SOCIETY FOR GENERAL MICROBIOLOGY

Fifty Years On

by

John Postgate

Foreword

To mark the Golden Jubilee, Council asked one of its most distinguished members, Professor John Postgate, to reflect on the last 50 years and to write a brief history of the Society. Fortunately, John Postgate's professional career as a microbiologist runs almost parallel with the life of the Society and, indeed, he has played a major role in shaping its history, having been Editor-in-Chief of the *Journal of General Microbiology* between 1969 and 1974 and President of the Society from 1984 to 1987.

John's talents in conveying the importance and excitement of microbiology to the general public are reflected in the current work which provides a fascinating account of the birth and development of the Society for General Microbiology.

His account reveals how its undoubted success has been dependent upon the foresight of Officers and Council in recognizing the need to adapt to changing scientific, social and political circumstances. At a time when the amalgamation of all but a few Departments of Microbiology into much larger Schools or Departments of Biological Sciences is creating something of an identity crisis for our subject, this publication is timely because, as well as reminding us of our past, it provides a vision of how microbiology should continue to develop in the future.

In particular, we are reminded that "*...real progress, innovation and ultimate enlightenment take place where the traditional disciplines overlap.*" Certainly, the Society was created because its founders wished "*...to bring virologists, agricultural and medical bacteriologists, mycologists, bacterial physiologists, protozoologists and so on together for interdisciplinary discussion and to learn from each other.*" At a time when the UK Forum for Microbiology, encompassing some 22 Societies, has just been established "*...to consult and advise on issues of mutual interest to microbiologists*", this publication is a timely reminder of the aims of our Founding Fathers.

Tony Trinci
President
Society for
General
Microbiology

Acknowledgements

I am grateful to Patricia Clarke, Eddie Dawes, Sidney Elsden, John Freer, Ernest Gale, Stuart Glover, Martin Pollock, Hans Schlegel and Harry Smith for impressions and recollections of the Society's earlier days; to Janet Hurst, Hilary Bower and Doug Watson for guidance, information and help with the Society's documents at Marlborough House, as well as for their own recollections.

My own career as a microbiologist started in 1944, the year in which the the decision to found the Society was taken. The Society has been an integral part of my professional life ever since, and I thank Council for giving me the pleasant task of looking back over its first half century.

Opinions expressed and conclusions drawn herein are, of course, my own.

John Postgate
December, 1994

The Beginnings

The seed of the Society for General Microbiology was sown in the turmoil of the Second World War. By the autumn of 1943 Italy had capitulated, Allied troops were advancing over Southern Europe and victory was in sight. Peace had become a real prospect, and people, scientists included, could relax a little and turn their minds to planning for the post-war world. On September 9, the day that Allied forces landed at Salerno in Italy, the British Society of Agricultural Bacteriologists held its annual meeting at Leeds, and at last found time to discuss seriously a matter which had rumbled on for several years: "the future status and title of the society". Even before the war many members, and some non-member scientists who worked with microbes, had become conscious that Agriculture was a narrow remit for the only British learned society then dedicated to non-medical bacteriology. A broadening of its interests and scope was surely timely, and would promote both academic and practical advance.

Needless to say, no-one demurred in principle, and discussion centred on how best to bring a more diverse range of microbiologists into a single society: should the Society of Agricultural Bacteriologists change its name and expand itself? If so, in what directions? Or should a wholly new Society be formed? In either case, how should societies which already accommodated microbiology, such as the Biochemical Society and the Society of Chemical Industry, be regarded?

A detailed history of the events leading to the foundation of the Society for General Microbiology is not appropriate here. The upshot was that the Leeds meeting set up a sub-Committee of twenty-five microbiologists, representing most areas of the subject, to assess the options. That body met a few weeks later and after a "lively discussion", all of the twenty-two who had been able to attend agreed that a new society should be formed "for the establishment and extension of common ground between all forms of microbiology - a society for general microbiology." More meetings ensued; some 350 scientists working with microbes throughout the country were canvassed during 1944 (only two positively opposed the idea) and a nucleus of 241 Original Members was formed.

Most active in the organisation of the preliminary meetings were Dr L A Allen, a dairy bacteriologist who had become President of the Society of Agricultural Bacteriologists at the Leeds meeting, and Dr R T St John-Brooks of the Lister Institute at Elstree. They had the enthusiastic support of such giants of the subject as medical bacteriologists Sir John Ledingham, Sir Paul Fildes, Ashley Miles and Alexander Fleming; bacterial nutritionist B C J G 'Gabe' Knight; protozoologist Muriel Robertson; industrial microbiologist H J 'Bill' Bunker; soil microbiologist H G Thornton of Rothamsted Experimental Station; virologists C H Andrewes and K M Smith; and, above all, Marjory Stephenson, a prime mover in the Society's foundation and one of Britain's most distinguished bacterial chemists (she it was who, at the "lively discussion", gave the Society its name, after Ledingham had suggested "The Leeuwenhoek Society for the Study of Living Things"). They were a wide-ranging, intellectually powerful constituency, and it is understandable that some in the Society of Agricultural Bacteriologists became anxious: what would become of their friendly, practical and informal community in this new, all-embracing Society? For the founders of the new Society had been insistent that its emphasis should be on the more fundamental aspects of the subject - physiology, variation, nutrition and systematics, for example - and were sternly opposed to any structure which would encourage segregation of specialities. The idea was to bring virologists, agricultural and medical bacteriologists, mycologists, bacterial physiologists, protozoologists and so on together, for inter-disciplinary discussion and to learn from each other; panels or groups reading parochial papers to each other, on viruses or agriculture for example, would be anathema. It was a principle which was reflected in the Society's agreed subtitle: 'Society for the Establishment and Extension of Common Ground between all Forms of Microbiology' (a clumsy mouthful which was happily soon discarded).

The Agricultural Bacteriologists were not re-assured. They could have formed the nucleus of the new Society, but in the event they chose not to do so. Whilst welcoming, and in most cases joining, the new Society, they retained their independence, expanded their remit and became the Society for Applied Bacteriology. There is little doubt that their special social character played as important a part as science in this decision and, despite occasional flirtations with unity over the decades, they have remained independent into the '90s. They still flourish alongside their now substantially larger offshoot.

THE SOCIETY'S FIRST GOVERNING BODY, ELECTED IN FEBRUARY 1945

President:
Sir Alexander Fleming

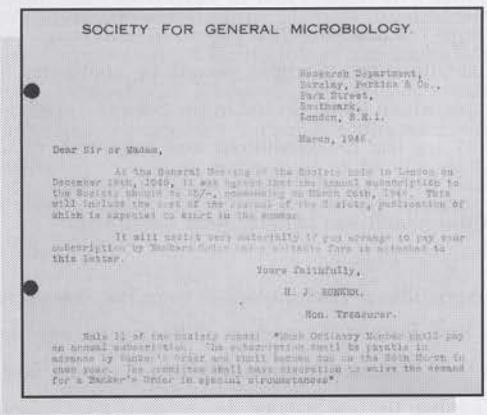
Secretaries:
R T St John Brooks and L A Allen

Treasurer:
H J Bunker

Committee:
C H Andrewes, B T P Barker, A W Downie, H B Hutchinson, B C J G Knight, A T R Mattick, K M Smith, A A Miles, Muriel Robertson, A W Stableforth, Marjory Stephenson.

So the Society for General Microbiology came into being, inaugurated by a gathering of the Original Members at the London School of Hygiene and Tropical Medicine, on 16 February, 1945. The first agendum of that meeting was to elect its officials. Despite finding a certain coyness about taking on high office among a few of the Society's originators, the Organising Committee had persuaded the microbiologists listed in the Box above to accept nomination. They were elected *en bloc*. Sadly, Sir John Ledingham, who had been much involved in setting up the Society and who had been proposed, had recently died; his vacancy remained unfilled among the intended 12 ordinary Committee members. The meeting also approved the Society's rules, covering election procedure, terms of office, qualifications for membership ("any persons who are interested in the study of microbiology") and other conventional details; it also agreed an annual subscription of 1 guinea until such time as paper shortages would ease sufficiently for a journal to be published, when it would rise.

The first scientific meeting of the Society for General Microbiology took place at Cambridge that July.



SOCIETY FOR GENERAL MICROBIOLOGY.

Research Department,
Burroughs Wellcome & Co.,
Park Street,
Southwark,
London, S.E.1.

March, 1946.

Dear Sir or Madam,

At the General Meeting of the Society held in London on December 18th, 1946, it was agreed that the annual subscription to the Society should be £1/-, commencing on March 25th, 1946. This will include the cost of the Journal of the Society, publication of which is expected to start in the summer.

It will assist very materially if you arrange to pay your subscription by Bankers Order and a suitable form is attached to this letter.

Yours faithfully,

H. J. BUNKER,

Hon. Treasurer.

Rule 11 of the Society reads: "Each Ordinary Member shall pay an annual subscription. The subscription shall be payable in advance by Banker's Order and shall become due on the 25th March in each year. The Committee shall have discretion to waive the demand for a Banker's Order in special circumstances".

A Growing Discipline

It must seem strange to the present generation, but at that time, Microbiology as an independent discipline was not widely recognized among scientists in general. There had been a couple of International Congresses of Microbiology before the Second World War (Paris, 1930; London, 1936) and a sparsely attended one in New York as the war began, and they had made a little impact among biologists - but almost none elsewhere. The subject had only one journal, the German *Archiv für Mikrobiologie*, initiated in 1930, and this specialized in micro-organisms associated with plants. Research involving microbes was published in bacteriological journals, of which there were several, and in botanical, biochemical, physiological, medical and even purely chemical journals, too. For bacteria were still formally classified as degenerate plants, the natural province of botanists, alongside the algae (including the so-called 'blue-green algae', now Cyanobacteria), and so were yeasts and micro-fungi; protozoa, being animalcules, were part of general zoology. This situation implied no antipathy to or lack of interest in micro-organisms. It was simply the case that the unifying features of Microbiology were not widely appreciated, so the name 'microbiology' was rare in scientific parlance.

What were, and are, those unifying features? They lie more in the subject's techniques and approaches than in biological relationships among microbes themselves: after all, though the microbes have it in common that they are so small that scientists need microscopes in order to see them, this is hardly the foundation of a new discipline. No, as all microbiologists are aware (if not always overtly), the primary distinctive feature of Microbiology is more subtle. Their small size means that it is difficult, and usually unrewarding, to study the biology of single individuals in the way that has provided the foundation of general Biology. Morphological and anatomical studies, for all their intrinsic importance, do not have the pre-eminence that they have in the biology of higher organisms. Therefore the microbiologist is generally obliged to study large populations, as laboratory cultures, or in animal or plant hosts, or perhaps in natural environments. This approach requires asepsis and the specialised techniques of obtaining, maintaining and containing, pure populations of microbes; it is these features, rather than the biological relationships found in macrobiology, that have determined the equipment, outlook and skills of the microbiologist, and hence the unity of the discipline.

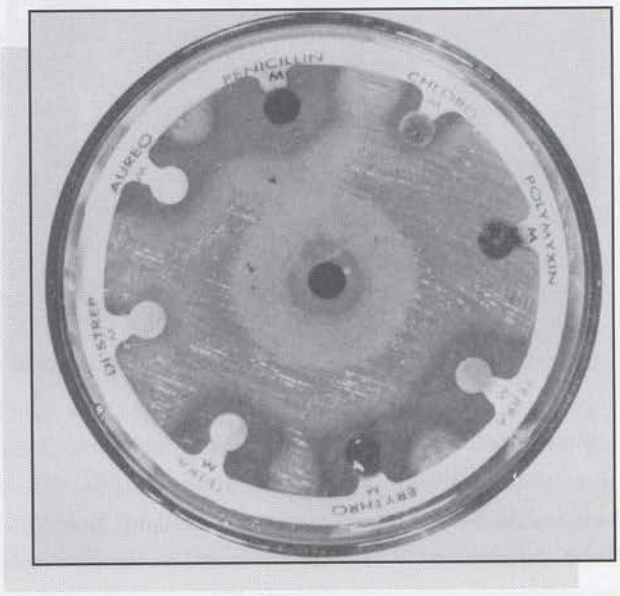
A supplementary distinguishing feature of Microbiology is the way in which chemical transformations brought about by microbial populations so often determine their environmental and/or physiological effects. This is a view of the subject that the founders of the Society certainly held to strongly, so much so that in 1946 and 1948 a group of them held, independently of the Society but with its blessing, two summer schools in microbial chemistry, the first at Cambridge and the second at Oxford. These were deliberate efforts to spread awareness of the primacy of metabolic chemistry in the study of microbes and their behaviour, and they, too, were highly influential in bringing microbiologists from various branches of Biology together. They are still remembered by senior figures in the subject to-day: the lectures, by leaders of research such as Marjory Stephenson, D D Woods, E F Gale, S R Elsden, Sir Paul Fildes and H J Bunker were revelatory to many of those present. However, the older universities had not yet adjusted to hosting conferences and some absurdities arose. After dinner in Balliol at the Oxford summer school, the distinguished Dutch microbiologist Professor K C Winkler, in deep scientific discussion with some lady microbiologists, walked with them to Holywell Manor where they were staying. Invited in to continue the discussion, he was refused

admission, because it was later than 7 p.m., the crucial hour after which males were in no circumstances admitted, Holywell Manor being then part of St. Hugh's, a college for women. The College Porter was adamant; the ladies were justly furious; happily Winkler was amused rather than affronted.

The Microbiological Scene

What did the subject of Microbiology in Britain look like in the mid 1940s? Obviously very much less was known than is known to-day, because microbiology has grown and flourished tremendously in subsequent decades. For one thing, the subject of bacterial genetics barely existed in 1945. Bacterial variation and the acquirement of resistance to inhibitors were topics of intense interest and research - burning questions of the day, so to speak. In higher organisms the reality of genes as determinants of both phenotypic stability and phenotypic change was no longer seriously doubted, and in the mould *Neurospora* classical genetic mutations which gave rise to biochemical lesions were proving extremely rewarding, permitting the first systematic approach to elucidating biosynthetic pathways. But as far as bacteria were concerned there was still little if any evidence that they possessed genes, and a substantial body of opinion existed, headed by the famous chemist C N (later Sir Cyril) Hinshelwood, which maintained that they had none: that bacterial variation could be simply and elegantly explained in terms of wholly phenotypic responses to environmental change based on ordinary, if somewhat sophisticated, chemical kinetics - a kind of up-dated Lamarkism. The fact that genes are composed of DNA, which we now take for granted, was still a speculation - and anyway, there was at that time no compelling reason to believe that bacteria possessed either nuclei or DNA at all. There were straws in the wind: in 1944 Avery, MacLeod and McCarty extended Griffith's demonstration of 1928 that the morphology and serological behaviour of pneumococci could be altered with cell extracts, and showed that the 'transforming principle' consisted predominantly of DNA. This work was the beginning of the deliberate genetic transformation of bacteria, and in 1944-5 came reports from Tatum's laboratory of true biochemical mutants of bacteria, the now famous *E. coli* strain K12. But bacterial genetics was still only a gleam in the eyes of an advanced few.

On the other hand, microbial nutrition was a flourishing research area, having led to a new understanding of the role of microbes in animal, particularly ruminant, nutrition and also to the discovery of new vitamins of universal importance such as pyridoxal and pantothenic acid. Through the use of organisms which absolutely required exogenous sources of such substances, microbes provided a powerful means of microbiological assay for most of the known vitamins. Pathways of carbohydrate and amino-acid catabolism in bacteria were being sorted out in the wake of the establishment of the tricarboxylic acid cycle in higher organisms, and interest was turning to assimilatory pathways; Tatum and Beadle's use of syntrophic biochemical mutants of *Neurospora* had provided one approach; enzymic assays of the internal pools in bacterial cells were just coming into use, too. The discovery by D D Woods and Sir Paul Fildes in the early 1940s that sulphonamides exerted their anti-bacterial action by competing with a micronutrient, *p*-amino-benzoic acid, had led to the synthesis and testing of numerous structural analogues of vitamins. Pharmaceutically this was a relatively unsuccessful endeavour, though it fortuitously yielded some useful anti-malarials, but in compensation the triumph of Chain, Heatley and Florey with penicillin had provoked



An antibiotic assay plate

frantic screening programmes throughout the industry, and new antibiotics began to appear regularly. On other tacks, a basis for the biochemistry of pathogenicity was being laid with the purification and study of bacterial toxins; the more forward-looking were already worrying about the structure, multiplication and management of viruses. Electron microscopy, still a crude art albeit over a decade old, suggested that viruses had symmetries and that bacteria, far from being just bags of enzymes, were structurally complex. Both views were correct, we now know, but the sceptical worried about experimental artifacts and suspended judgement.

Much of this information derived from medical research in Pathology and Bacteriology, from aspects of Biochemistry, Genetics and Organic Chemistry. As its component specialisms converged, the new and exciting discipline of Microbiology seemed to leap into being.

The First Decade

The scene was set for dramatic progress, and the later 1940s and early 1950s were indeed a period of impressive advance in microbiological knowledge. As so often, it was advances in methodology which propelled research. For a couple of decades chromatography had been a clumsy if sometimes invaluable tool of preparative organic chemistry; now partition chromatography arrived, followed closely by paper chromatography, providing quick, easy and versatile means of qualitative and semi-quantitative analysis. Soon ion-exchange chromatography was developed, revolutionizing preparative biochemistry. For the microbial physiologist and biochemist, many laborious and sometimes blunderbuss preparative and analytical methods, using enzymes, microbes

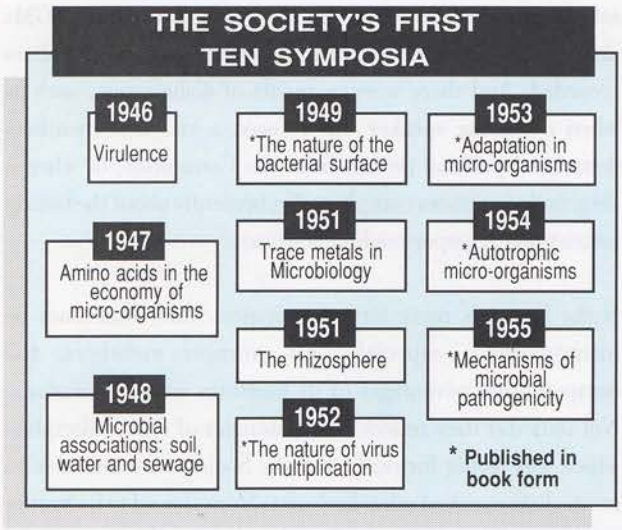
A S Knolles, K R Butlin and the author looking at a Warburg apparatus.

or chemicals, became obsolete almost overnight. Even the Warburg manometer, which had dominated biochemical and physiological research since the early 1930s, went slowly into terminal decline. Again, as a fall-out of wartime atomic research, radio-isotopes became widely available and easy to handle: tracer experiments, no longer confined to specialists who worked near a nuclear reactor, confirmed, or amended, known metabolic pathways and resolved new ones rapidly. As the 1940s ended, the metabolic map of a generalized cell which decorated many a laboratory wall had become too complicated to remember (by the mid 1950s it had become a booklet). Meanwhile biochemicals of reasonable purity began to be available commercially (though at first the wise did their own purity checks, and then recrystallised resignedly...). Electronic colorimeters began to replace Lovibond's tinted colour standards, and turbidity standards on the 'Brown Scale' gave way to turbidimeters. True, the battle for a safe and decent laboratory centrifuge was yet to be won - a positively lethal, hand-operated, geared-up device which smashed every third tube was still widely used, and electric bench centrifuges tended to walk about dangerously at high speeds; only a couple of ultra-centrifuges were available in the whole of Britain. But things were undoubtedly looking up in the research laboratories. Happily for scientific progress, no Health and Safety Authority had even been thought of: the hazards that researchers faced daily, and survived almost without exception, would have driven to-day's Biological Safety Officers to distraction.

Meetings

The subject raced ahead. The membership of the Society grew from its foundation 241 to over 1400 in 1955. Twice a year, generally in Spring and Autumn and often in London, it held scientific meetings which provided for the presentation of short, un-refereed papers and demonstrations. (The latter have long died out, except in the sense that commercial enterprises are enabled to display their wares at most meetings.) The gatherings would last for two days, and there would be a single programme without simultaneous sessions.

Arguably one of the most valuable functions of the Society at this time was to hold its annual Easter symposium. Its Committee chose topics that were determinedly general and which also reflected the major directions of current scientific advance. Once a topic was selected, contributions were sought from as diverse a range of microbiologists as possible: not only from the then dominant bacteriologists and virologists, but also from mycologists, algologists and protozoologists. In 1949 the Committee decided to publish these symposia, and a very important part of their plans was that the contributors provide written scripts in time for their contents to be available to membership *before* the actual meeting. This obligation had two objectives. Firstly, those unfamiliar with aspects of the topic could read the material in advance and if necessary bone up on it; secondly, the contributor's oral presentation could be a commentary on, and up-dating of, the written text. An early, somewhat idealistic, procedure was to circulate the written scripts as page proofs, so that revisions and discussion could be included in the published version; it was tried with the 1953 and 1954 symposia, but it foundered because participants made notes on their proofs and did not buy the book. In later years the scripts were made available as the final book. Occasionally a laggard contributor or lax Editor would undermine the Society's plan by missing deadlines, preventing the book from being printed in time. This would be a sad and embarrassing situation for the Society, and the quality of the actual meeting would suffer as speakers perforce altered their planned commentaries at short notice, an especially burdensome problem for contributors from abroad. But when all went according to plan the meetings were informative, up-to-date and constructive. The annual symposia did exactly what the founders of the Society had wished: they fostered the unity of microbiologists in Britain and hence the coherence of Microbiology as a



discipline. And, as an unexpected bonus, the published series of symposium books rapidly achieved a high reputation for scholarship and cogency in Microbiology departments and libraries throughout the world - this was true even of those which had been printed too late for the actual meeting.

For actual meetings, speakers were instructed to leave plenty of time for discussion and, in addition, Chairmen were enjoined to be severe with loquacious contributors. So there was usually a reasonable amount of discussion, which was sometimes vigorous and controversial. For example, the quality of the material presented at the 1949 meeting (the first to be published, see the adjoining box) went a long way to allay the misgivings mentioned earlier about the value of electron microscopy, since its conclusions were supported by physiological evidence for an osmotic barrier in bacteria. Yet at the same meeting A J Piper could still argue fervently that bacterial flagella played no part in motility.

The 1952 symposium was interesting for two reasons. It was scientifically important as representing a stage in the development of the subject; it was also politically memorable because the US authorities, then much influenced by Senator McCarthy's Committee on Un-American Activities, took away the passport of one of the principal scheduled speakers, the distinguished bacterial virologist S E Luria. It fell to a scruffy-looking young American post-doc then visiting Cambridge to deputise as best he could; here is his account of the matter:

"One of the main speakers was to have been Luria. Two weeks before his scheduled flight to London, he was notified that he would not get a passport....

"Luria's absence thrust upon me the job of describing the recent experiments of the American phage workers. There was no need to put together a speech. Several days before the meeting, Al Hershey had sent me a long letter from Cold Spring Harbor summarizing the recently completed experiments by which he and Martha Chase established that a key feature of the infection of a bacterium by a phage was the injection of the viral DNA into the host bacterium. Most important, very little protein entered the bacterium. Their experiment was thus a powerful new proof that DNA is the primary genetic material.

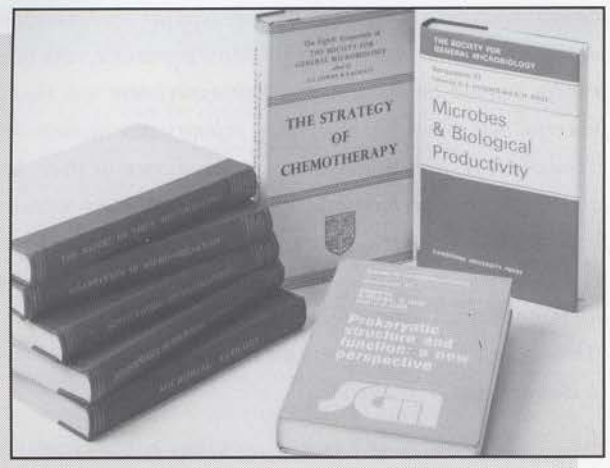
"Nonetheless, almost no-one in the audience of over 400 microbiologists seemed interested as I read long sections from Hershey's letter.... Moreover, when it came out that I was an American, my uncut hair provided no assurance that my scientific judgement was not equally bizarre.

"Dominating the meeting were the English plant virologists F. C. Bawden and N. W. Pirie...."

Those are the words of J D Watson in *The Double Helix*. In fairness to his audience one must add that his diction (head down, reading passages from a letter in not the easiest of mid-West accents), and the hall's poor acoustics, had much to do with his lack of audience response; but even in 1952, scepticism about the genetic role of DNA was still widespread. I was fortunate enough to spend part of that evening with Watson, R Y Stanier and several other scientists discovering what Watson had been talking about. The impact of that meeting among British microbiologists was actually considerable.

The 1953 symposium was also epoch-making in its day, and the book of the meeting was the first volume to sell out within months. An introduction by R Y Stanier set the scene for contributions from C N Hinshelwood (the subject's neo-Lamarkian) and bacterial Darwinians such as J Monod from Paris and S Spiegelman of Illinois. It was a clash, albeit gentlemanly, of Titans, with Hinshelwood defending his corner brilliantly but ultimately ineffectively: regulation at the genetic level was superseding the Law of Mass Action as far as bacterial adaptation was concerned. In contrast to those courteous exchanges, at the 1956 symposium (the sixth to be published) the audience was startled by the vehemence of an attack by C F Robinow on E D DeLamater's cytological evidence for a bacterial chromosome. But not all the decade's symposia were quite so action-packed. The 1954 symposium occupied a Friday and a Saturday and I was privileged to give the final contribution. I found myself addressing an audience that had dwindled from some 250 to about seventeen: mostly my own colleagues and a few Committee members. It became apparent that the British weekend break was of greater moment to members than the economic importance of autotrophs; symposia were planned for weekdays thereafter.

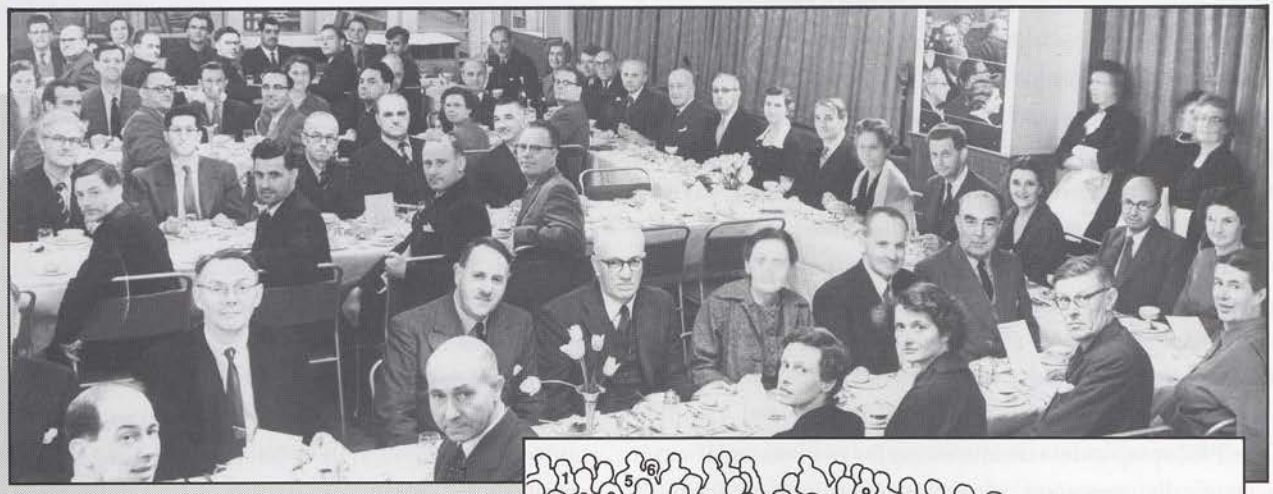
Later symposia dealt with topics such as microbial ecology, microbial genetics, microbial classification, symbiotic associations, pathogenicity; they tracked the growth areas of Microbiology. In response to demand from the Society's growing membership, the number of meetings per year was increased to three in 1963, when January meetings were initiated.



The paper-reading sessions were the nitty-gritty of the Society's activities and, because the abstracts were published rapidly, they were a quick and painless route for preliminary publication of important work. If the meeting included a symposium, the Committee would encourage members to submit papers having some relevance to the symposium topic, but this was not obligatory: anything that its presenter thought the assembled microbiologists would wish to be told about was assigned a slot in the proceedings. A slot would mean ten minutes for the oral presentation, plus an extra five for discussion; a salutary exercise in brisk and concise communication. Regrettably a few members were prone to loquacity: despite alarm clocks, coloured lights which lit up as the minutes ticked away, and the best efforts of formidable Chairmen such as B C J G Knight, contributions which over-ran their time were far from rare.

One other formal event was, indeed still is, the Annual General Meeting, with an Agenda of reports from the Committee on finance, meetings, journal etc., scrupulously circulated beforehand. To-day it is sparsely attended by the membership, a sign that the Society is being run in a generally satisfactory manner, but in the early years the AGMs attracted much interest, with attendances of 250 members recorded. And there were moments of disharmony, such as when a visiting speaker was refused a visa and members demanded political protest from the Committee, or when a disgruntled member complained vehemently about the timing restrictions at paper-reading sessions.

If the Society's more formal activities could sometimes be intimidating, especially for younger members, the compensating advantages of its meetings were tremendous. Not only did they reflect the excitement of a new discipline which was racing forwards, but the Society soon felt able to invite distinguished microbiologists from abroad to its Spring meetings. These were still quite small affairs, and the opportunity to meet and talk casually with these leaders of the subject, and their British equivalents, was invaluable to both old and young members: informality was a feature of coffee breaks and meal times, and extended to the Society dinners. One of these would occupy an evening at each meeting, and would be held in a relaxing environment, in university dining rooms or sometimes at the London Zoo's restaurant; dress



SOCIETY DINNER 1957

1. *Vic Knivett*
2. *Maurice Ingram*
3. *Harry Smith*
4. *Michael Stoker*
5. *Peter Mitchell*
6. *Peter Hobson*
7. *Donald Woods*
8. *J G Davies*
9. *Bill Bunker*
10. *Brian Lacey*
11. *Paul Fildes*
12. *Marjorie MacFarlane*
13. *Ashley Miles*
14. *Ken Cooper*
15. *André Lwoff*
16. *Reg Lovell*
17. *Ernest Gale*
18. *K C Winkler*
19. *Sir Graham Wilson*
20. *Elizabeth Rowett*
21. *Arthur Standfast*
22. *Jane Meiklejohn*

was casual and there was no grace; there would be a loyal toast, but the rule was that there would be no formal after-dinner speeches. In practice, that rule was not followed literally because, in the first place, the President rightly felt called upon to say a few words of thanks to those who had organised the day-to-day aspects of the meeting, and in the second place, H J Bunker (an Original Member) had a remarkable fund of jokes which he would tell with engaging modesty. So a kind of counter-tradition developed whereby the President, after duly conveying his thanks, would remind the Society of the 'no speeches' rule and then invite Bunker to tell a few stories - these being a 'non-speech'. It was a very popular custom, which began around 1950 and persisted for many years.

The Learned Journals

When the Society was founded in 1945-6, its founders knew well that there was a considerable backlog of British research which, because of the Second World War, was as yet unpublished. A proportion of this dealt with microbes, and they realised that a new journal dedicated to general Microbiology would provide a timely outlet for such research. Also, by bringing papers on fundamental Microbiology under one umbrella, it would promote their objective of bringing microbiologists together into a broad scientific community. A A (later Sir Ashley) Miles and B C J G Knight were appointed Editors and, wartime paper shortages having eased, Volume 1, Part 1 of the *Journal of General Microbiology* appeared in January of 1947, printed by the Cambridge University Press.

It was an immediate success. Microbiologists from all over the world provided an ever-increasing flow of manuscripts and the *Journal* rapidly acquired a formidable international reputation for publishing high quality fundamental research: in 1950 the Editors could announce to the Society's Committee, "We have established a considerable sale already in the States in the absence of an agency..." (This in response to a request from the Press's US office for an agency fee.)

In 1951 Miles retired from the editorship and was replaced by A F B Standfast. Knight and Standfast remained in charge of the *Journal* for almost two more decades, retiring in 1970. As the years progressed, they co-opted an Editorial Board to assist with the handling of manuscripts: choosing and approaching referees and, in some degree, actual editing. Collation and dealing with the Press were handled by Standfast and his indefatigable secretary, Linda Peerless.

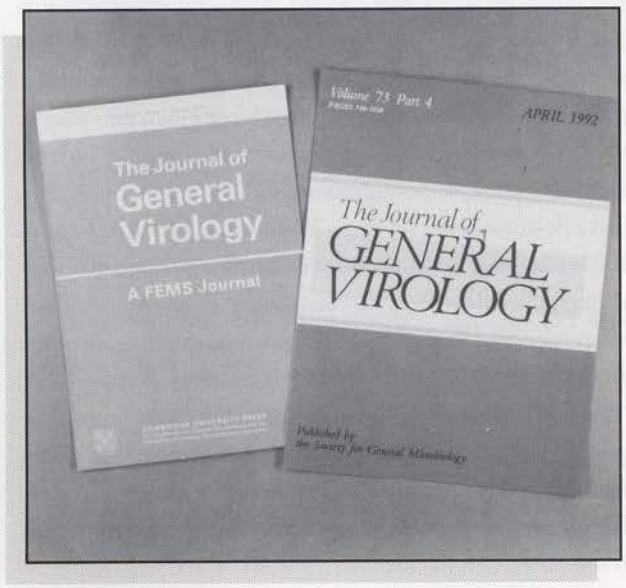
The task of an Editor of a quality scientific journal can be a thankless one. The Editors of the *Journal* had adopted 'peer review', but referees were anonymous, except when a referee might break convention and make direct contact with the authors - the Editors had no objection to that. It therefore normally fell to one of the Editors to communicate criticisms or rejections to the authors. It is a human failing to be unduly sensitive about one's writing style, as with one's driving, and the Editors' green inkings could seem capricious, arbitrary and sometimes downright mistaken, even though the Editors fell over backwards to ensure that wholly stylistic corrections were not made: only those which enhanced clarity or conciseness were permitted. Their activities were occasionally resented: at least one distinguished microbiologist, having published a few times in the Society's journal, decided that he could brook no more interference with his writing and never submitted a paper again. Happily, however, the majority accepted, and some actually welcomed, the editoriate's efforts. To continue the motoring simile, just as motorists hate traffic wardens but accept that they need them, so most scientists dislike both editings and the peer review process, but agree that there is no substitute. Without them the scientific literature would be cluttered up with confused writing and even rubbish.

For the first twenty-five years of the *Journal's* existence, and in fact for much longer than that, well over half of the manuscripts submitted would be returned for revision of the "presentation", which usually meant conversion into plain English. For example, some authors, forgetting that a proportion of the *Journal's* readership read and understood English only with difficulty, would introduce jargon or parochialisms. Or authors would, in the nineteenth-century manner, write a chronological account of their doings, including the hiccups and back-trackings that are normal in research: however fascinating - or exasperating - they may be to the researcher, they are of limited scientific interest, especially with a plethora of manuscripts jostling for publication and a post-war paper shortage. Manuscripts had to be be brief, impersonal and strictly to the point. But perhaps the most common problem was - and clearly still is - verbosity. There are certain 'red flag' phrases which tell an experienced editor at once that a manuscript will need what Knight called 'drainage'. A list would be tedious, but here is just one example. A scientist might write that he/she did something for "a period of 5 minutes". The phrase "a period of" is a red flag: it can be removed without affecting the sense at all. It is one of numerous decorative phrases which trip lightly off the pen and add nothing whatever. And in scientific writing they matter, partly because they cost money in setting type and consuming paper, but more because they distract the reader from the main sense of whatever has been written.

Of course, a manuscript which had come through refereeing and editing and was ready for publication was only half way there. Edited manuscripts had to be allowed to accumulate

until there were sufficient to make up a part of the *Journal*, be arranged in order, and then be sent to the Press. There they would be set in type laboriously and go through galley and then page proof stages before being bound (individually by hand) and sent out. Around 1965 the minimum publication delay was six months, and hazards such as bad writing, laggard refereeing, delays at the Press, or simple bad luck, could extend the delay to well over a year. Moreover, after its first ten years, as the number of parts per volume increased, the actual publication date of the *Journal of General Microbiology* began to slip: an issue dated May would actually be sent out in June. Such slippage could be of serious concern to authors when priority of publication was involved.

In 1962-5 some 15% of papers submitted to the *Journal* were virological, and late in 1965 a group of virologists within the Society called the Virus Club (more about such groups in a later section) felt that there was a need for a specialised outlet in their subject area. Council set up a sub-Committee to look into the matter and in due course agreed that the *Journal of General Microbiology* should bud off a sister organ, the *Journal of General Virology*. Its first issue appeared in 1967, edited by C Kaplan and P Wildy, and the virologists' arguments were vindicated by an immediate doubling in the number of virological submissions. Two years later the submission rate had risen by over four-fold and gradually this journal, too, became a financial and academic success.



The successes of the two journals were not only a matter of scientific reputation: the financial side was crucial to the Society, for the subscriptions paid by the Society's members never covered anything like the economic cost of producing and circulating the journals. In earlier days these costs were indirectly subsidised by the Editors' employers; later they were subsidised by library subscriptions. And gradually income earned by the Journals, in particular by the *Journal of General Microbiology* because of its wide coverage and seniority, became a major source of finance for the Society - more about that in a later section, too.

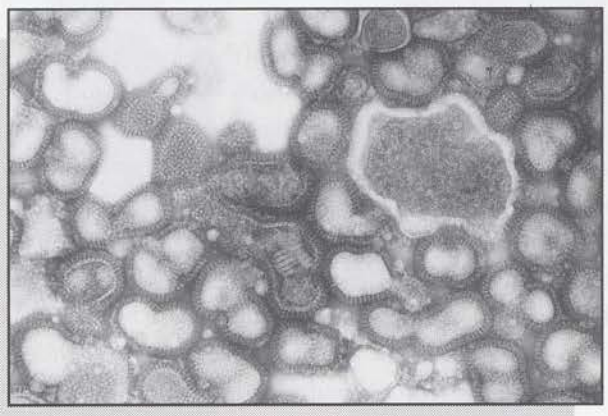
The profitability of publishing research papers did not escape the attention of commercial publishing houses, and in the late 1950s and the 1960s several commercial journals were established, publishing papers (often more rapidly and sometimes less carefully edited) in newer areas of Microbiology such as Biotechnology, Microbial Genetics and Molecular Biology as well as in general Microbiology and Virology. After initial alarm, the Editors of both Society journals discovered that this development was having no perceptible effect on their ever-increasing flood of manuscripts, and was perhaps relieving them of what might have been a catastrophic incidence of submissions.

Into the Golden Age

The three decades following 1945 were a golden era for scientific research, in Britain as in most of the developed world. With radar, penicillin, infra-red sensing, atomic energy and so on, wartime experience had demonstrated the practical value of scientific research repeatedly, both in battle and at home. And the public and its politicians had learned the lesson that such goodies do not come without a substantial investment in fundamental science. As prosperity returned to war-racked Britain, science and its applications seemed set fair to underpin Mankind's march towards an era of peace, plenty and freedom for all, towards a world in which war, persecution and deprivation would be but nasty footnotes to history. As the third quarter of the twentieth century progressed, living standards throughout the world improved, to differing extents in different parts of the world certainly, but in ways which were obviously generated by advances in science and technology. Investment in research was seen to be substantially justified, so financial support for research had high priority. To quote a British Prime Minister of the era, "the white heat of the scientific revolution" (Harold Wilson, October 1963) would be Britain's salvation in the new and competitive world then emerging.

Microbiology benefited as much as any other science in the golden era. Schools and Departments of Microbiology were set up in Universities and Polytechnics, microbiologically-orientated Departments appeared in Research Institutes and in many industrial laboratories. (It was a typically British quirk that the primary remit of the only Government Establishment wholly dedicated to Microbiology was research on biological warfare.)

Microbiological knowledge advanced over a very broad front. Perhaps the most obvious change was the growth of microbial genetics. Aided by the world-wide adoption of *Escherichia coli* as the work-horse of bacterial biochemistry, genetics spread throughout the subject. Gene transfer by transformation, transduction or conjugation became laboratory routine, new plasmids were regularly discovered, and an ever-increasing repertory of *E. coli* mutants began to accumulate, proving useful for physiological and biochemical as well as genetical studies; the genetic code was cracked; the structure of the *E. coli* genome was gradually revealed, with its circular chromosome, its gene clusters (operons) and elegant regulatory processes, the latter work spearheaded by the elucidation of *lac*. The plastic Petri dish and replica pad became the *sine qua non* of much microbiological research, and recognition of the central roles of DNA and RNA in biosyntheses enhanced interest in such details as protein synthesis, DNA synthesis and ribosome function. The spin-off into virology was especially fruitful when the central role of nucleic acids in virus structure was established: the variety of nucleic acid structures found in viruses added significantly to the corpus of nucleic acid chemistry - DNA circles, terminal base repetition *etc.* - and the details of retrovirus nucleic acids would prove invaluable when human immuno-deficiency virus came to the fore. The famous experiment of Hershey and Chase reported by Watson provided a unique insight into the mode of infection of a bacterium by a bacteriophage and offered a model for other kinds of virus infection. But in contrast, the study of spongiform encephalopathies such as scrapie, with its suggestion of an infective protein, and the concomitant 'prion hypothesis', seemed to conflict with Watson and Crick's central dogma on the role of DNA and generated vigorous controversy at virology meetings.



Transmission Electronmicrograph of Influenza virus (X 200,000)

Antibiotics had aided the purification of virus populations, and tissue culture technology facilitated their cultivation; increasingly progress depended on the exploitation of ever more complex technologies - for example, X-ray crystallography of poliovirus left the supposed artifacts of electron microscopy far behind and revealed sites potentially amenable to chemotherapeutic attack.

The explosion of *E. coli* genetics in the 1950s and '60s was indeed spectacular and dominated the microbiological scene. But to some microbiologists this preoccupation with *E. coli* seemed obsessive: how representative of bacterial life in general was this specialised intestinal parasite? To this question bacterial geneticists paid little or no attention, for *E. coli* was rapidly becoming the best-understood living thing in the whole of Biology, and that sufficiently justified their dedication. Nevertheless, the rest of the microbial world continued to preoccupy a great number of microbiologists; even a superficial survey of progress during that period would require an extensive review, but a few subjective highlights may be indicated, with apologies to almost every microbiologist of the older generation for having neglected their 'pet break-through.

Prompted, perhaps, by the excellent facilities available at the government's Microbiological Research Establishment at Porton Down (whose biological warfare remit went largely into remission, so to speak, for much of the 1950s and early 1960s), studies on infection and pathogenicity, and the concomitant specificity of infectious disease, developed apace, ramifying elsewhere into plant pathology, veterinary virology and mycology. The "Unity of Biochemistry", a principle enunciated especially by A J Kluyver and C B van Niel of the Delft school of microbiologists, had become widely accepted, and the special biochemistries that more exotic types of microbes had grafted on to our communal cell physiology excited widespread interest: the divergences demonstrable in organisms such as thermophiles, halophiles and psychrophiles came under productive scrutiny, spurred partly by their importance in food production. The comparative biochemistry of photosynthesis in coloured bacteria, oxygenic plant-type photosynthesis, and the chemosyntheses conducted by sulphur and nitrifying bacteria gave new insights into the nature of autotrophy; means of culturing exacting anaerobes such as sulphate-reducing and methanogenic bacteria became available and the discovery of cytochromes in anaerobic oxidative processes such as sulphate and nitrate reduction led to the fruitful concept of anaerobic respiration. The means whereby inorganic nutrients such as sulphate, elemental nitrogen and iron salts are assimilated were gradually clarified, leading to the discovery of ATP-activated assimilatory processes, and the secretion of powerful natural chelating agents. The pioneering work of E F Gale and his colleagues had demonstrated the reality of 'pools' of metabolites within bacteria, separated and protected from the external environment; seemingly crude experiments on the cell volume and permeability of bacteria led, in the hands of P D Mitchell, to chemiosmotic theory, once controversial but soon seen to be one of the most productive insights into bacterial physiology. Rediscovery of continuous culture, a

technology which had actually been reported in the 1920s, revolutionised microbial physiology by enabling researchers to avoid the uncontrollable physiological status of batch-cultured populations. Numerical taxonomy offered the beginnings of a rational bacterial systematics, and comparative biochemistry provoked the incorporation of Actinomycetes and 'blue-green algae' into the bacteria - by then distinguished from other living things by the name 'prokaryotes'.

Microbial ecology began to crystallise as an important sub-discipline, and new subdivisions such as food and oil microbiology appeared. 'Biochemical engineering', which in practice dealt almost exclusively with microbes, laid one of the foundations of what later became Biotechnology; and, of course, traditional medical, public health and agricultural microbiology continued to flourish and advance. In Industry, too, the importance of microbiology was increasingly recognised, both for production and for monitoring, and industrial laboratories became important contributors to scientific advance. Only the study of deterioration, corrosion, disposal and other matters concerned with public good rather than with profit, remained something of a research backwater.

The Groups

An ironic consequence of this intellectual turmoil was that the Society had to face a possibility that its founders had been at pains to guard against. The idea of a society for *general* Microbiology had arisen because the subject was fragmented: dispersed among Pathology, Bacteriology, Botany, Biochemistry and Zoology. But after a decade or so of consolidation, the post-war surge of research began to generate centrifugal tendencies among the membership. Thus virologists, while recognising the value of broadly-based meetings, also wanted opportunities to talk about Virology in technical detail, using parochialisms and jargon, swapping ideas and discussing loose ends, without having to make allowances for non-virologists in the audience. Similarly, taxonomists wished to delve into the subtleties of quantitative and systematic biological relationships to extents which no general audience would tolerate; microbial geneticists, too, were generating a parochial language which easily bewildered those not deeply involved. The Society's emphasis on generality and a broad appeal had been a marvellous thing as far as uniting and educating microbiologists was concerned, and it was widely admired and welcomed. But here and there murmurings began to the effect that the time had come to encourage more specialised meetings, which would be more productive of research and ideas: perhaps more fruitful in furthering the fundamentals of the science.

Older arguments remained compelling: there are few areas of microbiology that do not have a bearing on other areas; over-specialisation can be as counter-productive as over-generalisation. Yet to ignore the mounting pressure for specialist gatherings risked having disgruntled specialists form break-away societies. Anxious discussion about 'sectional interests' appear in the Committee's minutes as early as 1955 and a memorandum on the matter was prepared by E F Gale and K E Cooper in that year. Compromise was called for. The Society's virologists were the most vociferous and the Committee was soon persuaded to sanction the Virus Club (which I mentioned earlier) to meet before or after the Society's main meeting. It met formally for the first time in 1959 and no catastrophes followed; indeed, the Virus Club was regarded as a success, and appeared in no way to interfere with the Society's main proceedings. Meanwhile, the taxonomists within the Society had convinced the Committee that their specialism deserved comparable status, and in 1960 the first Group, the Microbial Systematics Group, was formed within the the Society.

A little belatedly, a formal structure for such Groups based on Gale and Cooper's memorandum, devised by virologists A W Downie and C H (later Sir Christopher) Andrewes, was approved by the Committee in 1961. In 1962, the Virus Club was up-graded to a Group. An Electron Microscopists Group, proposed in 1960, did not come to fruition, and the Microbiological Teaching Group came next, in 1964. By the mid 1960s the the evolution of the Society's now familiar Group structure had begun.

The Society's Structure

The structure and administration of the Society had perforce responded to the needs and wishes of an ever-increasing membership with ever-broadening interests. The Committee had been the Society's sole administrative structure for several years following the Society's foundation. It had two tiers, comprising twelve Elected Members - elected by the Society's membership - plus six Officers (the President, the Treasurer, the Meetings Secretary, the General Secretary and the two Editors of the *Journal of General Microbiology* (then the Society's only journal) who were chosen by the Elected Members. The Officers had usually had experience as Elected Members. As well as planning meetings and arranging speakers, the Officers voluntarily carried out all the more mundane tasks of running a learned society, such as keeping membership and financial records, collecting subscriptions, paying bills and so on. The *Journal* was edited on a similar voluntary basis. The luckier Officers used such secretarial assistance as their departments or places of employment would make available.

Presidents of the Society

1945

Sir Alexander Fleming

1947

Marjory Stephenson

1949

J W Mcleod

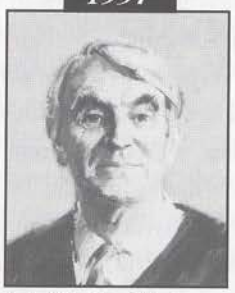
1952

H J Bunker

1955

C H (later Sir Christopher) Andrewes

1957



A A (later Sir Ashley) Miles

1959

F C (later Sir Frederick) Bawden

1961

R Lovell

1963

D W Henderson

1965

P W Brian

1967

E F Gale

1969

S R Elsden

1972

D G (later Sir David) Evans

1975

H Smith

1978

P Wildy

1981

R Whittenbury

1984

J R Postgate

1987

D C Burke

1990

J R Quayle

Running a learned society, especially a new one, takes a lot of work. In addition to discussing, planning and approving scientific meetings, advised but by no means dictated to by the Meetings Secretary, the early Committees had to work out the limits of the Society's remit from scratch. Problems generated by invited speakers being refused visas in the 1950s raised the question of how far a learned society such as the Society should tangle with politics and international affairs - more of such matters later. There was feedback from the Society's Annual General Meeting to be dealt with; there were new applications for membership to be scrutinised; on one occasion in the 1950s the expulsion had to be agreed of a member who had refused to pay his subscription for two years (on the grounds that Chairmen consistently cut short his paper presentations); sometimes a newly proposed Honorary Member would need consideration; retirements from and elections to the Committee had to be dealt with annually, and Officers changed periodically. Every two years the Committee held a secret ballot to choose a new President, who would be alternately a virologist and a bacteriologist (this traditional sequence lapsed in the 1980s); the President's term of office was extended to three years in 1969. Gradually precedents and procedures became established, co-ordinated by the General Secretary.

A question which the Committee did not wholly resolve concerned refresher courses in microbiology. In the mid 1950s many members still recalled the seminal unofficial summer schools of the late 1940s. In 1955 some members proposed that the Society hold comparable summer schools periodically. But was teaching refresher courses a legitimate part of a Learned Society's activities? A large majority of the members proved to be in favour, but the then Committee was divided: most were in favour, but a few dissenting voices took B C J G Knight's view that "teaching is no part of the Society's function". The project was explored and argued for some 18 months and eventually agreed to - but then it had to be abandoned for the very practical reason that those in a position to run such courses were far too heavily engaged in running their generally new departments to take on anything more.

The Committee's business, and concomitant paperwork, grew and grew. Even in the mid 1950s the heap of records and files which Officers had to pass on to their successors when they retired had mounted steadily. The major administrative burden fell on the joint Secretaries (whose responsibilities had divided at once into a Meetings Secretary and a General Secretary) and on the *Journal* Editors. As early as 1953-54 the then Treasurer, R Lovell, took a small step towards professional support staff: he arranged with the Institute of Biology that the Society should 'rent' clerical help for the two Secretaries from its administration. Thus the Society came to establish a small London office at the Institute's headquarters, an arrangement that worked satisfactorily for over a dozen years until, by 1967, the Institute was suffering from space shortage for its own activities. A new arrangement was come to with the Biochemical Society, which had its own premises in London, into which the clerical administrative staff moved (by then numbering three, and still employees of the Institute).

The Society's structure became gradually more complex. Once the Committee had agreed to the formation of the Virus and Microbial Systematics Groups, committees were needed within those Groups. And transient sub-committees to deal with specific issues were also needed periodically. To avoid both administrative and semantic confusion the Committee quietly re-named itself the Council, its present designation, in July of 1962. In 1963 A F B Standfast complained that Council was spending too much time on minutiae which ought to be delegated, a complaint which initiated a streamlining of its business procedure. The most significant consequence was that a meeting of its Officers to systematise the Agenda would take place before each of the year's six Council meetings.

The Named Lectures

Marjory Stephenson died in 1949, an active member until her last days. The Committee felt that some commemoration of so distinguished a pioneer of both the Society and Microbial Biochemistry was called for. Thus the first of the Society's named lectures came into being: money was raised by soliciting subscriptions and by 1953 sufficient had accumulated to finance a Marjory Stephenson Memorial Lecture, which would be given every second year at the Society's Spring meeting, on a subject to be drawn from any aspect of general Microbiology. In that year the first of the series was given by her one-time pupil, D D Woods. Re-named the **Marjory Stephenson Prize Lecture** in 1986, it remains the Society's senior lecture; the list of past Marjory Stephenson lecturers in the Society's current address book resembles a roll-call of outstanding microbiologists covering several decades.

Marjory Stephenson

Fred Griffith

The second named lecture, originally the Fred Griffith Memorial Lecture but renamed **Fred Griffith Review Lecture** in 1986, was named for the discoverer of transformation in pneumococci. It was established by way of a subscription fund initiated in 1964. It was given on a genetical theme every two years, alternating with the Marjory Stephenson Lecture. Appropriately, since he was a major contributor to that area of the subject, the first was given by W. Hayes in 1966. In recent years a genetical theme has ceased to be obligatory.

The Society's finances improved in the 1970s - more of that in a later section - and in January of 1975 H Rogers proposed to Council that it establish a prize lecture especially for young researchers. This suggestion was consistent with the Society's concern for the interests of younger members, and by the end of the year Council had agreed to what became the **Fleming Award,** a prize for distinguished research by a microbiologist under the age of 36, to be described to the Society in a lecture at one of its meetings. The Society was in a position to fund it from its own reserves and the first recipient was G W Gooday, who gave the first Fleming Lecture in September of 1976.

Sir Alexander Fleming

In 1984 the Institute of Biology asked the Society to run its **Kathleen Barton Wright Memorial Lecture.** This was an endowed microbiological lecture which, because attendances had been poor under its own aegis, the Institute felt would more appropriately be presented at a microbiological society's meeting. It would still be microbiological, would retain its appeal to general biologists, and would be shared with the Society for Applied Bacteriology. Thus it would feature in this Society's programme once every two years. Council agreed, proposing only substitution of the word 'review' for the word 'memorial' in its title.

Finally, in 1986 the multi-national company Unilever, which has a substantial interest in food and industrial microbiology, offered to finance a biennial lecture on a theme in applied microbiology. Council was delighted, and so the **Colworth Lecture** came into being (named for Unilever's research laboratory in Bedfordshire). The first Colworth Lecture was given by G Yarranton in 1989.

Professional and Political Activities

To return to the Society's earlier years. A Learned Society ought perhaps to be above such mundane matters as politics, but as long ago as the early 1950s circumstances dictated otherwise. The fact that US authorities refused to allow Luria to leave the USA and address the 1952 Symposium on virus replication was mentioned earlier, and naturally the then President, H J Bunker, was pressed by members to protest. The problem was, to whom should the protest be addressed? A relatively young association of microbiologists had little standing in such matters; after consultation Bunker wrote to the Foreign Secretary of the Royal Society, asking him to convey the Society's protest to the US authorities, and he also sent copies of the letter to the US Ambassador and to J B Conant. Dr Conant was a man of political influence at the time: President of Harvard University, a close scientific adviser to President Truman, and a Foreign Member of the Royal Society. In 1953 a comparable situation arose over Dr P Slonimski of Paris, who had been refused a visa by the UK authorities after agreeing to address that year's symposium on adaptation. The Committee had held a special meeting to discuss the problem and had written a letter to the Secretary of State. Its protests had again been ineffective, and in that case the correspondence was given publicity at the Society's next meeting.

Some attention to political matters was clearly inescapable and the Society accepted an invitation to join the Parliamentary and Scientific Commmittee.

In 1952-4 the European political scene was dominated by the 'cold war' and the 'iron curtain', but internationally some dramatic changes took place. Stalin died, the Korean war ended, and the first H-bomb test revealed a destructive power an order of magnitude greater than the A-bombs of Hiroshima and Nagasaki. International movements towards disarmament, already active in the non-communist world, took heart, and an echo of their momentum was felt even in the Society's activities. At an AGM during this period a group of members, M R Pollock and R Y Stanier prominent among them, pressed the Society, through its Committee, to condemn biological warfare - a research area in which some of its more distinguished members had participated at one time or another. Others, led by Sir Paul Fildes, spoke

vehemently against the proposal, on the grounds that it concerned a matter of individual conscience. In the event a majority agreed with Sir Paul and no action was taken, but feelings ran high: in the words of S R Elsden, who was present (and who was obliged, as President several years later, to cope with a comparable resolution at an international level), "the Society was riven, but survived intact."

Despite the cold war stand-off, contact with some microbiologists in the communist countries was still possible at a personal level. Through one such contact the then Meetings Secretary issued an official invitation to a young East German microbiologist to attend the 1954 symposium in London (the Committee agreed to act as guarantor of his visit). There he met and talked with C B Van Niel, an encounter which played an important part in enabling the young man to achieve his ambition to leave the East. He obtained a position at Göttingen in West Germany. The young man was H G Schlegel, who went on to become one of Germany's leading post-war microbiologists; in 1993 the Society made him an Honorary Member.

Dabbling in matters of visas and international politics fitted uneasily into the Society's scheme of things and had to be done warily. Concern for the state of British Microbiology was another matter and, though no dramatic policy reversals can be claimed, the Society's interventions added weight to the protests of others. For example, in 1959 a small but thriving group of Government microbiologists, headed by K R Butlin at the then Chemical Research Laboratory, Teddington, was arbitrarily closed down by its agency, the Department of Scientific and Industrial Research (DSIR). This action had been taken for administrative rather than scientific reasons, against the firmly expressed recommendations of the DSIR's advisory panel of microbiologists - all distinguished members of the Society. Although small, Butlin's team was the only group in a Government laboratory working on fundamental aspects of industrial and economic Microbiology. A political furore ensued, with the Institute of Biology voicing protest along with several industrialists. The Society's Committee minuted its concern about the consequences for British microbiological research even before the actual closure took place; afterwards it set up a working party convened by H J Bunker, to include representatives from the Society for Applied Bacteriology and the Microbiology Panel of the Society of Chemical Industry, charged to report on the state of British research in economic Microbiology. (Economic Microbiology, like industrial Microbiology, was a category of Microbiology which has since become largely subsumed into Biotechnology; it included conventional industrial Microbiology but was broader, covering those parts of applied Microbiology which fell outside the purview of private industry.) In the summer of 1960 the working party reported, predictably, that the situation was dire; it recommended the foundation of a government-supported Institute of Economic Microbiology, supporting its view with a provisional research programme. The three parent Societies agreed; the proposal had the enthusiastic support of Nobel Prizewinner E B Chain, then heading a new fermentation laboratory at Imperial College, and the Societies jointly sent the report to the Royal Society for transmission to the Minister of Science.

The reasons why nothing came of it are curious and very British. It so happened that plans were already afoot to civilianise the Microbiological Research Establishment (MRE) on Salisbury Plain, where biological warfare had dwindled to only a few percent of the laboratory's research effort. The rest of the work was non-secret basic Microbiology, generally of very high quality, and in 1960, MRE had actually hosted the autumn meeting of the Society for General Microbiology on its premises. In 1961 the Executive Secretary of the Royal Society responded to the joint Societies' report to the effect that the Minister had received it favourably; a new institution would not, however, be provided; instead, MRE would be expanded to accommodate the research. The Societies were well pleased with this reply, because the facilities at MRE were wholly appropriate for the kinds of research envisaged and MRE's remit was felt to be narrow, to put it mildly. Plans went ahead; D W Henderson, the Director of MRE, and virtually all of his staff were in favour; his Advisory Board approved. A problem to be solved was which Department should fund it, for the military departments who then funded MRE would lose interest on civilianisation, the Medical Research Council could not afford to take the laboratory over, and the record of the DSIR was discouraging. Given the will, this was just an administrative matter - but the delay it engendered was crucial. For during 1962 the international scene changed: it became obvious that a nuclear stalemate had been reached between the USSR and the USA, so interest in biological warfare, long moribund, revived across the Atlantic. MRE's input would be important to biological warfare research in the USA and Canada. In 1962-63 the Scientific Advisor to the Cabinet, Sir Solly Zuckerman, intervened, and plans to civilianise MRE were aborted. With those plans vanished the proposed Institute of Economic Microbiology. It took another 17 years for MRE to be civilianised: in 1980 it became the Centre For Applied Microbiology and Research (CAMR) of the Public Health Laboratory Service.

In 1962 the Society's Committee felt moved to protest in writing to the Minister of Science when the Government decided not to implement in full the funding recommended by the University Grants Committee. Nothing more than a bland re-statement of policy from the Treasury was achieved.

Council's forays into political and policy areas had so far been less than encouraging, at least as far as their more obvious effects were concerned. Though they probably did give pause to those politicians and administrators to whom Council addressed its views, it is perhaps no coincidence that such matters rarely featured in Council's agenda for the next decade.

External Relations

The Society's relations with Britain's other learned societies have been uniformly good and it rapidly became a respected and influential part of the national scientific establishment. In 1966 it had representatives on the Royal Society's National Committees for Biology (E F Gale), Biochemistry (Patricia Clarke) and Nutritional Sciences (J Yudkin); on the Biological Council (N W Pirie); on the British Joint Committee for Electron Microscopy (T H Flewett); and on the Science Laboratory Technicians' Advisory Committee (G M Williamson).

Since its inception it had maintained contact with microbiological organizations overseas. Indeed, threads linking the Society to the International Society for Microbiology (ISM), the pre-War body responsible for the first three International Congresses, go back to long before the Society's formation. S R Elsden, in an article for the *SGM Quarterly* (1982, 9 (1):3-5), told how the Second International Congress had been due to be held in Germany in 1934 but, because of the rise to power of Hitler's Nazis, it was postponed and moved to London, there to be organised by the ISM's National Committee for Great Britain and Northern Ireland. The Executive Committee of that Congress included four members (Fildes, Fleming, Ledingham and St John Brooks) who were later founders of the Society, and when the Society actually came into being, its residual assets, a useful £354/15/4d, were transferred to the Society. By the mid 1950s the amount of business concerned with overseas contacts, earlier handled on an *ad hoc* basis, had grown sufficiently to justify the creation of a new Officer of Council: the International Representative. Decisive action on this was precipitated by a letter from the Swedish microbiological society, which was planning the 8th International Congress of Microbiology in Stockholm in 1958, and E F Gale became the first such Officer in 1956. The Society continued to appoint *ad hoc* delegates to special international bodies, such as the nomenclature committees of the ISM's successor, the International Association of Microbiological Societies (IAMS).

The Society's representatives participated in arrangements for International Congresses of Microbiology in Rome in 1953, in Stockholm in 1958 and in Moscow in 1966, and for all three it made economical travel arrangements for its members. Gale actually 'led' a party of Society members to Moscow. That Congress was especially memorable, though regrettably more because of the local organization than the science: the Soviet Union had raised the 'Iron Curtain' for scientific conferences only two years before, and this was its second major international one. Despite the immense goodwill of the local scientists, Moscow and the State Travel Agency 'Intourist' were not versed in the minutiae of housing, transporting and feeding 3000 foreigners of diverse nationalities - all politically suspect to the authorities. Tales of chaos and disaster - hotels and hostels double-booked, currency and language problems, venues and transport changed without notice - all augmented by a ubiquitous gastro-enteric disorder known as 'Stalin's Revenge', provided the Society with coffee-break conversation for many years to come.

A wholly new initiative for the Society was the North-West European Microbiology Group. In 1966 representative microbiologists from Scandinavia had suggested having joint meetings with the British Society. Council had favoured the idea and by 1968 details had been worked out with, and approved by, the microbiological societies of Denmark, Finland, Holland, Iceland, Norway and Sweden. The Group held its inaugural meeting at the Society's autumn gathering in Edinburgh in 1968; the Society had taken its first steps towards joining Europe.

The Half-Way Mark

In 1970 the Society reached its first quarter century, having accumulated about 2900 members. Coincidentally the turn of the '70s was, in retrospect, a time of substantial change in Microbiology as a science, and in its public image; it also proved to be a period of change and reassessment in the Society itself.

The Molecular Revolution

In the early 1970s a few relatively abstruse research themes converged in an advance which would change the face of Microbiology. The discoveries of restriction enzymes, of small extractable plasmids, and of a means of tranforming *E. coli*, came together to underpin recombinant DNA technology. This development set Microbiology on course towards the sequencing of bacterial, virus and eukaryotic genomes, the use of gene fusions to answer both physiological and genetic questions, the exploitation of chimaeric genomes

to study gene expression, the use of nucleic acid sequences - both RNA and DNA - as pointers to biological relationships, and the amplification of DNA (by the 'PCR' reaction) and its use in ecological as well as basic studies. The molecular revolution also initiated a new era of advance by rendering the genetics, biochemistries and physiologies of numerous microbes in addition to *E. coli* amenable to study. And the discovery late in 1977 of the Archaebacteria (now Archaea) led to the first phylogenetic systematics of bacteria, rendering substantial portions of the subject's text books obsolete. It also, in due time, shifted the foundations of evolutionary theory, transforming general Biology.

These were marvellous advances for fundamental Microbiology, but it was their practical implications for genetic manipulation which had the most overt effect. Their uses in medical, agricultural, industrial and environmental contexts were, of course, so varied and numerous that new applications are still emerging in the 1990s. Economic Microbiology acquired a new name, Biotechnology, which became the buzz-word of the period on stock exchanges and in grant applications. But in July of 1974 Nature published a letter from Paul Berg and several other distinguished geneticists which, adumbrating unknown hazards which might be released on an unsuspecting public by incautious experimentation, called for a moratorium on such research. To most microbiologists, aware of techniques already available to handle known hazards ranging from salmonellae to tularaemia or smallpox, the alarm seemed somewhat overdone, but the world's media took a different view: had not the threat of Genetic Engineering frightened even the scientists themselves? It confirmed the worst forebodings of journalists, already becoming suspicious of the arcane mysteries of Science.

It is true that, in some molecular genetical laboratories, facilities for handling cultures aseptically were lamentable, as was the training of staff in aseptic techniques, but this is not the place to rehearse the alarms, excursions and controversies which ensued. Some consequences of the furore were beneficial, some were comic; all were expensive in time and money. Wisely, the Society remained largely aloof. Council merely 'noted' the moratorium in its minutes in 1974, though in 1976 it counselled moderation when asked to comment on the Health and Safety authority's proposals for regulating such research. Yet in 1978 Council became sufficiently worried by the course of events to form a sub-Committee to discuss and report on developments. However, the sub-Committee concluded without meeting that whatever was at issue was not as urgent as it had seemed; what actually the issue was is lost in the mists of time.

The panic over 'genetic engineering' died down, but it changed Microbiology's public image. It brought the subject into line with Chemistry, Physics and general Biology, which were already losing status in the public eye because of disenchantment with the side-effects their applications were having on the environment and on daily life: atomic energy and weaponry, pesticides and effluents, even automobiles and TV.

More Groups

Within the Society, the early 1970s saw three new groups come into being almost simultaneously: the Microbial Pathogenicity Group, the Microbial Cell Surfaces and Membranes Group and the Microbial Fermentation Group. In 1975 the Microbial Genetics Group was formed, an event that might have been expected earlier, but in fact microbial genetics had featured frequently in the Society's general meetings. The Microbial Ecology Group also appeared in that year, and a Chemotherapy Group was discussed but came to nothing.

In 1978 an accidental escape of smallpox virus from a laboratory in Birmingham, UK, caused a death, and the subsequent Official Inquiry criticised the laboratory's safety. Clinical virologists felt exposed and, as with the Virus Group two decades earlier, formed an informal group which Council invited to become the Clinical Virology Group. It first met officially in 1980; that year saw the emergence of the Cell Biology Group too - by which time the only major sub-divisions of Microbiology which remained outside the group structure were microbial physiology, microbial biochemistry and, of course, the many forms of applied microbiology. The latter had its own outlet in the Society for Applied Bacteriology (which, despite occasional friendly negotiations, did not wish to become a Group of the Society for General Microbiology). In 1985 the Microbial Physiology & Biochemistry Group was formed, effectively completing a Group structure which now covers all major areas of microbiology, each Group specialising in one or a few aspects of fundamental microbiology.

The Electron Microscopy Group proposed in 1960 had foundered largely because electron microscopy, being a technique rather than a scientific specialism, was not felt to be a suitable basis for a Group. In 1983 a comparable problem emerged as Microbiology entered the computer era. The relatively few microbiologists who had discovered the value of computers wished to spread their enlightenment among their colleagues. This time Council agreed, albeit reluctantly, to follow the precedent set by the virologists over two decades earlier, and to fund a Computer Club. It proved to

be very successful in its mission, with its newsletter *(Binary)* and demonstrations at meetings; in 1989 it metamorphosed into the Computer Users' Group, which also met to talk over its special interest. But its *raison d'être* declined as computer technology became universal and in 1994, consequent on a review of the Groups by a Working Party of Council, it was absorbed into the Education Group.

Of course, despite its apparent federal structure, the Society remains a Society for General Microbiology: all society members are *de facto* members of all groups, and none of the Groups has permanence in principle. They are expected to reflect changes in the microbiological interests of members. Another consequence of the Working Party's report just mentioned was the merger of another pair of Groups to form the Physiology, Biochemistry and Molecular Genetics Group, in recognition of the manner in which these three aspects of the science have grown together. To-day there are nine Groups (see the Box below) and the Society's meetings programmes benefit from its Group structure enormously. Group Conveners meet four times a year with the Meetings Secretary, a practice initiated in the mid 1970s by the then incumbent, J Porterfield, and the Groups have become Council's major source of suggestions for Symposium topics, both for the Society's Spring meeting - the occasion when subjects of broad interest and importance are still preferred - and for supplementary symposia at this and at other meetings. Some of the Groups' proceedings have been published by the Society in a series of 'Special Publications'.

THE GROUPS IN 1995

GROUP	PREDECESSOR(S)
CLINICAL VIROLOGY	Clinical Virology
CELLS & CELL SURFACES	Cell Biology; Cell Surfaces & Membranes
ENVIRONMENTAL MICROBIOLOGY	Ecology
FERMENTATION & BIOPROCESSING	Fermentation
PHYSIOLOGY, BIOCHEMISTRY & MOLECULAR GENETICS	Genetics & Molecular Biology; Physiology & Biochemistry
MICROBIAL INFECTION	Pathogenicity
SYSTEMATICS & EVOLUTION	Systematics
EDUCATION	Teaching; Computer Users'
VIRUS	Virus
IRISH BRANCH	Irish Branch

In effect, far from being the force for disintegration that the founders of the Society feared, the Group structure has proved to be a source of strength in the Society and an assertion of the stability and independence of Microbiology. Yet the Committee's resistance to a Group structure during the first decade or so of the Society's existence was certainly wise at the time, for it ensured that British Microbiology developed a sound and stable basis.

Quite distinct from the subject-based Groups must be mentioned the regional Branches, formed in Ireland and Scotland in the 1970s and 1980s in response to local demand, because meetings tended to be centred on the South-East of the UK and long-distance travel was tedious and costly. They were local gatherings which retained, at least in principle, the general character of the Society's main meetings, and were a natural consequence of the expansion in numbers and distribution of microbiologists that has accompanied the subject's growth. However, more recently Council has adopted a policy of having more regional meetings of the whole Society, and as these became more frequent, the *raison d'être* of the Scottish Branch was felt to have declined. By 1995 only the Irish Branch remains.

Finance

Crucially important to a healthy Learned Society are, of course, adequate and well-managed finances. The Society's first Treasurer, H J Bunker, collected subscriptions, ran the Society's bank account and paid bills himself, and Council would appoint two ordinary members annually to audit Bunker's accounts. K R Butlin, frequently an auditor, used to say that he welcomed the duty because he found it refreshing to visit Bunker's laboratory at Barclay Perkins, a brewery, to check the figures... In 1955 Bunker's successor R Lovell, who had brought in professional help for the Society's Honorary Secretaries, now arranged for a firm of professional accountants to conduct the annual audit. This action introduced to the Society Mr John Page, whose financial acumen would profoundly benefit the Society for the next 37 years.

Lovell's foresight was wholly justified. The first financial report in the Society's records is by Bunker, given to the 4th meeting of the Committee on September 14, 1945, when the Society possessed £606/17/7d, composed of the balance at the bank (£582/1/7d) plus a modest credit due from a publisher. This sum included the money 'inherited' from the Second International Congress of Microbiology, and it is likely that it represented the Society's total assets. When Lovell introduced professional accounting ten years later, the assets had grown to £14,484/16/8d, including some £6,500 allowed for back numbers of the *Journal*, and a dozen years later still, in 1967, its assets were valued at £72 000, this time excluding back issues. Much of the Society's money had come from sales of the *Journal of General Microbiology*, together with

judicious investment of annual surpluses. H Smith, who became Treasurer in 1968, foresaw that the Society would inevitably need to become more business-like, and less dependent on voluntary, and sometimes involuntary, support from Officers and their Departments. More paid staff, and enlarged premises, would soon be needed. So he followed a policy of investing any surpluses, so that reserves against a future major expenditure accumulated. He was wise. When circumstances compelled Council to purchase a Headquarters for the Society (see the next section), the money was available from the Society's reserves without need for a mortgage or any other financial arrangement.

The Society had been granted charitable status in the 1950s, which meant that it was exempt from income tax, and this was a tremendous help once it had acquired a reasonably large investment portfolio. The Society's assets had begun to approach six figures in the late 1960s, and not only did the Treasurer feel uneasy about sustaining sole responsibility for their management. Council, too, agreed that some degree of collective responsibility would be prudent. The Treasurer was empowered to set up a Finance Committee composed of members with some expertise in such matters. In 1970, that watershed year for the Society, the new Committee had its first meeting, as the Society's assets passed the £100 000 mark; apart from the Treasurer, its members were K E Cooper, W H Holms, A H Linton and General Secretary A H Dadd - all advised by John Page, who was soon co-opted on to the committee.

In 1980 the Committee was re-organised in some details and re-named the Treasurer's Committee, and a convention was initiated, which is still followed, that the President normally attends its meetings.

The Society's finances improved steadily during the 1970s - by 1976 its assets had risen to £266 000 and by 1982 the Society had become a millionaire - on paper. During the 1980s, movements of the dollar in relation to the pound periodically led to un-planned surpluses from the sales of the *Journals* in the USA, and at the same time a national policy of high interest rates led to large yields from its investment portfolio. Of course, the Society's financial commitments increased alongside, and domestic inflation made substantial inroads on its income. Neverthless, large surpluses accumulated in some years, and Council always had a satisfactory excess of income over expenditure at its disposal, even when reserves and other costs were taken care of. Council was able to be innovative in ways which I shall describe shortly. The recession of the early 1990s brought a degree of sobriety to the UK financial markets, and the sales of the *Journals* declined, but the Society's finances have remained healthy, even though the abundant positive balances of the 1980s are no longer available.

The Society's finances have been a success story. Its assets on paper were £4.2 million in 1992, and membership of the Society has been a very good financial bargain since its earliest years. The Society has been very fortunate to have been served by a succession of dedicated and prudent Treasurers, interested in financial matters, who have taken sound advice, then invested and managed wisely. All have paid tribute to John Page, accountant, auditor and adviser, and in 1981 the Society recognized his services by conferring upon him the status of Extraordinary Honorary Member. He retired in 1993.

Society Treasurers at the dinner given to mark the retirement of John Page, the Society's accountant for 37 years. Left to Right John Beal (1975-1980), Douglas Watson (1980-1987), Harry Smith (1968-1975), John Arbuthnott (1987-1992), John Page, Allan Hamilton (1992-)

A Headquarters

By 1970 the Society was serviced by its staff of three housed in the premises of the Biochemical Society. Council held its meetings some distance away in a room lent by the CIBA Foundation. It was becoming clear that a more elaborate headquarters was needed: the *Journal of General Microbiology* had become too large and complex an operation to be managed on a voluntary basis in a University or Institute Department, and its Editor was arguing for an independent Editorial Office with proper assistance. It would have been absurd to house such an office away from the rest of the Society's clerical administration. Government plans for a Science Centre in the capital, where many Learned Societies could have central offices for handling membership and publications, planning meetings, conducting routine business and so on, had been discussed for several years, but had come to nothing. The Society's finances were in good shape; the arguments for acquiring headquarters premises of its own were strong.

But not strong enough for unanimity on Council. The Society might have had sufficient funds, but was purchase of premises a justifiable use of money accumulated for the

benefit of members? The argument swayed back and forth as the 1960s came to an end. By late 1969, however, a substantial majority of Council were in favour. But where ought it to be? Some felt strongly that London was the only serious choice: it was the capital, it was relatively accessible from all parts of Britain and it was also the home of scientific bodies such as the Royal Society, the Biochemical Society and the Institute of Biology. But premises in London would be expensive to buy, maintain and operate; Reading, almost equally accessible except from the South East, cheaper and less crowded, was preferred by others. By early 1970 Council had plumped for Reading, and the General Secretary, A H Dadd, was asked to begin a search for an appropriate home, maintaining contact with the President, the Treasurer and the Editor of the *Journal of General Microbiology*. Within months Dadd had found Harvest House in Reading's London Road, a substantial Victorian house which had been used as offices by a private company. It looked promising: it was larger than the Society actually needed at the time, but that would be no disadvantage because space could be let to other Learned Societies, together with administrative services, both of which would help to finance the operation. The price was £37 000 - a very substantial sum for property in those days, but not exceptional. It seemed to be a wise investment. The Officers

The Society's Headquarters (1971-92), Harvest House, London Road, Reading.

inspected it and were enthusiastic: the Treasurer gave it his blessing; negotiations were duly initiated. In January of 1971 Harvest House became the Society's property, with A H Dadd, C Kaplan, J R Postgate and H Smith as trustees. Not all of Council was delighted: to everyone's regret, Elinor Meynell, who had opposed the whole project, resigned from Council in protest at what she regarded as waste of the Society's money.

Commissioning Harvest House - planning, redecorating, moving in staff, appointing an Executive Secretary (G Sheldon, an ex-colonial Civil Servant) to take charge, and dealing with all the minutiae and the hitches which cropped up on the way - was a tremendous job, and the Society owes an enormous debt to the indefatigable A H Dadd, who spent

The garden and rear of Harvest House, including the large horse chestnut tree.

time far beyond the call of duty getting the building habitable and organised. Within a matter of months the secretariat from the office at the Biochemical Society had moved in, to be joined almost at once by the office of the *Journal of General Microbiology;* in 1972 the *Journal of General Virology* moved in. The space available for rent to other Learned Societies was taken up with enthusiasm, and in 1973 five moved in almost simultaneously: the British Ecological, Parasitology and Photobiology Societies, the Mammal Society and the Botanical Society, followed closely by the Wild Flower Society and the Heather Society. Within a few years the Society for General Microbiology was providing administrative services for no less than fourteen such Societies as well as handling its own business.

In 1982 Hilary Bower, then Editorial Secretary for the *Journal of General Microbiology*, replaced Sheldon as Executive Secretary.

The Society's membership grew, and the size of the administration increased accordingly. So, too, did the need for space at Harvest House: not only for staff but for stores and records. Stocks of the *Journals* were for many years held and circulated by the Cambridge University Press, but in the 1970s it became more economic for the Society to circulate members' copies from Harvest House, and by 1984 Harvest House stored and circulated them all. These decisions created yet more demand for space. Despite alterations, and at least one major extension, room which had been made available to other organizations gradually became needed by the Society itself and, during the 1980s, services to other societies were run down. The last of the Society's lodgers, the British Society of Audiology, departed in 1987. By 1990 the regular staff working at Harvest House numbered 24, 14 of them directly concerned in producing the *Journals* and other publications.

Extensions and alterations at Harvest House had alleviated the cramped working conditions temporarily, but there is a limit to such expedients, especially on a site quite properly subject to planning restrictions. In the late 1980s Council reviewed the position, discussed it with predictable vigour and disagreement, and in 1990 concluded (unanimously this time) that new, larger premises should be sought. On paper, the Society could afford to move, for Harvest House was nominally a very valuable asset. But Britain was in the midst of an economic depression, with an almost frozen housing market, and realising that asset would not be easy. Remarkably, in 1991, a one-time Co-operative shop, extended and modified for use as offices, became available at Spencer's Wood on the outskirts of Reading. More remarkably, its owners were willing to consider a part-exchange arrangement, thus enabling the Society to avoid the problem of selling Harvest House on a stagnant market. With determination and ingenuity the then Treasurer, J P Arbuthnott, and General Secretary, R A Herbert, obtained the blessing of the Charity Commissioners, negotiated the complexities of conveyancing by part exchange, and in July of 1991 Marlborough House became the Society's property. Within three weeks it had been modified sufficiently for the staff to move in, and they did so at the end of July - though it was not until a reception held there in May 1992 that the Chief Scientific Adviser to the Cabinet, microbiologist W D P (now Sir William) Stewart, declared the Society's new headquarters officially opened.

The present Headquarters, Marlborough House, Spencers Wood, Reading and the Society minibus.

Council's decision in 1970 to purchase property and establish a 'home' for the Society has been eminently vindicated over the years. Harvest House, with its lovely walled garden, had been an immediate success and it was disposed of with some sentimental sadness. But the new headquarters, albeit somewhat less convenient to reach by rail, is light and roomy and, for the present at least, it accommodates staff, stores and records easily; it even has a spacious car park. As the General Secretary wrote in 1991, *"Marlborough House will satisfy the Society's needs well into the next millenium."*

The Workings of Council

The Council of the Society is elected by the membership and bears ultimate responsibility for everything the Society does. Its business agenda are varied and sometimes complicated. Discussion can be frank and vigorous at Council meetings, but happily it is normally constructive and to the point, sharing the common objective of reaching decisions. Standfast's protest of 1963 had arisen from a transient lapse, and was salutary: today details are largely delegated to Officers such as the General and Meetings Secretaries, and to the Treasurer and his Committee, and all are co-ordinated and documented by the Executive Secretary and her staff. Even so, Council has to meet several times a year to process a substantial agenda comprised of matters of principle, policy and report. The reports come not only from the Officers but also from representatives on other bodies, *ad hoc* working parties that the Council may have set up and, until recently, Group Convenors (they now communicate with Council through their meetings with the Meetings Secretary). Therefore a tradition of brisk and business-like meetings procedure has grown up - subject, of course, to the style of Chairmanship of whoever may be the current President. Council members in their more flippant moments have been known to offer odds on the rate at which a given President would get through an afternoon's business.

The practice initiated in the 1960s of having Officers meet separately before the full Council, to form a preliminary view of the agenda, had proved to be a very effective way of streamlining Council's meetings, and in 1978, to avoid any sense that the Elected Members of Council were simply there to rubber-stamp the Officers' decisions, preliminary but separate meetings of the the Elected Members were initiated. Then, in the full Council meeting, the Chairman would invite a spokesman to present the Elected Members' collective view on any given item before discussion became general. It is an efficient procedure and has enabled the number of Council meetings to be cut from its high of six to four per year, though, including the preliminary gatherings, Council meetings occupy a whole working day.

The growth of the Society's activities, both scientific and administrative, has imposed some increases on the size of Council. By the mid 1990s it has grown in numbers to twenty-one by the creation of three new Officers whose activities will be discussed in more detail shortly: the International Representative (now International Secretary) mentioned earlier, responsible for relations with microbiological organisations overseas, a Publications Officer, responsible for all the

Society's publications except the two learned journals, and a Professional Affairs Officer, who co-ordinates the Society's external and political relationships. Council also has representatives on some fifteen outside bodies, national and international.

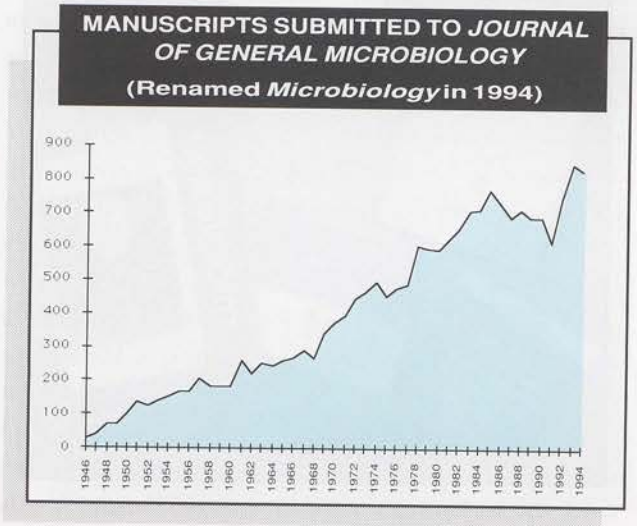
A disadvantage of Harvest House had always been that it had no room large enough to accommodate a meeting even of the old, smaller Council. In consequence, throughout the 1970s and '80s Council continued to assemble in London, in later years at the Royal Society of Medicine rather than the CIBA Foundation. While this arrangement had advantages for some, it meant that personal contact between Council and the staff at Harvest House was minimal. To maintain a degree of acquaintance, one Council meeting a year would be held in Reading, but even then its business had to be transacted away from Harvest House, in a room rented from the University. The position was less than satisfactory, and one of the great advantages of Marlborough House is that it does have suitable space. Today Council meets regularly in a proper Council Room at its own headquarters.

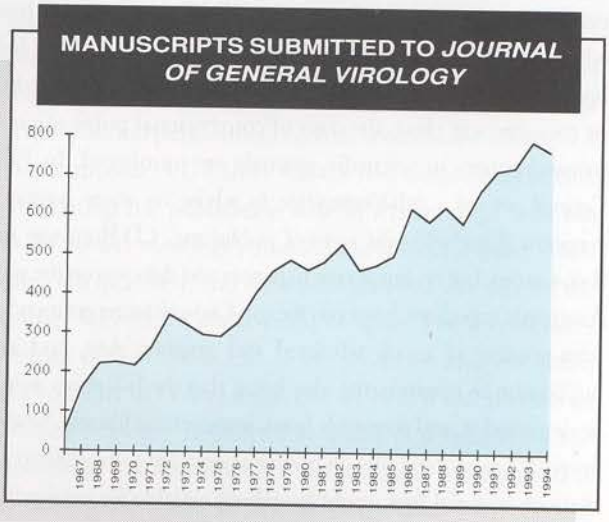
The Learned Journals' Progress.

Considerable impetus towards the purchase of Harvest House was generated in 1969-70 by a drastic change at the *Journal of General Microbiology*. After some twenty years as Editors, Knight and Standfast retired in succession. I had joined them as a third Editor in 1969 and was left in sole charge. I recall an occasion when, a deluge of manuscripts having come to me, I had edited and 'drained' several in the preceding fortnight, and I stood in my office one morning somewhat dazed, a new manuscript in each hand and three on the floor. My secretary brought in two more, complained that her office was filling up with manuscripts, and left the room. I then discovered that my brain had rebelled, too. I simply could not think what I was doing with all this paper, even what it was all about. If I tried to concentrate on one of the manuscripts, I could not assimilate a sentence. I left my office and went for a walk to recover.

It was clear to me that the *Journal* had become too big an operation, both in turnover and in space requirement, to be run by a few volunteers in their 'spare' time, using their employers' staff and office facilities. It was less than clear to Council, but at a crucial meeting in 1970, of which a diplomat might say "frank exchanges of view took place", Council agreed to a revised editorial machinery with a quartet of Senior Editors, one of whom should be an *ex officio* member of Council, and a substantial Editorial Board. More important, an independent editorial office would be set up to act as a clearing house for all editorial activities - the decision which influenced the purchase of Harvest House. Actually, the *Journal of General Microbiology* jumped the gun: it set itself up, with Olive Hamilton as editorial assistant, in a rented office in Reading several months before Harvest House was found.

It was the ever-increasing number of good quality submissions, in itself an excellent thing, which had forced a degree of professionalism on the *Journal of General Microbiology*. Early in 1972, 25 years after its inception, the Journal received its 5000th manuscript, and less than 10 years later, in 1981, the number of submissions passed 10 000. The relatively young *Journal of General Virology* was in a less acute position, but its spectacular welcome by the research community - manuscripts submitted leaped from an initial 50 in 1966 to some 240 in 1968 - had compelled Kaplan and Wildy, with Council's approval, to re-vamp its editoriate and take on paid help. However, they preferred to run it from Birmingham University and it was not until 1972, when D H Watson took over as Editor-in-Chief, that its office moved into Harvest House. Its submission rate had by then eased off and in 1993 it received 800 manuscripts.



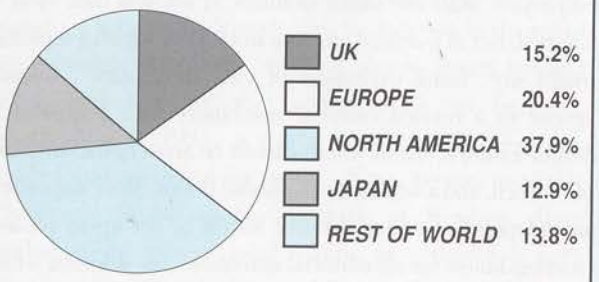


GEOGRAPHICAL DISTRIBUTION OF MEMBERS AND LIBRARY SUBSCRIBERS TO SOCIETY JOURNALS

(As at November 1994)

MICROBIOLOGY

SUBSCRIBERS



MEMBERS

JOURNAL OF GENERAL VIROLOGY

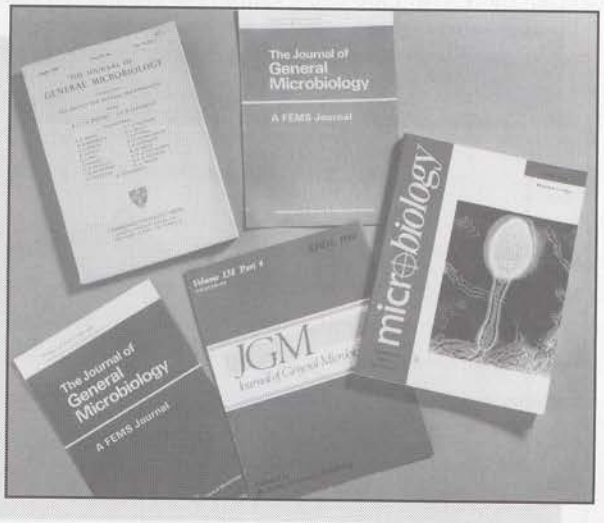
SUBSCRIBERS

MEMBERS

In the early 1970s, again partly in response to pressure of manuscripts submitted to the *Journal of General Microbiology*, the idea of budding off a second offspring, a *Journal of General Mycology*, was discussed, but the project was abandoned.

Council, and even more the editors of the Journals, were acutely aware by the late 1960s that the escalation of scientific publications could not go on for ever. In 1970 it had been said with some plausibility that more than half of the scientific literature that had ever been published had come out in the previous ten years; in theory one could calculate the time when, in the words of S Spiegelman, one might say that half had been published yesterday! It was an extravagant idea, but its message was clear: the days of conventional publication as printed papers in scientific journals are numbered. In 1973 Council set up a sub-Committee to advise on more compact, economical and efficient ways of publishing. CD-Rom was not then known, but on-line access to papers and data was on the way. As an early expedient, however, the sub-Committee recommended mini-printing of much tabulated and graphed data, and also publication as resumés, the idea being that the full paper would be deposited at, and accessible from, some central library. Neither proposal was adopted, and on-line data banks have since taken care of much material that would have been suitable for mini-print.

As the century progressed, scientific publication practices throughout the world were changing. Self-contained, rounded research papers of the traditional kind, usually quite long, were giving way to more frequent, shorter, rapidly published bulletins on research progress. In 1970 the *Journal of General Microbiology* had bowed to diversification within the discipline by categorizing its contents list, and it also made space for short, rapidly published papers, both of which changes were welcomed by the membership. Yet despite these changes, and despite the fact that submission rates remained as high as ever,



by the 1980s some of the more specialised commercial journals were perceived to be attracting good papers which ought to have come the *Journal's* way. Perhaps through mere seniority as much as anything, the *Journal* developed a rather stuffy image in the eyes of some younger researchers. In 1994 it changed its name and format and its re-launch as *Microbiology* was well received by the scientific community.

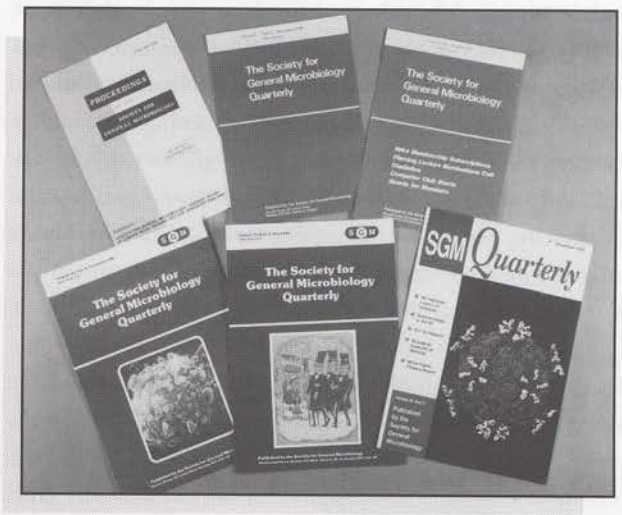
As a scientific discipline Microbiology has grown and blossomed in Britain during the latter part of this century. There can be no doubt that the two *Journals* and their editors did an enormous amount, especially in the first few decades, to sustain the unity of British microbiology and to conserve its reputation. They also did much to augment its quality too, for by insisting that microbiologists think carefully about what they were writing, they obliged them to think carefully about what they were doing.

The *Quarterly* Emerges

Today the *Society for General Microbiology Quarterly* is a lively, popular and extremely useful magazine, recording and announcing the Society's activities, keeping the membership in touch with the activities of Council, of the Groups, of the Administration - and with the outside world through book reviews, scientific up-dates, articles and commentaries. Yet it came about in a curious way which again reflects on how conventions in scientific publication have changed.

In the 1950s, published abstracts of scientific meetings - called the Proceedings - were generally accepted as legitimate publications. They would be cited in the reference lists of full papers and, in a few instances, an abstract might be the sole report of a significant advance. For many years the *Journal of General Microbiology* published the Proceedings of the Society's meetings, as the Society's early Committee had required. The Editors were unenthusiastic about printing un-refereed material in their *Journal*, and it is true that trivial and even mistaken matter occasionally reached print, which was good for neither the *Journal's* nor the Society's reputation. Moreover, abstracts took up space which was becoming ever more precious as the numbers of regular papers increased. Around 1960 Knight and Standfast had made a concerted effort to discontinue publishing proceedings on those grounds, with the further argument that people who attended the meeting ought to take notes - and anyway everything worth-while would be published elsewhere sooner or later. But they were overruled by the Committee, largely swayed by D D Woods and S R Elsden, who argued strongly that the Society had a duty to keep those members who had not been able to attend meetings properly informed of the latest developments in the subject. After obtaining agreement that they might limit the space occupied by Proceedings, the Editors reluctantly obeyed.

There the position remained until 1973, when a sub-Committee of Council (significantly including a recently retired Editor) proposed, and Council agreed, to publish abstracts separately in a new publication to be called *Proceedings of the Society for General Microbiology*. The intention was that *Proceedings* should also act as a house magazine, an attractive substitute for the meetings notices and other papers circulated to members, carrying notices of forthcoming meetings, lectures and Group programmes, and in addition providing news of Council and its activities, letters, comment, reviews and perhaps advertisements (though Council was wary over the latter because it might seem that the Society was endorsing the goods advertised). Its first issue appeared in September, 1973.



Proceedings was a success. It made the membership much more aware of what the Society was doing and made its workings familiar, and its ephemera were useful and popular. Originally put together by the General and Meetings Secretaries it soon became too elaborate to handle in addition to their regular duties, and in 1975 Council created the post of Publications Officer mentioned earlier, in charge of *Proceedings* and non-*Journal* publications such as books based on selected Group symposia. A G Callely was the first incumbent. In fact, co-ordinating the publication date of *Proceedings* with the dates of Society meetings remained a problem for many years: it came out quarterly, and if the relevant issue was delayed the Meetings Secretary's plans would be upset. For several years meetings notices often had to be produced and circulated independently of *Proceedings*. But by 1978 it had become an established Society newsletter as much as a vehicle for the proceedings, and its somewhat clumsy name was changed to *The Society for General Microbiology Quarterly*. It still

published abstracts, useful for those who had been unable to attend meetings, but by 1982 doubts about their value revived. For one thing, poster sessions were fast replacing oral presentations at the Society's meetings; for another, abstracts were no longer a widely accepted mode of scientific publication: to-day they hardly ever appear in the reference lists of mainstream papers. *Quarterly* finally abandoned proceedings in that year and became exclusively the Society's house magazine, as it remains to-day. Ironically, print-outs of abstracts are still made available by the Society, but only at meetings, thus frustrating the intention for which Elsden and Woods fought long ago... Probably it no longer matters.

New Activities

The early 1970s were indeed a period of re-assessment and looking ahead for the Society. It had committed itself to Harvest House and all the administrative changes which went with it; it revised its rules in 1970; by a sort of momentum, all its activities came under review. The appointment of the sub-Committee on the future of scientific publication, discussed earlier, was but one product of this new mood of re-thinking. Finding the Society to be moderately affluent despite the purchase of Harvest House, Council appointed a sub-Committee, headed by Naomi Datta, to look into new ways in which its funds could best be deployed for the benefit of its members and of Microbiology.

Datta's sub-Committee conducted a poll of the membership and reported back in 1972. Discarding suggestions that the subscription be reduced (partly on the grounds that it was unimaginative, but more because the Society was very good value already), it offered four proposals, of which two were adopted. The first of these has just been discussed; that the newsletter be initiated which became *Proceedings* and then *Quarterly*. The second was to set up a President's Fund, from which modest sums could be donated to or via members for the furtherance of Microbiology, wholly at the President's discretion. The idea appealed to Council immediately; it was partly subscribed, initiated by a donation of £100 (a substantial sum in those days) from the then President, D W (later Sir David) Evans. In its second year, 1973, its balance was £598, after nine modest payments from the Fund; fifteen years later the President would have some £20 000 a year to disburse, in well over a hundred payments. Originally the idea was to cover all kinds of contingencies which did not fit easily into the Society's normal budget. This generally meant helping younger members to attend meetings (and in a few years, as word got round, the epithet 'younger' had to be defined rather tightly), but it also served as a trouble-shooting or minor disaster fund. For example, when I was President I used it to provide an air ticket for a Chinese microbiologist who, visiting a member, was embarrassed to find that his national currency allowance had left him insufficient money for his return journey. Though now restricted wholly to assisting students (see later), the President's Fund proved to be one of the most useful and beneficial of the Society's activities.

Naomi Datta's sub-Committee had also suggested that the number of meetings a year be increased to six, but Council preferred to keep them at three. It also raised again the idea of sponsored refresher courses or summer schools but, while prepared to make grants-in-aid to such projects, Council remained unwilling to involve the Society directly. (The matter resurfaced yet again in 1979, but with no further change in policy.) Among suggestions noted by Datta's Committee, but discarded as inappropriate at the time, were Society medals, essay competitions, research grants and establishing a Society library. Research grants were in fact introduced in later years.

Council conducted further re-assessments of the Society's directions and activities in 1980 and again in 1990. Both led to changes in administrative structure and/or procedures which will be mentioned in the appropriate context, but some important innovations of the last quarter century came about as a result of ordinary Council business.

Grants

Throughout the 1980s the combination of high interest rates and favourable dollar fluctuations mentioned earlier caused the Society to have what the treasurer called "non-recurrent surpluses" (most of us know them as "windfalls"). In 1983 the surplus enabled the Society to initiate a Third World Fund to assist microbiologists in developing countries. At first the fund concentrated on helping recipients to attend training or postgraduate courses; after about 1989 the amounts available became smaller and its grants were restricted to financing visitors from the UK to present courses in developing countries. Council, aware of the chaos among scientists in Eastern Europe following the break-up of the Soviet Union, diverted some of its funds into an Eastern European Fund to help microbiologists in those countries. For example, the Society has recently granted funds to culture collections in newly-independent Russia for the purchase of culture media. In 1994 both funds were replaced by the Society's International Development Fund, assisting both Third World and Eastern European countries in the variety of ways outlined in *Quarterly* for May, 1994.

In 1983, too, the Council set up a Research Fund. The Society could not, of course, support research on any substantial scale, and it seemed that a helpful deployment of its relatively

limited resources would be to provide small grants to researchers to supplement the more comprehensive funding available from Research Councils or other such bodies. A category which was especially effective according to a 1988 review comprised "start-up" grants, awarded to assist newly-appointed staff in Higher Education Establishments to initiate research and thus gain a basis from which to apply for more conventional research funds; another category comprised small grants for special apparatus and/or consumables needed to follow new directions in existing research. By 1994, however, the machinery for funding research at a national level had changed and Council terminated the Research fund.

Whenever the Society's finances have looked good, Council has considered ways of being helpful to young microbiologists. As long ago as 1964 Council announced that it would defray the expenses of lecturers to student microbiological societies, and thereafter a limited number of "SGM Lectures" were, and still are, funded each year. Those student bodies which had alert secretaries have made good use of them, but, despite regular advertising, their take-up has been limited. But by the early 1980s a major part of the President's Fund was spent assisting post-graduate students and young post-doctoral researchers in the ways indicated in the adjoining box; more recently additional funds have become available to help post-graduates attend Society meetings.

Grants to improve the teaching of Microbiology in secondary and tertiary education, *via* teaching aids or travel, became available in the late 1980s, and in 1994 a fund was set up to help pay for seminar speakers in Higher Education Establishments.

By the 1990s the Society was disbursing as much as £100 000 a year in grants for the furtherance of Microbiology.

The amount of money that the Society has been able to set aside for grants has naturally fluctuated with its fortunes, and the types of grant available have accordingly changed from time to time. Although the sums granted are generally small for their context, rarely covering full costs, they do disproportionate good because their award very often helps applicants to obtain further moneys elsewhere.

GRANTS AVAILABLE FROM THE SOCIETY IN 1994-5

Developments in Teaching Fund: for improvements in the teaching of any aspect of Microbiology in secondary or tertiary education.

International Congress Fund: to assist members to attend international congresses of microbiology or virology.

International Development Fund: for the provision of training courses, journals and other assistance to microbiologists in Eastern Europe and developing countries.

Postgraduate Student Meetings Grants: assists student members to attend one Society meeting a year.

President's Fund: assists postgraduate students and first-term post-doctorals to attend courses, to make research visits, or to travel to non-Society meetings in order to present their research.

Seminar Fund: sponsors up to two speakers on microbiology a year for departmental seminar programmes.

SGM Lecture of the Year: sponsors one visiting microbiological lecture a year to a student microbiological society.

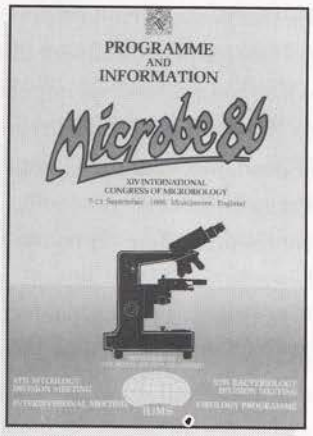
Vacation Studentships: enable undergraduates to work on microbiological research projects during the summer vacation.

Watanabe Book Fund: provides books for libraries in institutions teaching microbiology in developing countries.

Special Occasions

In the Spring of 1984 the Society held its 100th meeting. Council decided that this was an occasion for celebration, and that the symposium should be "special" and should include an element of retrospection. A double symposium was held at the University of Warwick entitled *The Microbe 1984;* part 1 was devoted to viruses and part 2 to prokaryotes and eukaryotes. Afterwards the Society dined in Warwick Castle, the dinner taking the form of a mock mediaeval feast. Happily the less reputable features of mediaeval banqueting were restrained (largely) and the evening was greatly enjoyed by most of those present, though disconcerting to a few.

1986 was the year in which Britain, or to be more precise Manchester, was host to the 14th International Congress of Microbiology, opened formally by Princess Anne. The Society, like its fellow microbiological societies in Britain, naturally granted funds to the Congress, and also played a considerable part in its organization, though the root of its widely acknowledged success was dedicated organisation by key figures in both our Society and the Society for Applied Bacteriology, with their local associates, in planning and co-ordinating its day-to-day arrangements. The Society for General Microbiology had its own exhibition stand and entertained overseas members and guests at its temporary office each evening. In 1993 Glasgow was host to the 9th International Congress of Virology, partly sponsored by the Society, with our stand again an appropriate feature. Its proceedings, reflecting the tremendous advances virologists



Professor Harry Smith, HRH Princess Anne, Professor John Postgate (President Society for General Microbiology) and Dr. Alan Paton (President Society for Applied Bacteriology)

have made during the Society's history, had a somewhat higher public profile than usual: the unresolved argument about whether to destroy the remaining stocks of smallpox, and the problems of HIV action and therapy, made good journalistic copy.

Political and Professional Problems

A Learned Society is not the same as a Professional Institute. It does not offer professional qualifications, examinations or codes of practice, nor should it pursue the professional interests of its members into the political arena. The Institute of Biology, albeit a younger organisation than the Society and with a much wider professional catchment area, is there for that purpose. Nevertheless, as I have already recorded, the Society has periodically felt unable to remain silent on matters which had professional or political overtones. In the years up to 1970 the Society's ability to influence the course of events seemed discouraging, an impression confirmed in 1972 when Council, like numerous bodies involved in scientific research, commented adversely on the Rothschild Report to the Chief Scientist, and the report was nevertheless adopted by Government. (It introduced the 'customer - contractor' principle into research by government agencies, thus creating a tier of administrators to contract for research in Ministries, and a tier of administrators in the Research Councils to respond to, and often advise, those contractors: creating lots of new administrative posts, perhaps, but draining off money which could otherwise have gone into research.) As I indicated earlier, the Society became relatively silent on such matters during the 1970s. However, as that decade came to an end, government funding of science began to contract as cuts were imposed and economies sought in both Government and University research budgets. 'Slimming down' research programmes, planning for 'cost-effectiveness', 'forward looks' and 'accountability' became the buzz-words of the era, generating the need for more and more time at paper-work, more reports by and to administrators, and consequently less research. Older microbiologists began to calculate the benefits of early retirement; sixth-formers opted for training and careers in advertising, the media or the City.

To be fair, there is little doubt that some such exercise was needed, for in not a few departments and institutions research had become an ineffectual hobby rather than a dedicated sortie into the unknown. But Britain's administrative bureaucracy suffered from equivalent ineptitude; its arrangements ensured that the brighter scientists took redundancy pay and moved on, often to emigrate, and failed to displace the dullards. Responding to the parody of consultation offered by Whitehall and its satellites in the research-funding administrations, the Institute of Biology did its best, and the Royal Society began to change its traditionally detached posture, but Council rightly became anxious lest the special interests of Microbiology, and of microbiologists, should be overlooked in the *mêlée*.

For example, Culture Collections are an essential part of the infra-structure of microbiological research - a proposition which hardly needs defending here. Britain had several, and they ought to have been thriving centres of research into comparative and evolutionary Microbiology, into taxonomy and microbial survival. But none has become such a centre, because they have had to struggle constantly for sufficient funding to sustain the collections *per se*. In 1981 several years of anxiety about the future of the various collections crystallised when the then Agricultural Research Council announced that it could no longer afford to maintain the two National Collections (of Industrial and Marine Bacteria) at Aberdeen. Council wrote in defence of the collections to the then Secretary of the ARC; no doubt others did too. Execution was stayed, compromises were reached, and in due course a further term of support for the Aberdeen collections was worked out with a new financial structure. But the story did not end there. Other collections in the UK, of yeasts and protozoa for example, were threatened in comparable ways. In 1986 the Society contributed to a Royal Society Working Party - the second on the topic - which advocated a special type of core funding for such collections. Its proposals were not adopted. Over the years at least one collection has been lost, and in 1994 the Aberdeen collections came under threat again. This time, lobbied by the Society, the Office of Science and Technology agreed to provide support until the result is known of a national review of culture collections yet to be completed. Our collections remain at risk even in the 1990s.

Among other political topics, Council was asked in 1982 to reply to a set of questions from a House of Commons Committee concerned with the protection of the country's research base in Biotechnology. And in 1986 it joined with the Institute of Biology in writing about the state of British science to a House of Lords Select Committee on Science and Technology. But many comparable issues came and went without Council having the opportunity to express a view. Moreover, the press, radio and television had discovered that technological scares were good copy, so startling misinformation, sometimes with a microbiological component, would be promulgated about pollution, disease and contamination. And often responses to events or consultative documents would be needed so rapidly that there was no serious question of referring the matters to a meeting of Council, let alone to an Annual General Meeting. In 1986-7 Council decided to create within itself a new Officer to handle these matters, and in 1988 I W Sutherland became the Society's first Professional Affairs Officer, with a newly appointed Research Asistant at Harvest House to assist him. Quite soon the Officer had his own Committee.

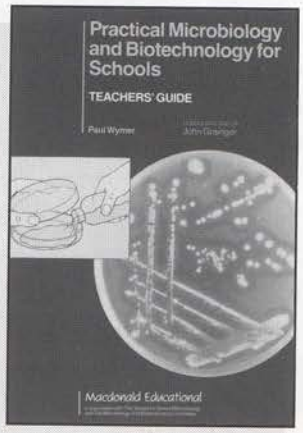
The Professional Affairs Officer's brief was wide and covered both political and professional matters. It included preparing evidence for official enquiries, identifying issues needing a microbiological input and making statements to the media when appropriate, representing the Society on the Parliamentary and Scientific Committee, sustaining contacts with other Learned Societies as well as with Research Institutes and Departments of Higher Education, and assembling and maintaining an appropriate data base, including press cuttings. Two recent examples from the political arena are the Society's trenchant response to an official review of the structure of the academic year in universities and colleges (the "Flowers Report"), and its firm comments on the Government's White Paper *Realizing Our Potential*, both reported to the membership in *Quarterly* for November 1993. Perhaps the most obvious result, from the point of view of the membership, has been the appearance of the regular "Westminster Column", to add a new dimension to *Quarterly*. That column became a useful compilation of political and professional news, reporting such matters as the alarms in 1989 about *Listeria* and genetically engineered microbes, AIDS statistics, the numbers and distribution of students of microbiology, University and Polytechnic funding, food hygiene, and the 1993-4 changes in the Research Councils. All the sorts of things you wished you could remember but were too busy to extract from the news media!

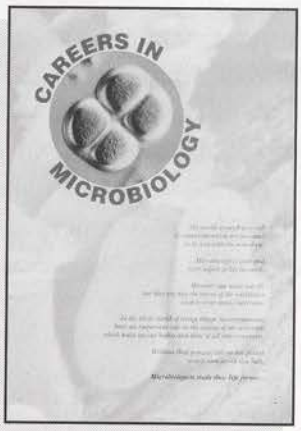
Well aware of the problems which have beset British science in recent decades, in 1989 the Society took out corporate membership of the Save British Science movement.

The Professional Affairs Officer and his department at Marlborough House are also concerned with more strictly professional matters such as the employment and interests of members, or the employment intentions and prospects of final-year students, on which they have published surveys. They also handle enquiries on microbiological topics from the public and press, and organise public lectures for events designed to promote the public understanding of science, such as the Edinburgh Science Festival of 1994.

Education

The last-mentioned activities link with another of the Society's undertakings, one which has become increasingly important over the years. A majority of the Society's members are educators of one kind or another, and education in Microbiology has been one of the Society's concerns since its earliest days, with the Education (earlier, Teaching) Group as the focus of that interest. In particular, Microbiology teaching at secondary and tertiary levels was minimal in the Society's early decades. In 1974, partly to stimulate interest at those levels, Patricia Clarke master-minded a booklet, *Careers in Microbiology*, which the Society published and made available to schools throughout the country. This booklet is now in its fourth edition and has been supplemented by a leaflet entitled *Choose Microbiology*, also widely distributed to schools. The Society offers advice on careers and training in Microbiology in response to individual enquiries, and at careers fairs it often mounts a joint stand with the Biochemical Society.





Around 1980, encouraged by an ordinary member, J M Grainger, the Society became involved with the Microbiology in Schools Advisory Committee, and in 1984 it paid for a biology teacher to be seconded for a year to the University of Reading, to produce a book of Microbiology experiments for schools. The book proved popular, and its success

moved the Department of Trade and Industry to initiate the National Centre for Biotechnology Education, which still provides training, equipment and consumables for teachers of microbiology though no longer supported by the Department. The Society retains its links with the National Centre, and liaises with comparable organizations such as the Association for Science Education and the Wellcome Centre for Medical Science. Society grants available to teachers in secondary and tertiary education were mentioned earlier.

The World Abroad

The North-West European Microbiology Group (NWEMG) held several successful meetings and could be counted a success. Inevitably other countries wanted to join in - a European Federation of Microbiological Societies had been mooted as long ago as 1955 - and in 1972 M H (later Sir Mark) Richmond wrote formally to Council proposing that an unrestricted association of European Microbiology societies be formed. He had come to the view, after a scientific trip to Germany, that the exclusiveness of the NWEMG was becoming inappropriate. Council deputed A H Rose, its International Representative (re-named the 'International Secretary' in that year) to look into the matter; he reported back favourably, and by 1974 negotiations with 16 of the interested countries had advanced sufficiently for the now familiar Federation of European Microbiology Societies (FEMS) to be formed. E A Dawes provided a brief account of its history in the 100th issue of its own journal, *FEMS Microbiology Letters* (1992, **100:** 15-24), by which time 25 countries were participating. It paralleled the Federation of European Biochemical Societies (FEBS), which had come into being a few years earlier, which held well-attended meetings, and published an increasingly popular journal for short, bulletin-like papers. FEMS held its inaugural meeting in Dundee in the summer of 1976, and the first issue of its journal came out in 1977. The NWEMG persisted for a while but was wound up at a joint meeting with FEMS in 1979. The Society, like the Society for Applied Bacteriology, has remained much involved with FEMS ever since its inception, and FEMS still has an administrative office at Marlborough House.

The amount of international business, like all other agenda, increased steadily, and the International Secretary was responsible during the 1980s for representing Council on the International Union of Microbiological Societies (IUMS, the second generation descendant of IMS); for reporting on matters such as international congresses, working parties, publications and so on; for representing Council on FEMS and on the Royal Society's British National Committee for Microbiology; for administering, with the aid of selected Council members, the Society's Third World Fund. By 1990, when Professor Stuart Glover concluded an eight-year stint, it had become a substantial operation, requiring both patience and a taste for foreign travel on the Officer's part.

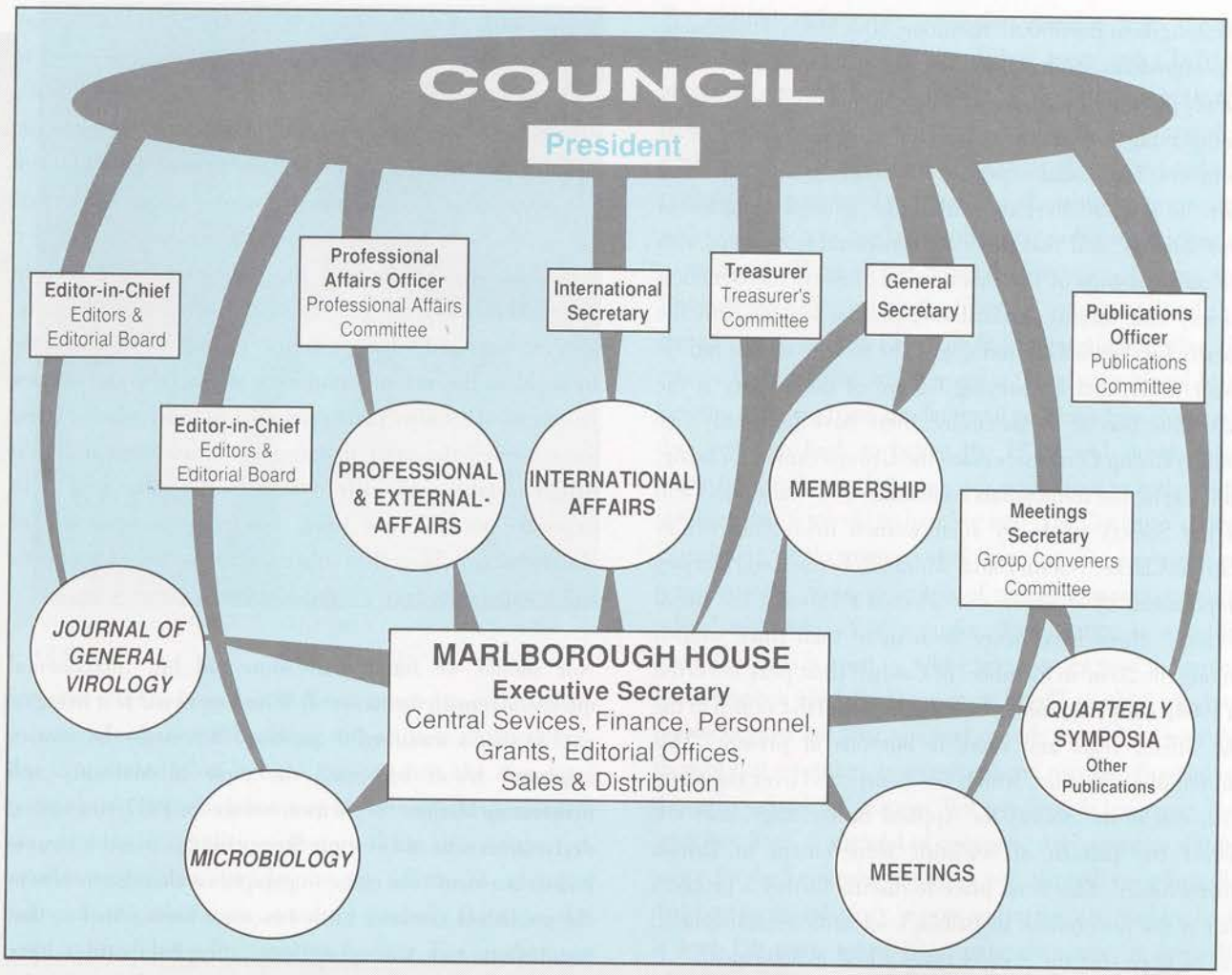
The Society Today.

From small, amateur beginnings the Society has grown along with its subject, diversifying in several directions to form the complex administrative machine shown in the diagram overleaf. Hilary Bower is still Executive Secretary, and heads a staff of twenty-seven who not only look after Council and its satellite Committees, but publish, store and distribute the learned journals; make up, print and distribute *Quarterly* and other small publications; see to the publication of symposia; provide an information service; keep accounts, pay bills and send out grant money; administer the membership; and attend to all the other essentials of running an efficient headquarters.

These duties occupy the majority of the Society's staff. But the interface, so to speak, between the administration and the membership centres on the Society meetings. Organizing these can be a task of awe-inspiring complexity, requiring minute attention to detail. The Society's meetings

A staff barbecue in the garden at Marlborough House.

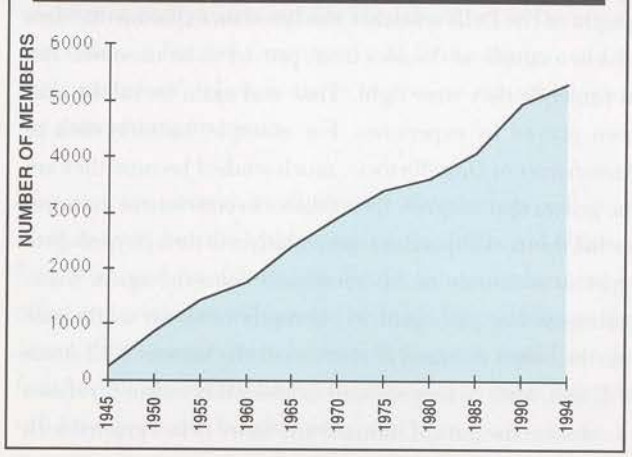
generally proceed with a smoothness which comes of many years' experience: accommodation and sustenance are laid on at the host university for several hundred participants, some from abroad, some with families in tow, and the inevitable few who will change plans after the last moment; arrangements are made for receptions, distinguished guests and the Society dinner. And once made, in liaison with local members of the Society, the arrangements must all be overseen, and slip-ups amended, during the actual meeting. These miracles are performed three times a year by the Meetings Administrator, working with the Meetings Secretary and appropriate group conveners. There are



GEOGRAPHICAL DISTRIBUTION OF MEMBERS

(AS AT NOVEMBER 1994)

SOCIETY MEMBERSHIP FIGURES 1945 - 1994



occasional hiccups, such as one that occurred at the Cardiff meeting in 1992, when muddle by the host University led to random allocation of insufficient rooms (hardly the Society's fault, but vexing for all concerned). Some problems are bizarre; as the Meetings Administrator wrote for *Quarterly* in 1990:

"...Then there are the vagaries of the different nationalities: 'No, I don't think that Warwick University could arrange to serve meat freshly slaughtered on the campus at dawn. Neither is it possible for you and your wife and three children to share a single bedroom; no, not even if they will be frightened sleeping on their own....'
"Last year at Cambridge I was presented with a door lock and the words 'we will have to charge you for this.' Apparently some unfortunate had become locked in a shower between bedrooms and the only way out was to take the lock off."

Organisers of meetings need a sense of humour above all else.

Late in 1992 the Society's membership passed the 5000 mark. The occasion was marked by a little ceremony at its January 1993 meeting (at the University of Kent at Canterbury) where the then President, J R Quayle, presented a bottle of

champagne to the 5000th member, Miss Stella Thompson. A postgraduate student, she was one of some 900 students, mainly postgraduates, among the membership. The Society's membership records do not include the specialisms of its members, but casual experience at meetings indicates that there is a wide diversity within the general compass of microbiology, and that there are considerable overlaps with the memberships of the Biochemical Society, the Genetical Society and various medical societies, as well as with the Society for Applied Bacteriology. The male to female ratio is about 50:50, and a worrying feature of the Society is the masculine bias of its hierarchy: there have been only five woman Group Conveners since the Groups came into being, and despite the tremendous contributions to the subject and to the Society made by such women microbiologists as Patricia Clarke, Naomi Datta, Muriel Robertson and Marjory Stephenson, all of whom were elected Fellows of the Royal Society, there have never been more than three women among the 20 or so members of Council (that peak occurred in 1964). Only two women have been elected to Council in the last fifteen years and there is but one at present. This lamentable situation, which has contrasted over the years with that in the Society for Applied Bacteriology, does not reflect the pattern of scientific achievement in British microbiology. This is no place to discuss further a problem that is not uncommon in Britain's scientific establishment. Let us hope that the Society takes a lead in solving it.

The Future

What will the next fifty years bring? For all the tremendous advances in fundamental microbiology that have taken place during the Society's first half century, the position to-day leaves one feeling that we have only just begun. But it is a truism that research raises more questions than it answers - of course, much remains to be learned about familiar microbes; no microbiologist is satisfied with the present state of knowledge in his or her special area. The forefront of current research will continue to advance in its familiar if chaotic manner, and the fall-out in Biotechnology and Medicine will continue to change society and the environment, generating wealth, health and satisfaction on the one hand, confusion, alarm and protest groups on the other: following a familiar pattern set in the late twentieth century.

With a touch of the irony to which nature appears to be prone, problems which were thought to have been solved will probably re-surface. As an example from the present, a decade or two ago it was received wisdom that the bacteria, as human pathogens, were conquered, and that protozoal and fungal pathogens were in retreat. Synthetic chemotherapeutic agents and antibiotics, although they were being exploited with careless profligacy, seemed set to keep the bacterial pathogens at bay, and showed every promise of rendering the others tractable. The viruses were the real enemy. So indeed they have proved to be, despite the promise of effective anti-viral agents among nucleoside analogues. But who would have predicted that it would be a virus that would bring back the autonomous pathogens in force? The emergence of HIV, which attacks the immune system, has enabled opportunist pathogens to gain new footholds in the human community, and has also created new reservoirs of familiar pathogens such as tuberculosis. These are rendered the more dangerous because they are often drug-resistant, the life-styles chiefly associated with exposure to HIV not being conducive to wise use of chemotherapy. Doubtless other seemingly solved problems will re-emerge to take microbiologists by surprise again.

Nor should we forget that some old but fundamental questions remain unanswered. What is a virus? Is it living or not? Is that a meaningful question? Where do/did viruses originate? Lwoff addressed the topic in his witty and penetrating Marjory Stephenson lecture for 1957, concluding dryly, in an echo of Gertrude Stein, that "a virus is a virus is a virus is a virus" (he chose to paraphrase that *dénoument* in the published version). Little has since been added to that conclusion; now the spongiform encephalopathies have revealed a comparable enigma: what, and whence, is a prion? How many more entities on the borders of life will the future bring forth?

On another theme, we know a great deal about the world of laboratory cultures, but not much about the real microbial world. As long ago as 1932 A J Kluyver and his student J K Baars pointed out that the cultures used by microbiologists were laboratory artifacts: populations selected out of their natural habitats by arbitrarily prescribed culture media, unlikely to be representative of those originally present because they will have become modified physiologically as they acclimatise themselves to those media. Curiously, the insight of the Delft scientists was based on experimental data which, a couple of decades later, proved to be unsound, but in principle they were right. Time and again its validity has been proved by experience. For example, bacteria such as *Azotobacter* or *Desulfovibrio*, much studied because they are the genera that outgrow their fellows in enrichment cultures, are not the most important representatives of their physiological types in economic or environmental contexts; again, many pathogens lose pathogenicity, abruptly or slowly as the case may be, when cultured *in vitro:* even the famous K12 strain of *E. coli*, after its long sojourn in laboratory culture, refuses to colonise the guts of humans any more (a fact greeted with

A J Kluyver

immense relief by brow-beaten *E. coli* geneticists in the 1970s). So, most of us have been working with artifacts all these years. Has it mattered? Not a bit - except when the occasional extrapolation from the laboratory to the natural environment has proved to be injudicious. For one thing, the situation was usually inescapable, for despite the efforts of microbial ecologists, microbial eco-systems are generally like a crowded room in which but a few faces are familiar. For another, our cultures, artifacts or not, have been immensely useful. Microbiologists have managed to fish out of the microbial world a wealth of research material which has provided a huge edifice of valid genetical, biochemical and physiological knowledge, with truly world-changing applications in medicine and technology; Kluyver's artifacts have widened the horizons of Biology in all directions. What is new to-day is that Molecular Genetics is providing, through such expedients as the polymerase chain reaction, ways of studying microbes in minute numbers, and in their natural environments. There is also the possibility of examining the microbial equivalents of fossils, fragments of microbial nucleic acids that have been preserved in ancient specimens. The microbial world as it really exists outside the laboratory is becoming accessible: a fantastic menagerie of living things, and of their ancestors' relics, is there to occupy microbiologists for generations to come.

The need for research in all areas of Microbiology will be as great as ever, but the 'golden age' of the 1950s and 1960s is long gone, and careful choices for the future deployment of effort and resources will have to be made. Speculation on the actual directions of microbiological research would not be fruitful, but already the kinds of constraints to which research will be subject can be glimpsed.

For example, electronic processing, ranging from the fax machine to on-line searching of data bases and CD-ROM abstracts, has immensely facilitated keeping up with the frontiers of research. As means of information transfer, traditional published research papers are obsolescent and will probably be replaced by deposition of manuscripts coupled with on-line access, perhaps with *précis* publication acting as a catalogue. (Happily the Society's Treasurer, Editors and Publications Officer have the financial consequences of this thought well in mind.) I set aside the question of who will referee the data-base and prevent it filling up with rubbish, because there is a more fundamental problem. Few electronic data bases go back to before the 1970s, and already busy researchers, and even reviewers, too easily cease to bother with anything that is too old to have got into 'The Computer's' files. Even before the electronic revolution good science was being lost, along with the dross, as writers of reviews compounded each others' omissions. Now a major discontinuity in scientific communication is upon us. Older scientists are used to coming across research which "rediscovers the wheel", or which trips into pitfalls pointed out long ago, and console themselves with the thought that repetition, re-assessment and revision of published data are essential for progress. But repetition in ignorance, like ignorance itself, is wasteful of resources. And resources will be scarce for the foreseeable future. A well-planned, encyclopaedic data-base for Microbiology, in print and on line, and reaching back at least 150 years, would be a tremendous asset to research, education and planning. Whether so large a project will ever be feasible in times of limited resources is another matter...

Another constraint will be imposed by society at large. By the year 2000 the world's population will be passing the 6 billion mark. Members of this Society hardly need reminding of the catastrophic social and environmental consequences of the population explosion. As far as humanity is concerned, this planet has become a closed system like a batch culture, rather than the matrix of open systems of earlier centuries. Substrate limitation and end-product toxicity provide metaphors for many of our more obvious ills. This is no place to go into details of the population explosion and its consequences, grave though they are; the unenlightened should look at the widely circulated *Joint Statement of the Population Summit of the World's Scientific Academies* (October 1993, available from the Royal Society), where these consequences are summarised wisely and briefly. As far as Microbiology is concerned, they mean that the pressure away from curiosity-motived research to matters of more practical urgency will become ever stronger, and more difficult to resist, because sponsors of research and grant-giving agencies will continue to find it painfully difficult to act upon the axiom that practical benefits depend absolutely on fundamental advance, even when they have become persuaded of it. Yet our founders'

vision of a Society dedicated to fundamental Microbiology will remain as cogent as ever, and their message will have to be pressed by the Society at every opportunity.

Some of the staff at Marlborough House, January 1995.

In a different sense, our founders' vision has already been undermined. The Society came into being because microbiological research was dispersed among several disciplines and subject areas. Microbiology became a distinct discipline in its own right, though it drew from Chemistry and all aspects of eukaryotic Biology. Over the decades it has remained interdisciplinary in character, and now it has begun to penetrate those adjacent disciplines, to add to, change and influence them. In Chemistry, for example, modes of thought and directions of research have been changed, as a result of discoveries in Microbiology, in areas ranging from the physics of membranes and polymers to metal complex and natural product chemistry. But naturally the most spectacular input from Microbiology has been into general Biology, both practical and theoretical. Thus, *E. coli* and yeast, together with microbial enzymes, have become routine research tools for the genetic analysis and manipulation of eukaryotes. And theoretical Biology, especially eukaryotic Genetics, has been transformed by the discovery of the Archaea, and of the prokaryotic origin of eukaryotic organelles.

Re-association of Microbiology with general Biology is already under way, which is as it should be. Inevitably this will continue - and will be reflected in the structure of educational departments and research institutes. In the 1960s it was trendy to set up unified Biology departments with no, or only token, Microbiology, and such departments found themselves floundering a couple of decades later with the rise of Biotechnology. Microbiologists will need to guard against comparable short-sightedness, but they must also avoid the parochialism that seems to be so strong a feature of late twentieth-century life. A Microbiology school which has but token involvement in eukaryotic Biology is just as bad as the unified Biology schools just complained of - and is already out of date. Microbiologists, one hopes, will continue to remember that real progress, innovation and ultimate enlightenment take place where the traditional disciplines overlap.

As a contributor to the Society's celebratory 100th symposium in 1984 put it, and I could not express it better myself, *"We must retain ... ability to draw from and interact with the rest of the sciences; for the really good microbiologists are not really microbiologists at all, they are scientists who happen to be very interested in microbes."*

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