



C R I T I C A L F O C U S

Brian J. Ford

The Royal Society Turns 350

*Happy Birthday to you,
Happy Birthday to you,
Happy Birthday, Royal Society,
Happy Birthday to you.*

No, it's not "trad." This popular birthday song officially dates from 1935, when the Clayton F. Summy Co. named Preston Ware Owen and Mrs. R.R. Forman as the writers. That, however, is not the whole story. The melody was originally written with the words "Good Morning to All" in 1893 by sisters Patty and Mildred Hill, who were primary school teachers in Louisville, Kentucky. By 1912, the words "Happy Birthday" had been substituted in the published music for the tune, so this most-widely known of all popular songs is just about a century old.

The reason we should sing this version is because the Royal Society (royalsociety.org) is celebrating its 350th anniversary. It is a remarkable achievement. The Society is Britain's academy of all the sciences and one of the greatest academies in the world. The publicity insists that it is also the oldest scientific academy in the world, though the Italian *Accademia dei Lincei* (literally, the "Academy of the Lynx-Eyed") dates from nearly half a century earlier. The *Accademia* was founded in 1603 by Federico Cesi, a passionate natural philoso-

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pher and botanist. Like many Italian organizations, this academy tended to rise and fall in influence; it was refounded in 1801 and again in 1874, so it cannot claim to have the continuity of the Royal Society. But it was the world's first.

For the best part of 50 years, my career has been loosely interwoven with the Royal Society, and I am grateful to them. I have known all their presidents since Sir Andrew Huxley, who encouraged me to work on the Leeuwenhoek papers in 1981. The first former president of the Royal Society I knew was Lord Adrian. He had served between 1950 and 1955, and I first met him in 1961 at a conference when he was master of Trinity College at the University of Cambridge. His research laid the groundwork for electrocardiograms, and in my own home laboratory, I had constructed a device for recording physiological data on a smoked drum. The carbon trace was then collected on adhesive tape and the results were fixed to sheets of paper for analysis. It was embarrassingly crude, the kind of device that you'd expect to find abandoned in the attic, and the smoked drum technique had been superseded by electronics years earlier.

Lord Adrian, who graduated from Trinity College (and was later appointed master of the same college), typifies the cyclical career of which Cambridge particularly approves: It gives the university their extraordinary sense of continuity, and they are second only to Harvard in the world (according to *U.S. News*



Snapped from the audience in February 1965, the author explains mechanisms of blood coagulation at a conference in the Royal Society's lecture room in Piccadilly, London.



The author demonstrates 19th century microscopes at the Society's two summer meetings in 1984, when the Society was located at Carlton House Terrace.

& World Report). Lord Adrian had designed superb devices that amplified nerve signals using thermionic radio valves, so I often think what he'd have done in the era of transistors and solid-state amplifiers. He was a slight, lean man with earnest features who was an athlete and yachtsman in his spare time; his manner was witty, quick, and instant in response. What a superb talk-show guest Lord Adrian would have been (though he'd have been completely uninterested in tele-

vision celebrity). He told me about collecting signals from single neurons. Lord Adrian was the first person ever to do that. In recent years, I have attempted to decode neuron spike recordings, which might never have happened had he not given me food for thought some 50 years ago.

PENICILLIN FOUNDER UNFORGETTABLE

He was followed as president by Sir Cyril Hinshelwood who was also from Trinity College, Cambridge. Hinshelwood was an eminent chemist and, as far as I know, I didn't even set eyes upon him. But when he stepped down in 1960, one of the greatest 20th century scientists took over as president – it was the man who gave us penicillin, the world's first antibiotic. This man was Howard Florey, who was one of the most unforgettable characters I ever encountered.

Florey had led the research team, with Chain and Raistrick, that started to investigate antibiotic phenomena as the growing threat of World War II was pressing on their heels. If a drug could be found, it would give the Allies a tremendous advantage in treating injured soldiers. They extracted penicillin from cultures of the mold investigated by Alexander Fleming, and it proved to be the "miracle drug" they sought.

Florey came to the Royal Microscopical Society (RMS) meeting at Balliol College, Oxford University, in 1962, and I was introduced to him by my friend and mentor John Bunyan, president of the RMS. Florey was intrigued at the idea of my carving a career as young independent microscopist and suggested that we have lunch together. It was an informal affair, and I vividly remember his beaming and affable face – his appearance reminded me of comedian Bob Hope. He was full of encouragement, and advised me always to stay close to the university in Cardiff; but he seemed very intrigued by the idea of maintaining your independence, and said that – if he'd thought of it earlier – he might have gone that way too. Even thinking back to the man gives me a glow of pleasure.

The Royal Society was then based at Burlington House, Piccadilly, in central London. My connection with the Society had been minimal – I'd made inquiries of their library, and that was it. But in February 1965, I spent a day there and gave a presentation in their lecture theater during a one-day conference of the British Microcirculatory Society. I showed the 16 mm films we had been taking of hemostatic mechanisms. I thought it would be hugely intimidating, but I became so swept up by the atmosphere of the meeting and the enthusiasm of everyone there that the hesitation evapo-

rated like gasoline on a hot sidewalk. This research attracted surprising interest and was later even reported in the London newspaper, the *Evening Standard*.

The Royal Society then moved to larger premises in Carlton House Terrace, overlooking the Mall (the wide avenue leading straight up to the Her Majesty the Queen's accommodation at Buckingham Palace). In the early 1970s, I went there to consult the Royal Society's collections as I was compiling my two books, *The Revealing Lens* and the *Microscope Manual* (both published in 1973), though I had less connection with the Society's presidents. The following three were the cloud-chamber physicist Lord Blackett (president, 1965-1970), then the noted neurophysiologist Sir Alan Hodgkin (1970-1975), who also became Master of Trinity College, Cambridge, followed by Lord Todd (1975-1980), who studied at the universities of Glasgow, Frankfurt, Oxford, Edinburgh, London, Manchester and eventually Cambridge, where he became Master of Christ's College and the Professor of Chemistry. I met Sir Alan Hodgkin, though only briefly, and I had no other connection with either of the other presidents.

For a decade I had been intrigued at what could be seen through early microscopes, and a few papers were published on the subject (among them was "Recreating the Pioneer Microscopist's View" in *New Scientist*, August 5, 1971). In 1981, I was awarded a major equipment grant from the Kodak Bursary Scheme and decided to commence an extensive study of exactly what these primitive instruments could reveal. I was soon back at the Royal Society, eagerly poring over their bound volumes of the *Proceedings of the Royal Society* and their superb collections of the earliest books on the microscope. Norman Robinson, their urbane and dignified librarian, took me under his wing and sorted out the materials that I needed to consult.

THE LEEUWENHOEK LETTERS

Sir Andrew Huxley was elected president that year and came down one afternoon to see what I was doing. He was a gifted microscopist, and in 1963 he had jointly won the Nobel Prize in medicine for his work with Sir Alan Hodgkin and John Eccles on the action potentials emitted by neurons. I had some of my experimental micrographs in my briefcase, which he looked at in a kindly manner before we got onto the subject of Leeuwenhoek. I had planned to work through the translated letters of that great man, of which the Society had an extensive collection in the published form, but Sir Andrew had a much more propitious proposal. He thought that I might be interested in looking through



The author's wife, Jan, with Sir Colin Spedding at a formal Institute of Biology dinner held at the Society in March 2001.



Adam Hart-Davis (right), one of Britain's leading science television broadcasters, interviews the author at the Society in 2003 about his research on Antony van Leeuwenhoek.

the original letters. They were downstairs in the strong room and I could have access to them all if I wished. The archivist in charge was Leslie Townsend, who in private life was an enthusiastic church organist from the coastal town of Broadstairs, Kent. I spent days working through the voluminous correspondence, my briefcase tucked onto a shelf next to Newton's original telescope. My work on the Leeuwenhoek specimens that lay undisturbed among the Leeuwenhoek letters was the outcome of that presidential proposal. Sir



Professor J.R. Norris (center) officiates as television naturalist Sir David Attenborough (right) is presented with an Institute of Biology award by the author at the Society.

Andrew subsequently arranged for me to present my work on early microscopes at the Society's two summer meetings, the *Conversazione* and the *Soirée*, which provided unique opportunities to demonstrate the work to an extraordinary range of influential individuals from academia and government.

On the Saturday morning following the *Soirée*, I was already committed to appear elsewhere and was suddenly informed that the local senior schoolchildren had been invited to attend the exhibition. My wife, Jan, took over giving the demonstrations and answering their questions. "I was soon surrounded by school children, all eager to ask questions, when a friendly woman came over and asked if she could help to get them organized," Jan says. It turned out that her volunteer helper was Richenda, Lady Huxley, though Jan didn't know that at the time.

"When there was a lull in the proceedings, I was on the point of making some cheeky and rather irreverent remarks about Sir Andrew," Jan says. "But fortunately, someone caught her attention before I could say a word – and by the time we began talking again, she'd introduced herself. Actually, that was a close call."

As a result of the growing interest, and as my publications on early microscopes modestly increased in number, Sir Andrew arranged a morning meeting at the Royal Society that was reminiscent of the 17th century. He invited a group of distinguished microscopists to come to private rooms at Carlton House Terrace and witness a demonstration of how I used these early instruments. That great – and much missed –

authority Savile Bradbury was among them. I set up the microscopes and demonstrated how the images were obtained. Nobody had anticipated observing such detail, and that intimate gathering remains, to this day, a unique occasion. Huxley is now 93 and as vigorous as ever. His latest homemade Christmas card shows a stunning view over the Scottish lochs, taken by Sir Andrew himself. We recently met over lunch in Cambridge at Trinity. He is still a great inspiration.

On several occasions I have been interviewed by journalists at the Royal Society, when reporters have come along to ask me about the way discoveries were made. We have brought up the Leeuwenhoek letters on these occasions for reporters to film, and these intriguing old documents remain an endless source of fascination – and not just to me.

A 'JOLLY GOOD' SOIREE

Jan has joined me in attending occasions from the Royal Society's program over the years, and we jointly hosted many scientific events. One was a reception at the Society that brought together science writers with leading members of the British Parliament. The funding for the meeting would provide only the predictable, conventional food for guests to nibble: canapés, little dips and sausages on sticks. We wanted something special. Since we never offered food like that at home, why inflict it upon our guests?

Early on the morning of the reception you'd have seen us at Berwick Street Market, nestled near Piccadilly Circus in the center of London, where the finest food is still sold from traditional market barrows and idyllic little delicatessen stores are secreted among the shops. We picked up exotic spiced cold cuts from Eastern Europe, delicious sliced sausages from Germany, aromatic cheeses from Italy and Belgium, olives from France and Spain, pickled fish from Scandinavia, and bread ranging from floured white French baguettes and heavy dark bread from Poland to scrunchy white rolls from the handmade bakery. We had fine wine from France, beer from Belgium and Czechoslovakia, coffee from Arabia and Kenya.

The rest of the day was spent in preparing the food and setting out the tables with our helpers. Jan wore a pretty apron decorated with red roses to do the work in the Royal Society's downstairs kitchen. As you'd expect, my choice of clothing was rather different (the roses on my frilled apron were yellow). We cut and sliced, we prepared ingredients and laid them out, until – just half an hour before the starting bell – the tables were laden with wonderful food, all looking so appe-

tizing and so different from the routine monotony of wine parties.

The guests were appreciative. Everyone enjoyed being within the Royal Society's gracious rooms, of course, and there were favorable comments about the edibles. A senior government minister was chatting to Jan and confided, "I say, this food is jolly good. Where did you find the caterers? This is terrific. Do pass on everyone's appreciation to the crew, won't you?" She smiled back. "I will pass on your kind comments," said Jan, "just as soon as I get together with them again." He winked.

Sir George Porter followed Sir Andrew as the next president of the Royal Society. I had first met him when the British Council had invited me to India to lecture. We sipped tea under a frangipani tree on the lawns of the British High Commission in New Delhi. Sir George was a witty and charming individual and was there to receive the UNESCO Kalinga Prize. I was a guest at the ceremony, and Sir George introduced me to Morarji Desai, the Indian prime minister. Desai always wore traditional Indian garb, never a Western suit. He was urbane and thoughtful, and was telling me of the probability of finding oil under the continental shelf. He also shared his belief in the future of solar power. We joked about a solar-powered means of personal transport, and I told him that the Indians already had one. It was, I said, the bicycle.

At the Royal Society I also took part in meetings about a new body to represent the communication of science to the broader public. The result was COPUS (Committee on the Public Understanding of Science), and Sir George, a consummately successful broadcaster, became its first chairman. When I required an updated microscope, their chief executive, Ronald Keay, took me to their private store and found exactly what I needed. The Royal Society also awarded me grant support during the 1980s and 1990s, which was of crucial importance for my research.

Sir Michael Atiyah, a distinguished Lebanese mathematician, who was brought up in Sudan and Egypt, was the Society's first Arabic president from 1990 to 1995. I found him a gently spoken and thoughtful person, and enjoyed hearing him lecture on the theory of knots. Mathematical theory ordinarily leaves me cold, but Sir Michael's capacity to analyze and then explain was a sheer pleasure.

BUTTING HEADS OVER BSE

Matters changed when Sir Aaron Klug became president in 1995. We ran on a collision course. During



Sir Andrew Huxley (right) and the author are deep in conversation at the annual gathering of biologists held at the home of the late Dame Miriam Rothschild.

that year there were increasing reports about a possible connection between Mad Cow Disease (bovine spongiform encephalopathy, or BSE) and human disease. The government steadfastly repeated denials of any link. But in the spring of 1996, it was finally admitted that the human spongiform disease was, indeed, causally related to BSE. In London, Transworld was publishing my book on the subject, and I included an analysis of the various official publications that were available on the subject. One of the most prominent was a report by the Royal Society, and it was a dreadful document. It had been drawn up under the presidency of Sir Aaron, who was an expert on the prion diseases, of which BSE and its human counterpart were examples. He and I had always enjoyed a cordial relationship, and my damning the Royal Society's report in my book would clearly compromise that.

There was no way out of this. My views were highly critical of the Royal Society's stated position. Their summary was hopelessly confused and inaccurate. In 11 paragraphs there were about as many errors, and I said so. Shortly after the book had been published, I was at a reception at the Linnean Society and found myself with Sir Aaron. It was not an easy encounter for me, though the Royal Society's president took it in good grace and put my fears immediately to rest. Sir Aaron agreed that their report had been hastily produced, and he concurred that parts were poorly expressed. We then went on to discuss what was hap-



Photo by Yasunobu Kobayashi

Professor Shinichi Fukuoka (right) interviews the author in the Society's library in 2009 for a Japanese magazine.

pening in the field of investigation, and he told me of his studies among the cannibals of Papua New Guinea (a country that I was able to visit on my most recent speaking tour). I left the event fully briefed on the current state of research – and a lot less nervous than I'd been two hours earlier. And yes, we have remained on cordial terms ever since.

A LEAP INTO MODERNITY

When Sir Robert May assumed the Royal Society presidency in 2000, there was a seismic shift in the way matters moved. Like Howard Florey, Bob May was Australian. He had been a professor at the universities of Sydney, Princeton, Oxford, and Imperial College, London, finally settling in Oxford University as a fellow of Merton College. He was also made a member of the House of Lords. Bob May trained as a chemist and then did a Ph.D. in physics – but, as is true of so many great minds, he works in fields very different from those he had studied as a student: His most innovative and influential work was in population biology.

I have greatly enjoyed May's company, because he was the first member of the rock 'n' roll generation to head that august organization. His language was colorful. He would describe some adverse trend in biological systems, pause and then say: "The result was a total fuggin' disaster!" and leave half the audience chuckling merrily while the rest looked shell-shocked. May revolutionized the Society. He changed the main lobby to a different entrance, had exhibition areas and

closed-circuit TV installed. The whole place became forward looking and more culturally relevant. He brought about huge changes, and the Society was placed on a far more secure and modern footing by the time he stepped down.

His successor in 2005 was a good friend of mine, the distinguished astronomer Sir Martin Rees. He is yet another scientist who became master of Trinity College, Cambridge. No, he hasn't a trace of biology in his CV and indeed he has issued some very odd statements about life. In a BBC television series that he presented, Sir Martin once showed short sequences of ants, using them as examples as "primitive" forms of life. Primitive? We biologists will quickly tell him that ant society seems certainly more sustainable than ours.

Sir Martin (as many other presidents of the Royal Society) was elevated to the peerage, becoming Lord Rees of Ludlow, and has steered the Society's planned celebrations throughout this year. I have known him since the 1980s, and he is always encouraging. At Cambridge, I am president of the Society for the Application of Research and Lord Martin Rees has come to present a lecture to us there – we hope he will return in a year or two, when he has ended his presidency.

The Royal Society is an open and influential organization, and one that wholeheartedly represents the scientific establishment. If it has any major drawbacks, it is that it has been slow to welcome women. The majority of life sciences undergraduates in Britain are female, but they are still in a small minority in the corridors of power. But it was the Royal Society that gave such help and support to many of the pioneers of microscopy, welcoming the discoveries reported by Antony van Leeuwenhoek, rather than being deterred because he was such an unconventional character. And they cover a range of topics. A recent meeting was on "life in outer space," and I've just received an invitation to speak on early microscopes at their new History of Science Center in October 2010.

People sometimes complain that the media are too preoccupied with anniversaries, and say that we devote too much space to celebrating events solely because of an essentially arbitrary date. This one, though, is worth commemorating. Our era needs as much science as we can get to address the problems of the future, and the Royal Society is a key mover in advancing that aim. For their prominence, their sense of adventure and their unconventional streak, we can all admire what they do.

So, a very happy birthday, Royal Society. And many happy returns.