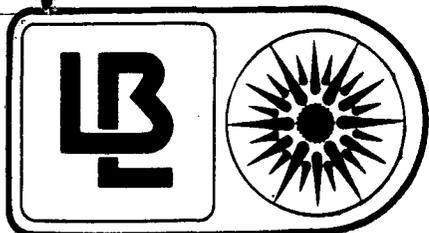


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NEWSLETTER

Lawrence Berkeley Laboratory
Applied Science Division

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****INTERVIEW WITH ALEX QUINTANILHA****



[Alex Quintanilha is the Interim Assistant Division Head for the Applied Science Division.]

ASD: Alex, you seem to be an extremely busy researcher working on projects in both the Solar and Environmental Research Programs. Can you tell us about your role in each project?

Alex: I am mainly working in two different groups at the Lab: Membrane Bioenergetics and Instrumentation Survey. In the first one, for the last nine years, my work has been related to the understanding of some of the mechanisms of redox reactions in cells on the one hand, and oxidative damage to tissues and biological systems on the other. In the redox reaction systems (systems which simultaneously oxidize one compound while reducing another), I have been particularly interested in the mechanisms of conversion of the chemical energy released into electrochemical gradients of ions (in particular, protons). These gradients are then used for the generation of ATP which, as you know, is the primary source of biological energy. In animal cells, most of the redox mechanisms occur inside mitochondria, which are the power centers of cells. The substance that is reduced in this case is oxygen; in fact, the reduction of oxygen in these systems accounts for most of the oxygen consumption that our bodies are responsible for.

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ASD: What do you mean by energy conversion?

Alex: One of the most fascinating problems in cellular metabolism is this problem of the inter-conversion of one type of energy into another. The way in which mitochondria, for example, are capable of generating ATP via the use of energy released during redox reactions is an extremely elegant mechanism. The mitochondria generate an electrochemical gradient across their membranes, which upon dissipation is capable of releasing enough energy for the formation of ATP. You might ask how biological membranes are capable of generating such electrochemical gradients. They do this by pumping protons from one side of the membrane to the other. This mechanism is found not only in mitochondria but also in chloroplasts in plants and in many bacteria. My work in this field has been primarily involved with the quantitation of both the amounts, the kinetics, and the control of such mechanisms. We have been able to demonstrate electrical-feedback control in some of these biological proton pumps.

ASD: You mentioned that you were also investigating oxidative damage to tissues. What is that?

Alex: The problem of oxidative damage is one that has fascinated me in the last few years. The assumption in this is that oxygen, although it is required for the generation of energy in aerobic organisms, can also be a powerful toxic substance. We have recently published a paper that shows that during physical exercise in which the oxygen consumption of the body goes up as much as tenfold, there is very clear evidence of damage being produced in both muscle and liver tissue. This was of great interest to us because we wanted to try and understand why physical exercise may be, in a sense, beneficial for you. It appears that the reason why physical exercise may be good for you is precisely because of the small amount of damage that it does to your tissues. This has become our working hypothesis. In this respect, physical exercise works very much like a vaccine. By producing a small amount of damage, it stimulates body tissues to respond by increasing their protective mechanisms. We have now shown that this is indeed what happens in both skeletal and heart muscle tissue. A clearer description of these mechanisms of damage and adaptation is one of the aims of my own research at this particular time. I have five students from various departments working with me in this area. The departments include physical education, physiology, biochemistry, and nutritional science.

ASD: How are you involved with the Instrumentation Survey group here at LBL?

Alex: We are trying to get the second volume in our series ready for publication by John Wiley. This is the Water volume. The first volume, Radiation, was published in April 1983, and we hope the Water volume will be published in 1984. Basically, the volume contains a number of chapters dealing with methods and

instruments used for monitoring the various kinds of pollutants that are to be found in water. It also includes quality criteria for water and a discussion of health hazards.

ASD: When did you first come to Berkeley and in what capacity?

Alex: When I first arrived, on the 10th of October 1974, I had just finished my Ph.D. in theoretical physics, and I wanted to become involved in biological projects. Coming to Berkeley was almost like a jump into a void. I had very little idea what I was going to be doing here. I had never been to America before, and the culture shock was quite enormous. My first few years here were very difficult, and I felt very out of place and miserable. But as I became more and more involved in the research work that I was doing and established closer relationships with friends, my perception of the place changed and now I wouldn't choose to live anywhere else. I spent most of my first year learning biology and generally getting an idea of what areas I would be interested in developing. I became an LBL employee in December 1974. My appointment at that time was by Jack Hollander.

ASD: Recently you spent six weeks at the Biomedical Institute at the University of Porto in Portugal. How did such an appointment come about?

Alex: In 1976, the Biomedical Institute at the University of Porto was created. At that time, the Organizing Committee approached me to ask if I would like to become responsible for the Biophysics Department of such an Institute. I told them that I felt I didn't have the time for such a full-time commitment but that I would be willing to give them all the support I could in terms of advice and collaboration. Since then, I have been going to Portugal every year for one to three months, spending my time trying to get the Biophysics Department on its feet.

ASD: What kind of work is being done there?

Alex: We started off by sending a number of post-graduate students to get their Ph.D.'s in England and the United States. I began to teach and set up a laboratory with facilities that would allow research to go on. At the present time, two people have come back with Ph.D.'s and they are part of the Department of Biophysics. Last year when I spent three months in Portugal, I was able for the first time to get some of the students in the department to do research. One of the students is completing her Master's Thesis at the present time; the other is working for his Ph.D. and will probably be ready for it in another two or three years. Since it is a biomedical institute, I thought it would be reasonable for the students to be involved in biomedical problems. One of the students decided to study red blood cells in normal and diseased patients; the other one decided to look at the properties and structure of nerve cells in patients who have a very specific genetic defect that leads to a degeneration of the nervous system. Another project that is just

starting is in the area of ischemia (local anemia) in the brain and has to do with oxygen toxicity to brain cells.

ASD: Do you have any other projects in mind?

Alex: Having been in Lisbon, Porto and Aveiro in the last few years, I have become more and more aware of the problems of pollution in some of the Portuguese cities. Most of the public transportation is via diesel buses and taxis, and the level of pollution in some of the streets is so high that I ended up many days having headaches from simply just walking through the streets. It occurred to me that a project of monitoring the air pollution in the city of Porto via collaboration with Tica Novakov's group might be feasible. Tony Hansen arranged for a sampler to be sent to them, and we have one post doctoral fellow and one faculty member doing work on collecting specimens for analysis both in Portugal and at LBL.

ASD: You have recently been appointed Adjunct Professor of Physiology in the Physiology/Anatomy Department on the UCB Campus. What does this involve for you?

Alex: I am primarily going to further the research that I have been doing these past several years and continue teaching. I have taught several major sections in different lecture and laboratory courses. I will probably start two courses in the next few years for which I have already submitted proposals. One is an Honors Laboratory course for students in the biological sciences who are interested in learning some of the more sophisticated techniques used in research. The other course deals with free radicals in biology. Both of these courses will be run in collaboration with other members in the Department and other faculty in the University. The appointment also allows me to be directly responsible for the students who are working with me. In addition, it will enable me to start my own areas of research within the Department. I'm very excited about that possibility.

ASD: You have an interesting accent. Can you tell us something about your background?

Alex: I think this requires a little history. I was born in Mozambique in the city of Lorenzo Marques which, after independence in 1975, was renamed Maputo. I finished high school in Mozambique and then went to do my undergraduate work in Johannesburg, South Africa. That was the first time that I had to start speaking English every day. Until then, my home language was, of course, Portuguese. But it is a little more complicated than that because my mother is German, born in Berlin. So here I am with Portuguese nationality, with a German mother, born in Mozambique, and living in Berkeley. I find it interesting to note that Berkeley is almost the direct antipode of Maputo. As for my accent, when I went to Johannesburg I was fortunate enough to be able to stay with a wonderful English family. As we all know, the English from the colonies are even more British

than the British, and they spent a lot of time trying to perfect my accent. I was given a very rough time trying to learn how to say the "th" and "wh" correctly. To some extent, I think that I have now lost a little of that British accent. That is not surprising because the facility I have with language comes from the fact that I can imitate sounds very easily. I have never been able to study or retain any of the grammar that I have attempted to learn in any language. Two weeks ago, when I was in England, some of my friends told me that my English had changed somewhat, but by the end of the week I was again talking like them. I think, given another five or six years, I will probably sound like a typical Californian - if there is such a person!

ASD: What are your other interests besides research and teaching?

Alex: I have absolutely no interest in sports. I don't do any physical exercise of any form. That probably accounts for the fact that I usually feel so healthy. All my friends who play sports or do exercise are always complaining about their knees, legs, backs, arms, and all kinds of different parts of the body which are being contorted into some extraordinary shape by what they do. I don't smoke and I don't drink, and those are probably other reasons why I feel healthy. I am very interested in both literature and art. Most of my close friends are in the fields of fine arts, architecture, literature, cinema, or law. I like to cook and garden. But I like to cook mainly for my friends who are capable of enjoying good food and conversation. At one time in my life, I thought I very much wanted to have children. That has somewhat changed in recent years. I have no intention of getting married, but perhaps I'll adopt a child someday. I like to paint and draw. I enjoy very big cities with lots of noise like New York, possibly because I lived all my youth in a very quiet community and in a very protected environment. And I love to eat sweets - especially Portuguese ones.

DIVISION NEWS

- We want to thank Tica Novakov for the valuable time he has given as a member and past Chairman of the Division Professional Staff Committee. Frank Robben will begin a term on the Committee starting in November.



CHRISTMAS PARTY!

The Division Christmas Party is scheduled for the afternoon of Friday, December 16. More details will be sent out soon!

HAPPY HOLIDAYS!

SABBATICAL VISITOR

Steven Lewis is spending a sabbatical year at Lawrence Berkeley Lab working with the Ventilation and Indoor Air Quality group in the Energy Efficient Buildings Program. He is a senior scientist with the Israel Atomic Energy Commission and lives with his wife and two children, ages 5 and 13, in Rehovot, Israel. Although a native of Boston, Mass., where he earned his B.S. in nuclear engineering at Lowell University, he has lived in Israel for the past 15 years. He received his M.S. in nuclear sciences at the Technion (Israel Institute of Technology), Haifa, and his Ph.D. in isotope research at the Weizman Institute of Science in Rehovot.

Steven has been working with tracer applications (e.g., the movement of materials in the natural environment or chemical processes, and industrial complexes) in Israel, and here at LBL he will be involved in research using techniques for tracing radon penetration and daughter behavior in buildings. He will also be working with tracers in ventilation efficiency and indoor air quality research not directly related to radon.

RECENT REFEREED JOURNAL ARTICLES

"The Impact of Fenestration on Energy Use and Peak Loads in Daylighted Commercial Buildings," S. Selkowitz, S. Choi, R. Johnson, and R. Sullivan, Progress in Passive Solar Energy Systems, pp. 187-192 (1983).

"Field Data Logger with EPROM Storage," A.W. Robb and W.W. Nazaroff, Rev. Sci. Instrum. 54 (9), pp.1252-1253 (1983).

"Verification of BLAST by Comparison With Measurements of a Solar-Dominated Test Cell and a Thermally Massive Building," F. Bauman, B. Andersson, W.L. Carroll, R. Kammerud, and N.E. Friedman, Journal of Solar Energy Engineering, pp. 207-216 (May 1983).

"The Absence of Coherent Vibrations in the Raman Spectra of Living Cells," M.S. Cooper and N.M. Amer, Physics Letters, Vol. 98A, No. 3, pp. 138-142 (1983).

IN MEMORIAM: THEODORE VERMEULEN

Ted Vermeulen, a Faculty Senior Scientist with the Applied Science Division and UC Berkeley Professor of Chemical Engineering, died Friday, October 28, at UC Hospital in San Francisco where he had been hospitalized with leukemia. He was 67.

Ted received his B.S. and M.S. degrees from California Institute of Technology in Pasadena. He obtained his Ph.D. from UCLA in 1942. Since 1947, he has been a member of the UC Berkeley faculty and was the first Chairman of the Department of Chemical Engineering. His long association with LBL has extended over the same 36-year time period. He led LBL projects in Nuclear Waste Reprocessing during the 1947 to 1953 period, and projects involving Separations and Mass Transfer from 1954 to 1970. More recently, he has been instrumental in establishing and leading key elements of the fossil-fuel R&D program within the Applied Science Division. His professional and technical reputation in his field has been recognized by such honors as Fulbright and Guggenheim Awards in 1963-64, and the AIChE William H. Walker Award in 1971. Everyone who has had the pleasure of associating with him will remember him with fondness.

NEW EMPLOYEES

Stephen Byrne is a staff scientist who has recently joined the Energy Analysis Program. He is originally from Bellevue, Nebraska and has a B.S. in architecture from the University of Nebraska and an M.S. in solar technology from Arizona State. Before coming to LBL, he was working on energy analysis in buildings with a consulting firm in Tempe, Arizona, and was a part-time faculty member at Arizona State. He is presently working on energy analysis in residential buildings using the DOE-2 and BLAST computer simulation programs.

Jim Bull is a new staff scientist with the Building Energy Simulation group of the Energy Efficient Buildings Program. He worked as a consultant with the Energy Analysis Program last year and has been working for Consultants Computation Bureau in San Francisco for the past 5 years. He has an M.S. degree in Computer Science from Washington University in St. Louis, Missouri, and is currently working on DOE-2 enhancements, improvements, and extensions.

INVITED TALKS AND FOREIGN TRAVEL

October

- Max Sherman attended the Fourth AIC (Air Infiltration Center) Conference on Air Infiltration Reduction in Existing Buildings in Elm, Switzerland, where he was invited to present a paper entitled "Component Leakage Areas in Residential Buildings."
- Jayant Sathaye travelled to Monrovia, Stockholm, and London for research discussions. In Stockholm, he was invited to give a talk to the Building Research Council on energy models in buildings and the use of heat pumps in the residential sector.

November

- Art Rosenfeld was in New York where he was invited to speak at the International Scientific Forum on New Energy Realities. The subject of Art's talk was "How to Invest in Conservation and Avoid Investing in Much More Expensive Supply."
- Elton Cairns was invited to speak at the AIChE Diamond Jubilee Annual Meeting in Washington, D.C. The title of his talk was "Future Directions for Energy Conversion." He was also invited to give a talk entitled "Present and Future of Lithium Batteries" at the Alcoa Technical Center in Pittsburgh, PA.



*Season's
Greetings*

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