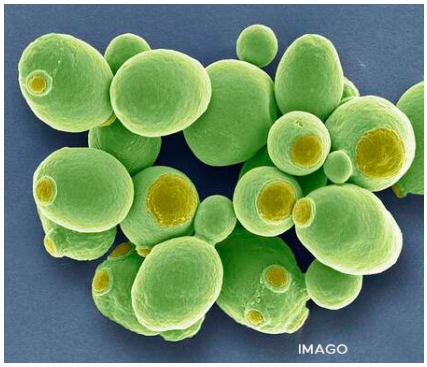
12 The road to Pee-Are

Thirteen years on a student visa

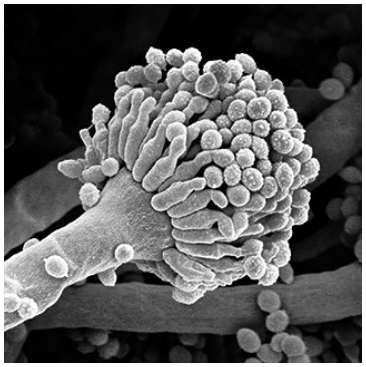
I entered Australia in Perth, Western Australia on a student visa in 1974. I started on my Leaving Matriculation there at Leederville Technical College after which I gained entry into the University of Western Australia in 1975. After I graduated with a bachelor's degree in agricultural science with honours in 1979, I proceeded to embark on a PhD candidacy which was completed in mid-1985. The year following this completion turned out to be very eventful and resulted in a change in my residency status in Australia. Let me recount the events.

My career in microbial terms

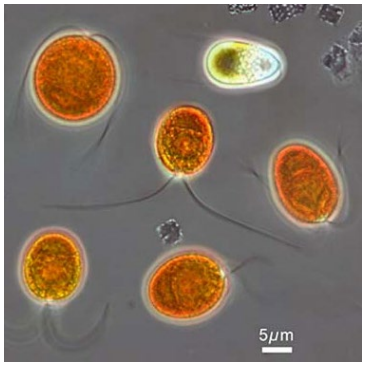
My technical specialization began to emerge in the honours year of my BSc(Agric). I chose a research project in rapid batch fermentation of ethanol. It seemed topical at the time because firstly, there was an energy (oil) crisis initiated by Arab members of the oil cartel placing an embargo on exports of oil to countries on the "wrong" side of the Arab-Israeli conflict in the early seventies. Secondly, Western Australia where I was located was looking at mass production of sugar cane in the Ord River scheme in the north of the state. Where there is sugar as a feedstock, ethanol is always a consideration as a value-added fermentation product. Thus, my career in industrial microbiology began. This expert field can described as the use of microbial agents (whole or parts thereof) to produce goods and services. The conversion of sugars to alcohol (ethanol) by yeasts is an example of microbial agency in a production process. The treatment of wastewater via bacteria is an example of a service by microorganisms. Some of my key associations with microorganisms during my career can be seen in the figure below:



Saccharomyces cerevisiae which I studied in rapid batch production of ethanol in my Honours year

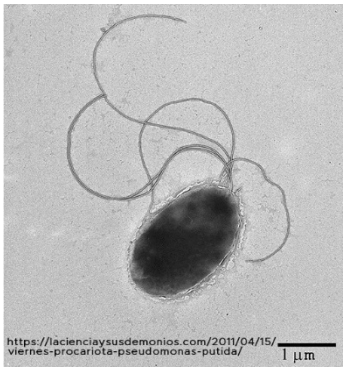


Aspergillus phoenicus the fungus I studied in my PhD on saccharolytic enzymes

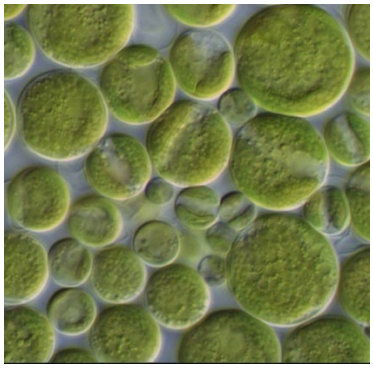


Dunaliella salina, the microalga used in my first post-doctoral employment in a beta-carotene project

Laccaria laccata, one of the fungi I worked on in my R&D project on inocula for the eucalypt plantation industry



Pseudomonas putida, the bacterium used in my students' Honours and Masters projects in wastewater treatment

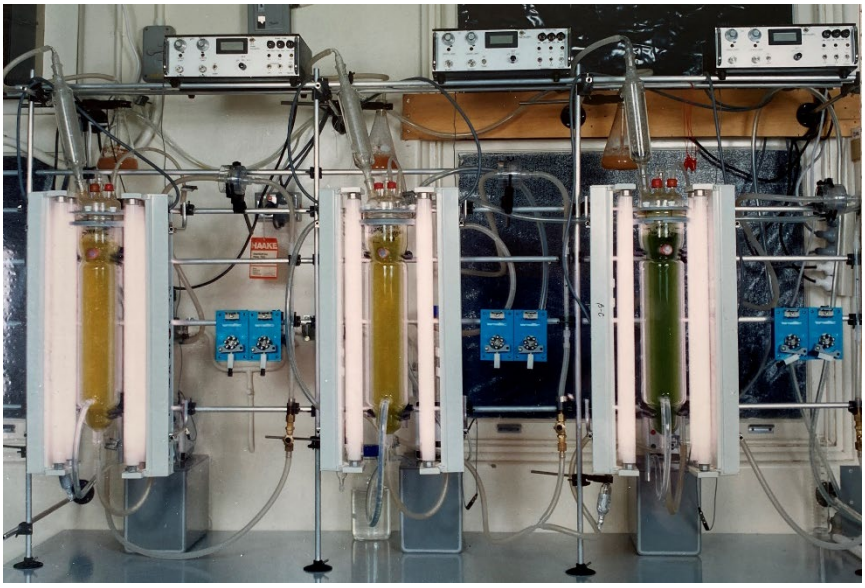


Chlorella protothecoides, the microalga worked on by one of my Masters students for biofuel production

When I had just about completed writing my PhD thesis, I was introduced to Dr Rod Lukatelich and Associate Professor Arthur McComb the Department of Botany at the University of Western Australia. They had heard of my PhD work on the culturing fungi in bioreactors and wanted to see if I would be interested in working in a project to culture a particular alga under controlled conditions. This alga was *Dunaliella salina*, which occurs naturally in the arid north of Western Australia and elsewhere around the world where given the right conditions, they turn red through the accumulation of the pigment beta-carotene.

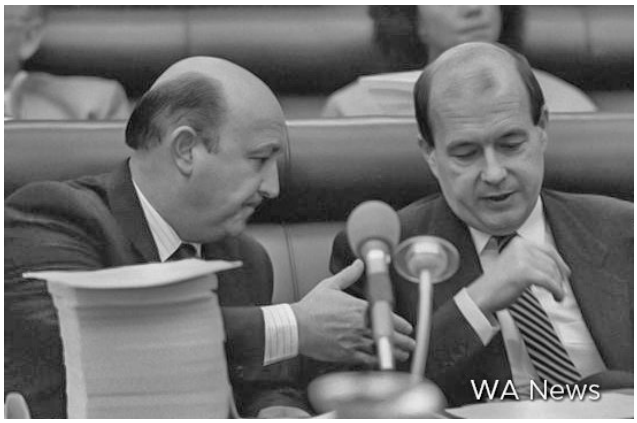
Natural beta-carotene can be extracted from the alga and sold for a good price to the food, nutraceutical and animal production industries. All around the world at the time, R&D was being rapidly carried out to ride the wave of commercial interest in this pigment. In Western Australia, the R&D centred on production of the alga in outdoor ponds. An investor group owned by two Hungarian emigres wanted to see if production can be done under more controlled bioprocessing using photobioreactors. As my PhD work was all done using bioreactors which allowed precise and reproducible environmental conditions to be implemented during the culture of a microorganism, it was a natural and relatively easy step to take to set up a system for controlled culture of the beta-carotene alga. This was how I begun my first postdoctoral position.

Designing and setting up the photobioreactor rig for the project was relatively easy as I had all the previous contacts from my PhD work *viz.* the electronics workshop (Institute of Agriculture), and the glassblowing shop (Department of Chemistry). It was an exciting time to have access to relatively comfortable funding to acquire new equipment and apparatus *e.g.* to build the photobioreactor rig; upside-down microscope; a HPLC for analysis; and a coulter counter for counting cells (as opposed to a thinly-funded PhD project). It was also the pleasure of working for enlightened team leaders in Rod and Arthur, and new colleagues in Arthur's research group. My Research Assistant Sue Harders and I were ensconced in a lab set aside for the algal work. To this lab came many visitors to see *Dunaliella salina* cultured in bioreactors.



The photobioreactor rig which I designed for the Department of Botany at the UWA

News of this research reached the office of the Western Australian Technology Directorate. An officer there eventually learnt of my key role in the project and that I was soon to have to leave the country due to the completion of my PhD studies. It was decided to have the Directorate through the Western Australian Deputy Premier, Mr Mal Bryce (Head of the Directorate), communicate with the Federal Minister for Immigration (in the same Australian Labor Party) to see if he could grant some form of dispensation to allow me to stay on in Australia on a permanent basis. This was done on my behalf without my active involvement. Then a few weeks later I received a formal letter from the Immigration department which informed me that since Mr Bryce had petitioned on my behalf for a change of visa status, I was no longer under a student visa and that should the Federal Minister not support the petition, I would have to leave the country within 14 days! This came as a shock because I have never asked for my case to be petitioned and the Head of my university department where I was enrolled for my PhD had to get involved to regain my student visa which still had months to run (allowance was given to stay until PhD results were obtained). Eventually, my student visa was reinstated and I stayed on until my contract in the algal project was completed, and my sucessful PhD result came back.



Mr Mal Bryce, Deputy Premier of W.A. (left);
Mr Brian Burke, Premier of W.A. (right) 1987

At the time my visa matter arose, the original investors in the algal project were casting for further investors to join. This was how Mr David Deane-Spread came onto the scene and how I was introduced to him. David was an entrepreneur and as was the *de riquer* in Western Australia at the time when cash was chasing for projects to invest in and list on the Perth Stock Market's Second Board (a listing comprising more risky start-up ventures),

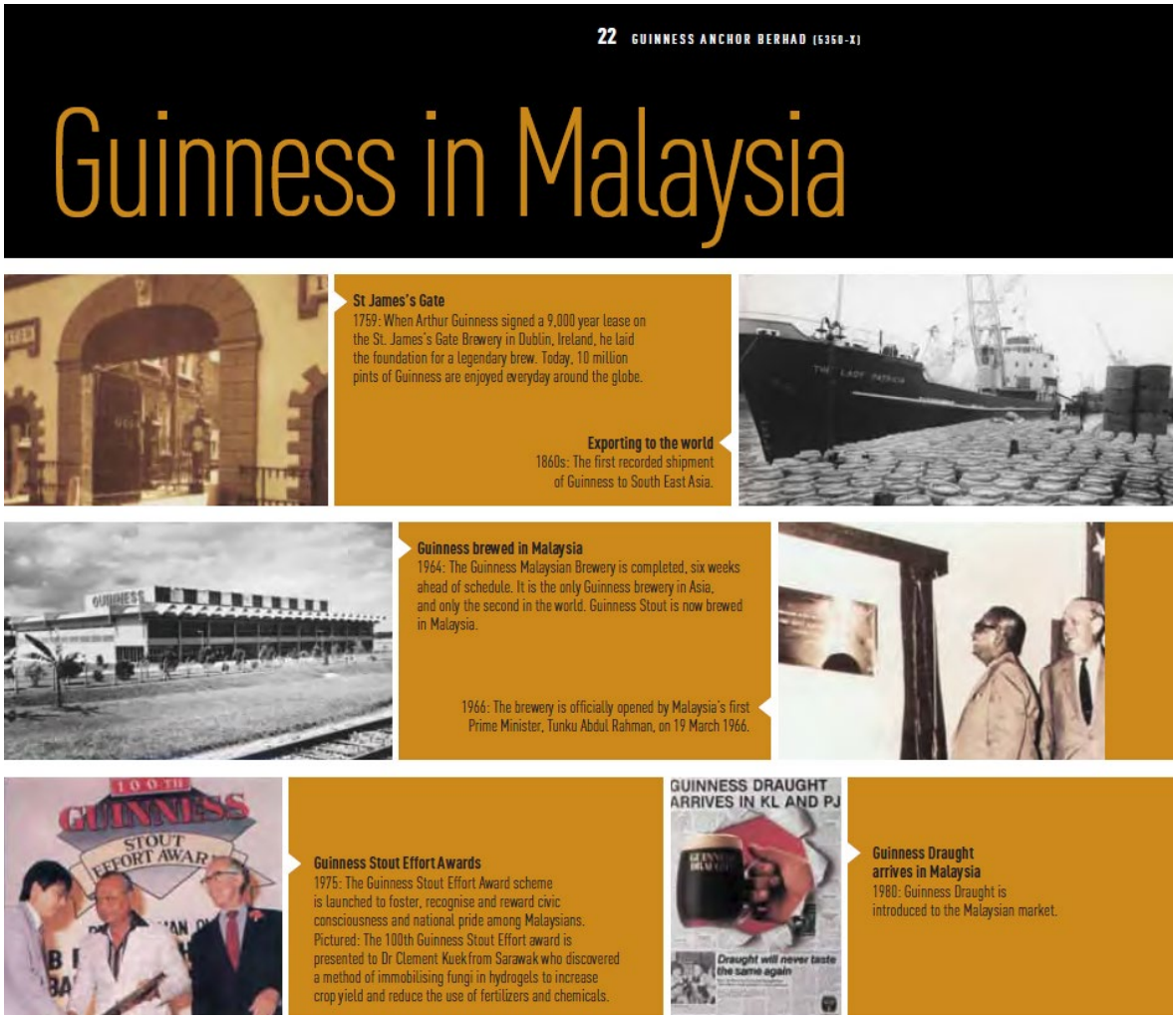
he was looking for projects to put money into. He had access to a financial backer on whose behalf he could invest.

Fungal mycelia which I cultured within hydrogel beads for use as a form of plant inoculum

It turned out through discussions with David, that he had more interest in another project which I was developing with two collagues at the time *viz.* a proposal to produce live biomass of fungi (inoculum) which grow on roots of host plants with the net benefit to the latter of better nutrition and hence growth rates. It was proposed that this technology would make an economic difference to the planned industrial plantations for wood pulp which were being mooted for South-Western Australia at the time. My colleagues (and indeed mentors), Drs. Nick Malajczuk and Inez Tommerup and I had already won funding from a Reserve Bank of Australia fund for the fungal inoculum proposal but we had declined receving it because we were only allocated a fraction of what we considered as required to run the project effectively. David had agreed not only to fund the project fully but also to sponsor my family and I as permanent residents of Australia after our mandatory return to Malaysia after the completion of my PhD candidature.

1986: David Deane-Spread and Wendy Moffat (PA) at the Interbac office located at Subiaco, Perth. Both David and Wendy still reside in Perth.

My family and I returned to Malaysia in June 1986 and applied for migration as permanent residents (PR) sponsored by David's company Interbac Australasia Pty. Ltd. While in Kuching, Sarawak, a newspaper article in the Sarawak Tribune which featured by PhD work caught the attention of the selection committee of, and as a result of which I was nominated for and won the 100th Guinness Stout Effort Award for my PhD work on fungal mycelia immobilized in hydrogels.



Bottom left: 1986 at Kuala Lumpur
Receiving the 100th Guinness Stout Effort Award from the Deputy Prime Minister of Malaysia, En. Ghafar Baba
The award comprised a pair of Mont Blanc pens, a certificate, an all expenses paid trip to KL, and which resulted in various media interviews including a video segment on Radio Televisyen Malaysia

My family was quickly granted our PR visas and were arrived back in Perth in early December 1986. Four years later after the episode related in the chapter "Last Mango in São Paulo", we became Australian citizens (after having lived continually in Australia since 1974 - except for the period while applying for PR, and except for my son who is an Australian citizen by birth).