.
Sly, Channing
Spires, Tribetta
Stallman, Martha
Stewart, Armond
Summers, Shundria
Sutton, LaRue
Taff, Philip C.
Taylor, Annelle
Taylor, Jamille
Tennin, L. C., III
Tran, Thuy P. (Samantha)
Washington, Nina T.
Whitfield-Smith, Louisa L.
Wicks, Tonitric
Wilson, Cindy
Wilson, Melanie
Worthy, Raven
Young, Jerlen

TEACHERS

SUMMER RESEARCH INSTITUTE PROGRAM DESCRIPTION - 2004

The Summer Research Institute at the University of Mississippi (UMC) School of Health Related Professions (SHRP). *Base Pair*, a biomedical research mentorship program, pairs faculty from the UMC with students and educators from the largest Mississippi public school system, the Jackson Public School District (JPSD). Initiated in 1992, *Base Pair* seeks also to meet an increasing demand for the teacher training that it provides in the area of laboratory-based science instruction in biology and chemistry. The primary objective is to establish a state-of-the-art laboratory science training facility at the UMC-SHRP (the Summer Research Institute) to enhance professional development of high school science teachers and to provide educational incentives to advanced placement high school students. Teachers and students will participate to stimulate inquiry-based science curriculum formulation. Teachers and students are recruited from programs directed toward the current *Base Pair* target site, Murrah High School, a second JPSD site, Jim Hill High School, and from other Jackson Metro area secondary schools. The impact of the Summer Research Institute is documented by continuation of a record of high school teacher and student presentation/publication of science research in professional scientific forums; submission by, and awarding of external education grants to, science teachers; adoption of a *Base Pair*-created science course, *Biomedical Research*, at high school sites; and utilization of laboratory activities fostered by Summer Research Institute graduates. Use of the inquiry-based course, *Biomedical Research* (Mississippi Department of Education Course Code 260502), by teachers is strongly encouraged. Research ethics, laboratory safety, electronic communications and information retrieval, grant writing and the use of contemporary popular literature about science and scientists as an integral resource for science teaching are actively promulgated.

The SHRP has provided access to a clinical laboratory science training facility for use by Summer Research Institute teachers. The space provided (Rooms SH261/259) includes approximately 1,840 ft² of bifunctional laboratory/classroom area with an additional 820 ft² of biotechnology preparatory laboratory space.

The objectives for the 2004 Summer Research Institute were to:

- 1) acquaint secondary school science teachers and students with modern skills in molecular biology and chemical laboratory technique, in a manner that facilitates utilization in routine high school science courses. The skills include quantitative measurement and preparatory methods, centrifugation, use of preparatory and analytical chromatography (column and electrophoretic), sterile technique, microbiological culture, and protein analysis.
- 2) familiarize teachers with the fundamental knowledge required to incorporate web-based inquiry, by students, as an essential component of science teaching.

- 3) assist teachers in the development, and funding, of specific, inquiry-based, exercises that will be incorporated at their home schools. To the maximum extent possible, exercises are structured around simple, low-cost, commercially available biotechnology-oriented kits. Training in writing of proposals for funding of such activities for independent classroom use is provided and teachers are expected to prepare and submit a proposal as an outcome of the summer training.
- 4) propose web-based mechanisms by which teachers and students can communicate with one another, and have the ability to readily access biomedical expertise, information and equipment resources during the school year, and
- 5) promulgate adoption of the course, *Biomedical Research*, at each teacher's home school.

The program took place within the SHRP research/teaching laboratory building, from 9:00 a.m. to 5:00 p.m., 5 days/week, during the summer of 2004. An overarching theme for participating teachers was self-evaluation, with the goal of refreshing and enhancing classroom instruction. The inclusion of students in the program provided teachers with an immediate feedback of laboratory based exercises while providing gifted high school students access to additional educational opportunities. The program was conducted in two parts: The first third of the course was attended by teachers only and involved curriculum development, grantsmanship, and intense laboratory skills training. The last two thirds of the course included both teachers and high school students. During the teacher training portion of the program, mornings were devoted to didactic lectures in molecular biology and chemistry required to teach modern, biotechnology-oriented science curricula. Practical training in safety, electronic communications, biomedical information retrieval, and professional skills development were also emphasized. Teachers were familiarized with the objectives, design and implementation of inquiry-based learning using *Biomedical Research* as the model. The teacher-student portion also utilized didactic lectures during the morning sessions, the use of educational videos and student participation activities, as well as laboratory exercises coordinated to emphasize lectures. Afternoon sessions were laboratory-oriented, with emphasis being placed on development of quantitative laboratory skills and acquiring familiarity with selected kit-based biotechnology laboratory exercises. This also provided the teachers an opportunity to practice their newly acquired laboratory skills. A detailed reading list was used of books that identified and presented science, particularly relating to contemporary biomedicine and bioterrorism, in interesting, and informative ways. These included two books by the science journalist, R. Preston, including the best-selling depiction of exposure to Ebola and Marburg viruses (*The Hot Zone*, 1995), and *The Cobra Event* (2002). In addition, videos, such as *Medicine Man*, starring Sean Connery, that fictionalizes discovery of a unique anticancer drug in the endangered Amazonian rain forest, were employed. Other videos, including *The Coming Plague*, *Brain Eaters*, *Jefferson's Genes*, and *Planted Evidence* from various Nova and A&E programs, were screened by teachers prior to being shown to students. These videos set the stage for a laboratory exercises in which both teachers and students participated. One breakout session/week for the teacher participants was based on presentations, videos, and laboratory exercises, and was devoted to group discussions of the materials used in the summer program. In addition, sessions with both students and teachers discussed the perception of scientists by the lay public and the role of ethics in science. Such sessions were designed to encourage teachers to utilize similar material in teaching efforts in their home schools.

The laboratory exercises compared BioTechnology Explorer™ kits (<http://www.explorer.bio-rad.com>) with other kits obtained from sources including Edvotek (<http://www.edvotek@aol.com>). The kits are inexpensive (generally less than \$100/kit), serve groups of 8-10 students each, are extremely well documented, and dramatically capture the interest of teachers and students alike. These, more than any other single strategy tested by **Base Pair**, seemed to fulfill existing needs of secondary science teachers. A considerable component of the summer training was dedicated to grantsmanship, with the expectation that Summer Research Institute teacher alumni will be able to gain external funds to support the use of such kits at their home schools. Again, experience from the existing **Base Pair** activities indicates that this is a very realistic expectation. Participants engaged in web-based e-learning courses; one of which is formatted using a commercially available e-learning software platform (www.blackboard.com) and which provides instruction in assessment of

information resources. Faculty mentors who participated in the teaching program included Lauren Young, M.L.I.S. (Instructor, Academic Information Services, Rowland Medical Library), R. Rockhold, Ph.D. (Program Director; Professor, Pharmacology & Toxicology), David Fowler, Ph.D. (Professor and Chair, Clinical Laboratory Sciences, SHRP), L. Spence, Ph.D. (Assoc. Professor, SHRP), D. Sullivan, Ph.D. (Assoc. Professor, Medicine and Program Co-Investigator), Susan Wellman, Ph.D. (Professor of Pharmacology), William Lushbaugh, Ph.D. (Professor of Microbiology), Thais Tonore, M. D. (Professor of Family Medicine), and Olga McDaniel, Ph.D. (Professor of Surgery).

The following resources were provided to all teacher participants:

- 1) Textbook: *Molecular Biology Made Simple and Fun*: Clark, D.P. and Russell, L.D., Cache River Press, Vienna, IL, 1997.
“Written primarily for the science student, but suitable for the non-scientist, the reader will gain a solid understanding of the fundamentals and tools of molecular biology. The book also details how this rapidly advancing field has and will continue to have and impact on health, law, agriculture, biotechnology and our understanding of the origins of the species.”
- 2) Reading/Video material on using literature about science:
 - A. *The Hot Zone*. Preston, R., Anchor Books, New York, NY, 1995.
 - B. *The Cobra Event*. Preston, R., Anchor Books, New York, NY, 1995.
 - C. *The Demon in the Freezer: A True Story*. Preston, R., Random House, New York, NY, 2002.
 - D. *Germs: Biological Weapons and America's Secret War*. Broad, W., Miller, J., Engelberg, S., Touchstone Books, 2002.
 - E. *The Medicine Man*. VHS format, Hollywood Pictures, 1992.
 - F. *The Coming Plague*, DVD format
 - G. *Brain Eaters*, DVD format
 - H. *Planted Evidence*, DVD format
 - I. *Jefferson's Genes*, DVD format
- 3) Curriculum Material:
 - A. Career planning for the health sciences
 - B. Grant writing for high school teachers
 - C. Research and medical ethics
 - D. Laboratory safety
 - E. Science curriculum development
 - F. Use of Internet and medical library resources for science teaching
 - G. Introduction to molecular biology
 - H. Biotechnology laboratory kit use in the classroom
 - I. Drug abuse and health care information
- 4) Biotechnology Laboratory Kits:
Sets of 14 biotechnology oriented laboratory experiment kits will be evaluated and 5 kits will be provided to the teachers, enough to serve a class of 25, for classroom use during the academic year
- 5) Grant Application Program:
An opportunity to prepare individual, teacher-initiated grant proposals for funding of classroom activities.
- 6) Honorarium:
Teachers will be hired as UMC Temporary Employees for the duration of the program. The salary scale is approximately \$10/hour for the six week period. Participants must undergo a mandatory background check and drug screen as a requirement for employment at the Medical Center. Funds for student reimbursement are not available at this time.
- 7) Continuing Education Credits:
Teachers will receive Continuing Education credit for their participation in the program.

The overarching purpose for the **Base Pair** Summer Research Institute is to enhance the opportunities for science learning in the Jackson Metro area, utilizing the resources of the University of Mississippi Medical Center to foster incorporation of contemporary, laboratory-based and inquiry-oriented activities as the primary means to enhance learning. Having that as the objective, attention was focused on determination of the degree to which the program achieved that goal. Accordingly, a series of specific, task-oriented outcomes was used and which participants were directed to address. Pursuit of these outcomes has distinct educational value within the context of the principal objective and provides measures that can be easily quantified. The outcomes that each participant was asked to accomplish were:

- Completion of the tasks identified in a Personal Professional Philosophy Development Plan, including,
 - enumeration of personal learning objectives.
 - listing behaviors/activities describing leadership qualities in education.
 - formulation of methods to measure your success in enhancing personal leadership skills.
 - description of lesson plan involving one or more activities generated from Summer Research Institute training, including evaluation of the effectiveness of that lesson plan.
- Preparation of a teacher-initiated application for funding from a granting agency of the participant's choice. Submission of the application will be coordinated by the Program Director. Participants were asked to notify the Program Director of the final decision concerning funding of the application.
- Active participation in weekly discussion of science-related literature.
- Submission of evaluation instruments throughout the course of the program, including the
 - pre- and post-program evaluations.
 - exit interview with Program Co-Investigator.
 - University of Mississippi Medical Center Continuing Education evaluation form.
 - University of Mississippi Medical Center Student evaluation form.
 - student pre- and post-program career preferences.

Base Pair Teacher List

1992-2004

<u>Name</u>	<u>Current Position</u>	<u>District/School</u>
1. King, Theophilus		Hardy Middle
2. Spann, Mary		Murrah
3. Momand, Isa		Murrah
4. Harris, Renee		Byram Middle
5. Baker, Sherry		Siwell Middle
6. Cook, Cindy		Murrah
7. Farrish, Helen		Provine
8. Ford, Willie		Capital City
9. West, Richard		Clinton
10. Redhead, Karen		Murrah
11. Lipscomb, Jennifer		Murrah
12. Evans, Karen		Madison
13. Groat, John		Northwest Rankin
14. Walker, Windey		Bailey
15. Lawson, Annette		Northwest Rankin
16. Reiken, Angela		Mendenhall
17. Henderson, Elizabeth		Murrah
18. Wyatt, Gwin		Murrah
19. Boyd, Charlotte		Jim Hill
20. Stokes, Jeffery		Jim Hill
21. Wilson, Greg		Jim Hill
22. Clarke, Shannon		Brandon Middle
23. Bender, Susan		Jim Hill
24. Hemphill, Jammy		Forest Hill
25. Lundy, Ben		Forest Hill
26. Hardy, Sandra		Powell Middle
27. Kennebrew, Janice		Blackburn Middle
28. Moore, Chyrissee		Northwest Rankin
29. Martin, Jennifer Pittman		Northwest Rankin
30. Luse, Lender		Provine
31. Davis, Consuella		Whitten Middle
32. Ighoavodha, Miriam		Hardy Middle
33. Hardy, Tabitha		Whitten Middle