

Roger Angold interview

By Owen Morton

How do you make the perfect light-sponge cake?...or turn starch into a protein product you can sell the world-over? Well, you could start by asking Roger Angold, one of the UK's most respected food scientists, and a member of the RMS since the early 1960s.

Now in his 80s, Roger is still working in the food industry as a consultant, and recently received a Lifetime Achievement Award from the Food and Drink Federation. He kindly sat down with infocus to talk about his life in science and microscopy.

Let's dive in!

Roger's scientific journey, he explains, began when his primary school teacher, Miss Chapman, introduced him and his classmates to Arabella Buckley's natural history classic 'Eyes and No Eyes'. The book, first published in 1903, follows the adventures of three children observing the animal and plant life on their way to school through fields and woods.

"That book was fascinating", says Roger. "From the age of about five or six I have been completely captivated by the natural world. Natural Sciences became my subjects at school and I did botany and zoology at A-Level."

Roger also studied botany as an undergraduate at Kings College London in the late 1950s. It was during these formative years, that he first encountered the celebrated botanist, Professor Irene Manton – a figure who has made a lasting impression on Roger (and of whom we shall hear more later).

He says: "There were some intercollegiate lectures, and I remember her giving one of these. She introduced me to the electron microscope and this was absolutely fascinating. It was the wonder of being able to look inside cells and see the machinery of life. I think this really galvanised my emerging passion for microscopy and imaging."

Roger went on to do his PhD at Cambridge University botany school under Professor Sir Harry Godwin, who was looking for staff to help him piece together the botanical history of the United Kingdom. The Botany School had just acquired an electron microscope and Roger worked with Patrick Echlin (who would go on to be editor of the Journal of Microscopy and President of the RMS) using it to develop an understanding of the structure and formation of pollen grains. The world of work was soon beckoning though, and the young Roger weighed up his options.

He says: "As I came to the end of my PhD I found a potentially interesting job which was forestry management in New Zealand. The job would have involved wandering the forest on horseback, but I never heard back after the interview, so I thought I'd better look for something else to do."

J Arthur Rank, nightshifts, and the 'appliance of science'

That 'something else' soon came along when Roger applied to baking giant Ranks Hovis McDougall, who were looking for someone to set up a microscopy lab at the company's new technical base in High Wycombe, the Lord Rank Research Centre. It was the beginning of a long association with the company, which was run until the 1970s by celebrated industrialist and film producer, J Arthur Rank. Roger would continue to work for 'RHM' in one form or another until 2002, eventually retiring from

the position of Senior Research Associate.

"J Arthur Rank runs like a thread through my life", says Roger. "He came from a milling family and when his brother died, he took over the food business and decided that the 'appliance of science' was what was needed, so he had to get an electron microscope – which was where I came in. He was an astute businessman who had a huge impact in the history of food production. He knew that if you're going to make a pie or bake a cake, it is a great help if you have a proper understanding of the materials involved."

"J Arthur Rank runs like a thread through my life"

Roger spent years assisting the production lines, investigating and troubleshooting when products failed to meet the highest standards, and using microscopy to work out how the constituents of bread loaves, cakes, pies - and more - behaved when subjected to different processes.

He says: "Once you've learned what the structure and texture of a product are, and the quality you require, if something goes wrong on site, the best way to find out how to fix it is to go down to the factory, take some kit including a microscope, prepare samples and see what happens when you pull different levers."

In control: These days Roger lives on a stud farm in the west of Ireland, where this video-recording drone comes in handy for checking on the paddocks.

Now in his 80s, Roger has returned to Reading-based company RSSL as a contractor, and has been praised for his "tenacious approach to every challenge"



"I found that the best time to do this was during the night shift, when the production team were bored, and above all, the production manager wasn't around to interfere. One thing I discovered was that the team of people on the production line really know what they are doing, and while they don't want some whipper-snapper coming down to tell them how to do it, they are keen to make it work, so I used to show them what could be seen under the microscope, and they would take a real interest in making the required adjustments to produce the right results."

Roger recalls an incident in which the production line had run into difficulties producing a light sponge, having just installed a new mixer at the factory.

"The sponge quality had gone to pieces", says Roger. "I took a look at what was going on, and the behaviour of the new mixer didn't seem to be any different, but they were blaming it for the failure."

"It turned out that when they had replaced the mixer, they had also replaced the pump, and the old one was down in the junkyard. We tried some experiments and it turned out that the leaky shaft seals from the original pump were introducing air that was critical to the production process, and we found a way of making it work to produce what was needed."

Quorn (but not forgotten...)

One of the undeniable highlights of Roger's lengthy and impressive CV, is his role in helping to develop

the protein product Quorn – specifically his important insights into Mycoprotein, which held the key to the product's desired texture.

Quorn's inception was another example of J Arthur Rank's remarkable foresight and willingness to embrace scientific solutions to real-life problems. Some younger readers might assume that its purpose was always to serve as a meat substitute for the growing vegetarian market, but in fact, at the time, many scientists were (wrongly) projecting that the planet would run out of protein food for many by the 80s or 90s, and it was thought that the developing nations were going to have a desperate shortage. As a renowned philanthropist, J Arthur felt he could do something about this.

Roger recalls: "In the 60s and 70s, the assumption was that starch was bad for you, so factories were producing things like Energen Rolls and Nimble Bread. So, masses of spare starch was coming out of factories as a waste stream, and J Arthur said 'How do we turn all this starch into protein product?'. This task was the primary focus of the Lord Rank Research Centre and a team under Dr Gerald Solomons was established to work on it."

Roger's early role in this was to develop an understanding of how the harvested organism functioned as an ingredient providing structure and texture to the products made from mycoprotein, but from 1981 to 1986 he was designated programme manager for the team taking mycoprotein from the pilot plant to the commercial production of Quorn

through a joint venture with ICI. However, missing laboratory life, Roger returned to the bench once the product had been launched.

“Serendipity ran through J Arthur’s life”, says Roger. “The product soon became a huge success – but not for the reasons it was developed.”

Foreign bodies, a fighter jet and a Christmas pud

“I used to spend a lot of time with microscopes to identify things that turn up in food unexpectedly”, says Roger. “Usually, 95 per cent of customer complaints are actually own-goals – either they have been introduced in the shop or in the home.

“For instance, pins used to turn up in M&S loaves because people were buying a new shirt at the same time, and the pins from the shirt would somehow work their way out of the wrapping and into the loaf.

“But sometimes you can come across something truly amazing. There was one time when a piece of glass turned up in a Christmas pudding. My initial thought was how on earth had the customer managed to do this? We looked at the glass and concluded that on this occasion, it must have been in there when the pudding was manufactured. We analysed it in the SEM using x-ray spectroscopy and found an original surface which had an interesting assortment of earth metals as a coating.

“I sent the details on to Pilkington’s (the glassmaker) research lab at St Asaph– the foremost experts at the time. They said ‘where did you get that piece of glass? Do you know what it is?’”

“I told him that I didn’t and he named a particular fighter jet, and explained that it must have come from the windscreen of this particular fighter jet.

“I was absolutely amazed, but then, if you think through the constituents of a Christmas pudding, one of them is dried fruit which is sticky, and it’s very difficult to clean, so little bits of grit can make their way in there, so that was the line we followed.

“So we went back up the line of suppliers and found the grapes involved came from a vineyard in Turkey. This was shortly after the first Gulf War, and the coalition forces had been maintaining a no-fly zone. We found out that at some point a fighter jet had got into difficulty and the crew had ejected and the plane had crashed in the vineyard.

"Investigative microscopy is about uncovering stories"

“So we now had a chain of evidence that led from the Christmas pudding back to the source of the glass. A letter and a hamper of goodies was sent to the complainant expressing sincere apologies, but she said: ‘never mind the hamper, this is a story I’m going to be able to dine out on for years to come!’. This really sums up my fascination for investigative microscopy; it is about uncovering stories.”

From 2002 to 2016, Roger was the Science Director at Pyxis CSB Ltd. In this role he acted as a contract microscopist and spectroscopist for several companies, including Cadbury, Pepsico, McCain’s Foods and Kraft Foods.

As well as tackling the big conundrums at the heart of manufacturing processes, much of Roger’s time in this role (and others he has held) was spent examining customer complaints about foreign bodies found in food products. Roger has extensive experience of such investigations and has appeared as an expert witness for both prosecution and defence in criminal trials - and also as an expert witness in civil cases.

“Young man, what did you do to my ultramicrotome?”

Anyone who has worked for decades in any industry will be able to cite at least a few important, influential figures. With such a wealth of experience and now, as a highly respected scientist in his own right, it would be interesting to know who has made the biggest impact on Roger’s professional life. Let’s ask him.

“We could go back to Irene Manton”, he says. “She was an intense woman, a very imposing woman. I remember at an International Botanical Conference in Oxford in 1962, she gave a lecture on cellular motility. She was showing pictures with a number of organelles in each cell, and some were labelled with the initials ‘GKW’. Someone asked if she could enlighten us on what this stood for, and she just said: ‘Oh, that’s “God Knows What” – I’ve no idea what they are!’”

“I suddenly realised that even the most eminent scientists were actually just as human as everybody else.

“There was another time when I was working on secondment at Leeds University, and I needed access to an ultramicrotome. At that time in the early 1960s, such instruments were few and far between but there was one in Professor Manton’s Botany Department. I went to see her and asked if I could use it. She said I could, but only if I left it in exactly the same state as I found it.

"I suddenly realised that even the most eminent scientists were actually just as human as everybody else"

“I have to say that I found it in a very difficult state to use, so I had to make some adjustments to it – thinking, of course, that I must remember to put it back to how it was. Unfortunately, I finished working that night at about 2.30am and forgot to do so.

“A couple of days later I was in the cafeteria and felt a heavy hand on my shoulder and a booming voice: ‘Young man, what did you do to my ultramicrotome!’ “I was mortified and said I would sort it out straight away, but she said: ‘No, no, absolutely not – it’s working so much better now!’”

No sign of stopping

In the latter stages of his career, Roger worked from 2012 to 2018 as Associate Principal Scientist at Reading Scientific Services (RSS), undertaking forensic and other investigations in microstructure and microanalysis. He has since been rehired by the company as a contractor, and now works for them remotely from his new home on a farm in the west of Ireland. He moved there with his family as part of a business venture led initially by his two daughters. The family runs a stud farm and livery stables – with plenty of flora and fauna in the surrounding rural landscape to pique Roger’s natural history curiosities. He also occasionally finds time to indulge his passion for boating (Roger is a Life Governor of the RNLI).

Last year Roger made a few headlines when he received a Lifetime Achievement Award from the Food and Drink Federation, in recognition of his ‘outstanding dedication to the industry’. A press release was put out by RSSL, in which Roger’s company director praised his “tenacious approach to every challenge”, describing him as “a truly inspiring mentor for those around him”.

Roger says: “I had retired from RSSL at the time, so the nomination for that award came as a bit of a surprise – as did the request from the company to go back to them as a contractor. They are a brave company taking on an octogenarian!”

Which, of course, brings us directly to the question of Roger’s longevity, and unrelenting enthusiasm for his work. What is it, exactly, that keeps him going?

He simply says: “If you had a hobby that you really enjoyed, and which required some very expensive toys to pursue, and somebody said they will pay you to do it’ - then you would jump at it.”

To be fair, you would, wouldn’t you?