ACB News

Celebrating the ACB's 70th Anniversary




In this issue ...







Issue 683
June 2023

The Association for Clinical Biochemistry & Laboratory Medicine
1953–2023

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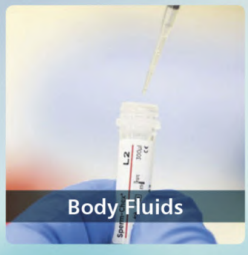

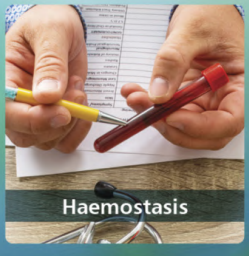

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ACB News

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1953–2023

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Message from the President

70 years is a long time in historical terms, during which healthcare has gone through huge changes and advances. The ACB has also radically transformed itself since its first official meeting in 1953, to become a potent, professionally led association for laboratory medicine.

This message marks my final contribution as ACB President, and it has been a great honour and privilege to represent the Association over the past two years. A lot has been achieved both within the ACB office and across the profession during this time, and despite the ongoing post pandemic impact. Our work within the various committees, driven by our enthusiastic directors and chairs, has delivered hugely valued services for our members and created vital input, commentary and opinion to external agencies and stakeholders.

It has been particularly rewarding to see the growing importance of equality, diversity and inclusivity in everything we do, and also to see the beginnings of our sustainability agenda take root through our newly appointed Green Champions.

I am hugely grateful to the ACB staff team over the past two years in providing me with the support needed to fulfil the role as President. Our departing CEO, Jane Pritchard, deserves special mention given her efforts in transforming the ACB office and making the ACB more corporate and financially stable. I wish her all the best in her new role, which I am sure she will excel in.

So it's all change time, with a new CEO being recruited and of course a very capable new President, Kath Hayden, coming on board – I am sure she will be brilliant and has all my support. For me personally, taking over as President of the Royal College of Pathologists later in the year will be very challenging but it will also allow me to help forge even closer relations between RCPath and the ACB.

Finally, to all ACB staff, directors and members, I wish you all the best for the future. It's been a great few years – a time I will cherish and never forget. Thank you so much. ■

Bernie Croal, ACB President

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Message from the President Elect

It is a great privilege to be taking up the role as ACB President in what is our 70th Anniversary year. That this important date for our Association coincides with the upcoming 75th Anniversary of the founding of the NHS on 5 July is another reminder of the role that Laboratory Medicine and our members have played in the huge scientific advances in tests and services that have improved patient care across the UK since its inception.

UKMedLab23 from 12-14 June will be a fantastic opportunity to both celebrate the 70th Anniversary and showcase clinical and scientific topics from all regions and nations, alongside emerging research in the posters and Medal Award sessions.

Over the last year I have been involved in developing tripartite communications with the RCPath and the IBMS, including those on the new ISO15189:2022 standards and results direct to patients. We will continue to work collaboratively to address other common issues such as direct-to-consumer testing and the proposed UK Conformity Assessed (UKCA) Marking for regulation of medical devices in the UK, and to raise the profile of Laboratory Medicine and diagnostics.

There is some fantastic work going on for the ACB around sustainability and I am looking forward to working with our Green Champions to promote its importance and see how we can all help in our laboratories to achieve the NHS Net Zero target. In addition, I have been invited to speak at the AACC meeting in Anaheim in July on Appropriate Test

Utilisation Driving Sustainability, which will be a further opportunity to highlight the downstream benefits of removing waste that is generated from unnecessary or inappropriate testing.

Finally, we will be starting a piece of work in the coming months, in conjunction with our new EDI Champions, around membership engagement to better understand what members want from the ACB, to ensure that we are fully inclusive and highlight the many opportunities to get involved, so please feel free to get in touch with any suggestions. It will be an exciting year ahead! ■

Kath Hayden, President Elect

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So long and thanks for all the fish!

I am absolutely delighted on behalf of the *ACB News* team and the staff team here at Tooley Street to welcome you to this special edition of *ACB News* to commemorate the 70th Anniversary of the ACB.

It's a bumper edition with contributions from many members old and young looking back over the history of the ACB as well as to the future, marking the progress and change that's been made over the years. I hope you enjoy it.

We will also be celebrating this important milestone at this year's UKMedLab meeting taking place at Leeds Royal Armouries between 12-14 June. I hope to see many of you there and at our AGM when we will be asking members to formally confirm the name change chosen in the Member consultation to The Association for Laboratory Medicine. We will also be saying farewell to Bernie Croal and welcoming Kath Hayden as President for the next two years.

It's been a busy time for the ACB Nominations Committee having just completed the process of appointing two new EDI Champions in a role sharing arrangement who will work with Council Member Dilini Peiris to drive equality, diversity and inclusion through all our activities.

Our Green Champions Group is growing and expanding its activities so watch for more news over the coming months and opportunities to get involved. The Group has reached out to the IBMS and the RCPath to join with us to make real impact on this agenda.

Finally, it is with a mixture of sadness and excitement to let you know that this will be my last *ACB News* CEO Message as I am leaving at the end of June to take up another CEO role.

This of course means that the Nominations Committee is busy again as the process for selecting the next Chief Executive is well underway. By the time you read this there should be a shortlist for final interview and a decision should be made during June.

It's been nothing but a pleasure to work for you over the past three and a half years. You have been welcoming, supportive and very open to change. It's been a delight to learn about the world of Laboratory Medicine and to see the Association and its members recognised for the critical role you play in education, professional standards and scientific innovation to drive the best possible patient care. As always, there will be challenges around the corner, but I hope that the ACB is now better equipped and in a stronger position to tackle them head on and to keep moving forward.

With all my very best wishes for the future. ■

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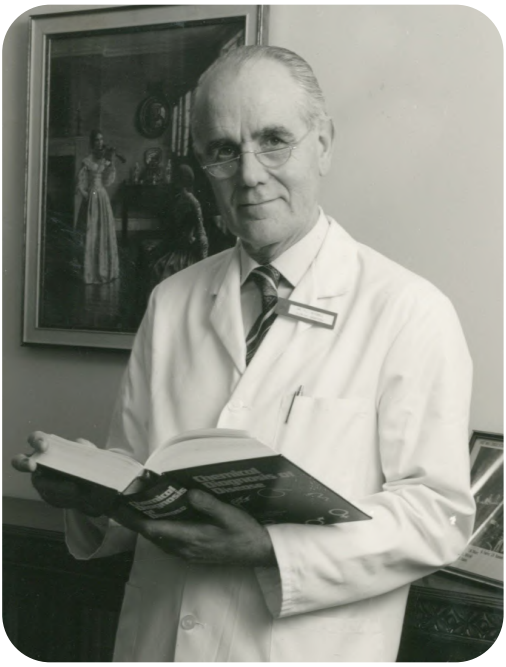
The first 70 years of the ACB

by Fred Mitchell, Founder Member



On the 70th anniversary of the Association, at the age of 101 and a Founder Member, I have been asked by Tamsin Lawson, our Events Manager, to write a few words about the evolvement of the ACB and the incredible changes which have occurred in Clinical Chemistry over the last 70 years. It might be opportune to mention three episodes typical of the 1950s and not likely to be encountered today.

My first post after five years as a pilot in the RAF and graduating in Biochemistry in 1949 was Endocrinologist at the Jessop Hospital for Women in Sheffield. This involved the measurement of female hormones for the North of England. Clinical Chemistry was then so primitive; no chemical methods were available and all we could do was inject extracts of urine into mice and note the effect on their ovaries and uteri, trying to be quantitative. This involved breeding thousands of mice which in a womens' hospital could be tricky. I could not breed as many as were necessary so had a standing order for four dozen immature female mice once per week from The Mousary in Kent. These were delivered to the porters' lodge every Sunday evening. All was fine until The Mousary changed from wooden to cardboard boxes and the little mice ate their way out so that on Monday morning they were all over the hospital, including up the stairs. You can imagine the effect this had on our patients. Amusing isn't quite the right word!

On another occasion we found that on Monday mornings some of our mice had coloured backs. It did not take long to find out that the enterprising junior doctors in their mess next door were clearing their refectory dining table on Sunday night, taking six of our mice, colouring and racing them from one end, wandering around the table and betting on the first to reach the far end. This was a game just as good as with horses or dogs but much more compact and cheaper. We could not allow it though.

Another event which did not involve animals made us most unpopular. For many reasons we had to do all our work using 24-hour samples of urine. These came by post from all over the north of England and I had an arrangement with the GPO to use special boxes for Winchester quart glass bottles, plastic had not come into use. On one hot day in summer one very full bottle broke in the middle of the hospital mail. The result was something of a disaster, it all had to be destroyed. Now we rarely use 24-hour urine samples and all our bottles are plastic.

Such, now amusing, complications of

clinical chemistry do not occur anymore and we can measure all the hormones we wish very accurately on very small samples of blood. From a rewarding point of view, we have lived through a time when so many exciting developments have come along to make this possible. Personally, it was a delight to work on hormones with the MRC Clinical Endocrinology Research Unit in Edinburgh.

The ACB was founded in 1953 by Professor Earl J. King in London, Professor Grant Lathe in Leeds, Harold Varley in Manchester, C. P. Stewart in Edinburgh and myself in Sheffield. The aim was to bring together the increasing number of medical and scientific staff then working separately and independently in Chemical Pathology, or using its alternative names, Clinical Chemistry or Clinical Biochemistry, in different parts of the country. Earl King coordinated things nationally from London and regional districts were formed throughout the country with their own Chairman and Secretary. Grant Lathe was Chairman of the NW Region and I was Secretary, later Chairman. There was no central office and we all used our own departmental offices and secretaries. The Americans had formed the American Association of Clinical Chemistry (AACC) in 1949.

Technology was very primitive and it has been exciting over the years to join in the incorporation and development of colorimetry, spectrophotometry, chromatography in its various forms (liquid, paper and gas), radioimmunoassay and mass spectrometry combined with liquid and gas chromatography, as they became available.

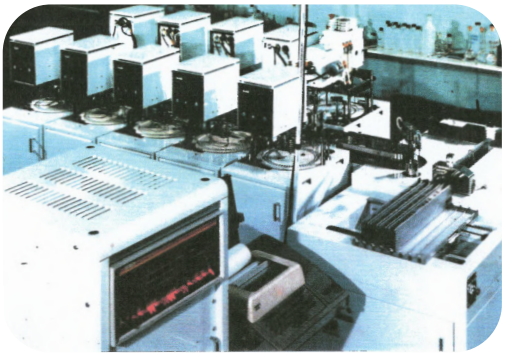
Many items in blood (mostly proteins, some obscure and in very small quantities) have been discovered comparatively recently and can now be measured and used as indicators for the diagnosis and treatment of many disorders previously difficult to manage. The complexity of modern Clinical Chemistry is now quite frightening compared with what it was in my day, making study for the fellowships of professional bodies rather daunting but none the less exciting and gratifying to achieve results. The profession has two main components – methodological and interpretive, there is a tendency for senior staff to opt for one or the other. Methodological development used to be the main problem, hard work and success has reduced its size.

In the 1960s laboratory workloads were getting out of control with many laboratories completing over one million assays per year, increasing at 18% per year. Work was done in large numbers by technicians using mouth pipettes. Quality control was unheard of with errors and precision levels unacceptable. Three of us wrote the first article on the subject – 'Quality Control in Clinical Chemistry', Whitby, Mitchell and Moss. *Advances in Clinical Chemistry* Vol 10 p65-156 1967. The Editor asked us if we could think of another name, 'Quality Control' reminded him only of Henry Ford's production line. Quality control is now mandatory throughout the profession. Even the MRC thought something should be done about the situation and asked me in 1968 to start up a division in their new Clinical Research Centre and Hospital at Northwick Park. We ran for 17 years, at one time having a staff of 80 including hospital service. During that time we worked on automation to deal with the numbers and in my specialty developing a system, now used throughout the world, for separating and measuring all the many steroids in humans. Professor Tom Whitehead ran a similar unit in Birmingham funded by the NHS. Tom concentrated on establishing quality control in hospital laboratories.

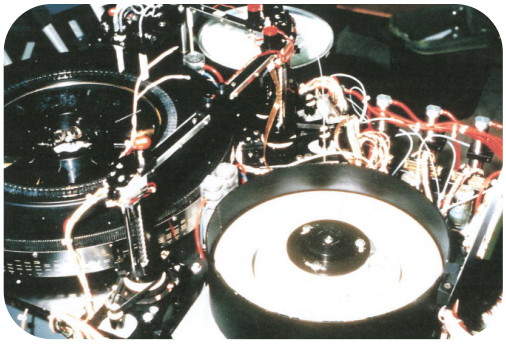
To deal with the twin problems of increasing the throughput and the

precision of service work, which was one of our remits, meant tackling both automation and computer management. Automation at the time depended solely on an invention of Skeggs in the USA where all reactions took place in a flexible tube. A 12-channel instrument using this principle had been produced by the American Technicon company. When I was in Edinburgh we had evaluated the first of these machines to come to Britain.
Our published results were reasonably good but at the CRC we wished for various reasons to develop automation based on reactions in discrete tubes – a decision which later proved wise. Starting up development from scratch on this approach would have meant an unacceptable delay in catching up with work being done elsewhere. An old friend, Dr Clifford Riley, a very mechanically minded Consultant Chemical Pathologist, had applied much work and originality working with Vickers at St Olave's Hospital in East London building a 20-channel analyser accepting 300 specimens an hour (6,000 assays). Clifford happily agreed to join us with our good facilities at the CRC and in the fullness of time he and I persuaded the Department of Health to install at a cost of £100,000 the first production model of the MC-300 (Multi Channel, 300 specimens per hour) at Northwick Park. It was a complex machine, every movement for the first time in our experience controlled by a computer. Working with Vickers was interesting. They got instrument production mixed up with building submarines – the console was made from quarter inch sheet steel; its weight meant it had to be craned through the window onto a specially strengthened floor.
A submarine's electrical supply was apparently positive ground meaning the frame is positive at 24 volts. Fine for submarines but not for 230-volt instruments! The Vickers machine acted as the backbone analyser in the hospital for years. We were very grateful to Clifford for introducing us to working with industry. By now cooperation with industry was essential for instrument development since the engineering required for the automation of chemistry needed specialist facilities and staff. The MRC had not done this before, so we were breaking new ground for them. Since this time industry has successfully taken over R&D for practically all the profession's instruments. It is a big money spinner for them.

The next machine we produced was with Coulter. The main difference was, instead of the final tubes for colour measurement passing in front of the light source, it moved round the row of tubes



Vickers MC-300 analyser

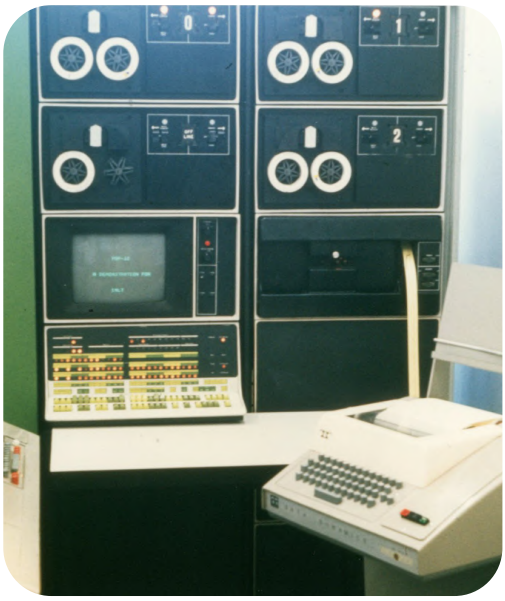


It's successor – DACOS, with function parts exposed. Note decrease in size with increase in mechanical and electrical complexity.

continually monitoring any activity; importantly this allowed the measurement of enzymes in action. We called it a Discrete Analyser with Continuous Optical Scanning (DACOS). Coulter successfully sold this on the world market.

We had an interesting collaboration with Kodak. They had a large factory near to the CRC and sitting next to the manager at one of their dinner parties I suggested they might find another use for the multi layered film used for colour photography. On a napkin I showed if you placed a specimen of blood on top of the film, as it soaked through the layers, they could each contain chemicals for a reaction, the last one on the back producing a colour which could be measured. After some time he invited me back to dinner to tell me he had a problem. His boss in America had told him they were already working on the idea in secret and in a big way. They didn't know what to do with me. The MRC rose to the occasion, sorted the formalities and we had a very happy and long collaboration. They were concentrating on a big multi-channel machine.
We suggested a small instrument with a few channels for an outpatient's department or a doctor's desk was more desirable and made them one. They were all successful but Kodak got into trouble with the advent of digital photography.

By the 1980s most of Clinical Chemistry's problems were approaching solutions and the WHO asked us to do something for developing countries. All our machines were expensive, required a good electrical supply, good climate, expert staff to run them, regular maintenance and they were not robust. Could we produce something which dealt with all these problems?
We worked on this difficult task for two years and produced a small instrument which did six assays commonly required in the developing world. The space programme at the time fortunately had produced light emitting and light sensitive



PDP 12 computer which served Northwick Park Clinical Chemistry from 1971-1984. Note random access tape memory and punched tape output

diodes and high energy batteries, the first LEDs produced green light with exactly the wavelength required for the six assays; a very short flash was sufficient so the battery life was many years, users could be easily trained, it could be used in all climates and it survived dropping on the floor, required no maintenance and cost only £90. There was a big problem however, no company would make it. It just would not make any profit and to some extent would replace the expensive inappropriate monsters they were selling. We handed over to WHO all the intellectual property etc, and they started production in China and South America and a small run by Denley Instruments in England.

The output of clinical chemical laboratories, being entirely digital, paved the way for them to lead in the computerisation of hospitals.
We purchased one of the first small computers – PDP-12 – mostly accessed by punched tape and with a memory

enhanced by small magnetic tapes which could be rapidly searched. We invaded hospital reception where each patient received a supply in his or her notes of edge-punched identification cards which were both human and machine readable. One of the cards was sent to the laboratory with each specimen. The output of the MC-300 was machine readable and so all in all we had for the first time in Britain a system which removed the biggest source of random laboratory error – faulty specimen identification. We later supervised the extension of computerisation to cover the whole hospital. An interesting non-intentional use of Clinical Chemistry.

After starting up the ACB in 1953 Earl King around the same time again used his foresight to suggest the few societies of Clinical Chemistry then forming internationally should join to form an international federation under the umbrella of the International Union of Pure and Applied Chemistry (IUPAC). It became an Associate Member and in 1967 independent. It now has 91 full member societies and 16 affiliates in all, representing some 45,000 Clinical Chemists. It is recognised as a nongovernmental organisation in relations with the WHO. For several years, on behalf of the ACB, I was Chairman of the IFCC Expert Panel on Instrumentation with six international members at an interesting time when our instruments were going through dramatic development. We met and lectured in many parts of the world. The IFCC has recently added to its name 'and Laboratory Medicine', indicating its clinical relevance and overall coverage. ■

Kodak "Desk Top" analyser

"Flash" colorimeter for developing countries

Photo from the past

Whilst sifting through the archives in the ACB Office we came across this wonderful photo. Unfortunately, no details were attached. Do any of our readers know the history behind it? Please do get in touch if you know why it was taken...or indeed, if you are in the photo!

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E. J. King and the beginning of the Association of Clinical Biochemists

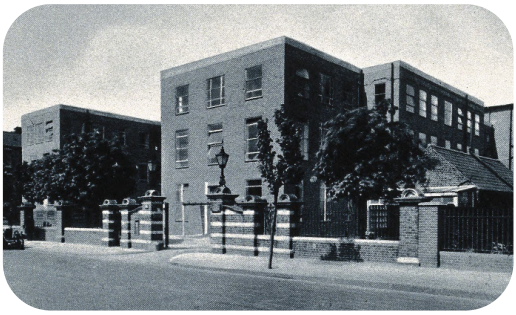
by Charles van Heyningen, retired Consultant Chemical Pathologist

The year 1953 was memorable in Britain for many reasons. Some remember the first description of the structure of DNA or the Nobel Prize being awarded for the discovery of the citric acid cycle. Others remember the devastating North Sea storm surge causing flooding, the Queen's coronation and the publication of the first James Bond novel.

In 1953, the Association of Clinical Biochemists (ACB) was founded mainly through the efforts of Earl Judson King (EJK). The earliest unofficial British meetings in Clinical Biochemistry were held in the 1940s when he added clinical papers to the annual meetings of the Biochemical Society. After such meetings, he would serve beer from a keg in his room at the Hammersmith Hospital in a bluff, friendly and forthright manner. In 1952, following a Biochemical Society meeting, he held another meeting of clinical biochemists at the London School of Hygiene and Tropical Medicine to elect a committee for Southern England.

A further meeting was held in a sanatorium in Shropshire with biochemists from the Midlands, the North West and Scotland to reconcile different points of view. With King's negotiating skills a synthesis of views instead of a compromise was achieved. Other existing societies, the Association of Clinical Pathologists and the Royal Institute of Chemistry, had decided against setting up subsections for Clinical Biochemistry. Against this background, the national Association of Clinical Biochemists was founded at the Hammersmith Postgraduate Medical School on 28 March 1953.

Earl Judson King (Biochemical Journal 1963)



The British Postgraduate Medical School, opened in 1935, where the ACB was founded in 1953

At this first meeting the Association was named and working rules were accepted. EJK served as Chairman for three years followed by another three as President. By the end of 1953 the ACB had 194 founder members and the membership has

grown tenfold to a current membership of 2000. The name of the Association was changed twice to recognise increasing numbers of medical members and a broader range of laboratory specialties.

In 1954 the International Federation of Clinical Chemistry (IFCC) was formed in Stockholm and EJK became Chair of the Committee of National Representatives. Thus he was able to ensure that the ACB was at once given international status and membership of the IFCC. In the United Kingdom, he gave valuable advice to ACB members, not only on scientific matters, but also on the training of biochemists and on laboratory standards. For many years, he was a scientific advisor on Clinical Biochemistry to the Minister of Health.

EJK was born in Canada where he graduated in Chemistry and Biology. At the age of 33 years, he was invited to become Head of the Chemical Pathology Department at the newly formed Postgraduate Medical School at the Hammersmith Hospital in London. His main research interests were silicosis and the phosphatase enzymes. With A. R. Armstrong in Toronto, he devised a method for the measurement of alkaline phosphatase. The units of enzyme activity became known as King-Armstrong units in all Clinical Chemistry labs.

EJK was the original author of Microanalysis in Medical Biochemistry, first published in 1946. The methods described involved using 0.1-0.2 mL of blood compared to 1-5 mL by earlier methods. He received many honours including the Queen's Coronation Medal and honorary degrees from universities in Norway and Iceland.

He was described as typically forthright in his manner and very direct, but nevertheless the kindliest of men, who made many friends. He was a good host. Each year he would invite any visitor or junior colleague to his home in Wembley if he knew they would otherwise be alone on Christmas Day. He suffered from a serious illness before his death at age 61 years, leaving behind his wife and two daughters.

References

1. E. J. King and the foundation of the ACB. *Proceedings of the ACB* 1963, volume 2, 5, 94-95.
2. Earl Judson King (1901-1962), *Biochemical Journal* 1963, 89, 401-4.
3. Prof E. J. King, *Nature* 1963, 197, 18.

Hammersmith Hospital with the Royal Postgraduate Medical School on the right.
© Hammersmith Hospital

Twenty-four hours in Laboratory Medicine circa 1953

by Peter Goddard, retired Consultant Chemical Pathologist

On qualification, the medical student was already a competent laboratory technician, carrying out Point-of-Care testing on the ward using the equivalent of a urinary dipstick with the apparatus illustrated. In the, then coincident, status of today's Foundation Year Two they could be appointed to the post of Resident Pathologist responsible for provision of emergency laboratory cover over a period of 24 hours or more.

On arrival in the laboratory in the morning, they were designated Transfusion Officer and became responsible for the confirmatory grouping and cross-matching of the day's orders for blood, occupying the specific laboratory area containing microscope and centrifuge allocated for this purpose. They were greeted by a cup of tea on the bench provided by one of the Wash-Up ladies from the autoclave room.

Meanwhile the rest of the laboratory technical staff were occupied with housekeeping duties for the day's work. There were solid chemicals to be weighed out and dissolved for stock and fresh reagents, Pasteur pipettes to be manufactured, and items to be prepared for issue to the wards. There were no plastics available and disposables few, therefore sterilised glass syringes were supplied accompanied by needles recently sharpened in-house. The preferred sample for blood analysis was serum, as chemically clean plain glass rubber stoppered tubes were available commercially for immediate issue. Otherwise, anticoagulated specimen tubes or Bijou bottles were prepared by the laboratory, predominately the fluoridated bottles for blood sugar determinations. The Bacteriological Department was busier than others with their requirement for sterilisation of equipment, the preparation of media and

Urinalysis test stand

its pouring into glass Petri dishes and biochemical test bottles.

No automation of any kind was available so all methods were manual and very time consuming. In Haematology the Medical Laboratory Technicians (MLSOs) spent much of the day performing red and white blood cell counts with stained blood film differentials and the determination of haemoglobin levels. Apart from routine blood grouping, the other main occupation was in coagulation determinations, though interestingly, the Prothrombin time was used as a Liver Function Test (LFT). Normal controls were provided by other unsuspecting patients or the laboratory staff themselves.

Bacteriological techniques were little changed from the standards of the previous two decades with the exception of the sensitivity tests for the then current increased number of the newer antibiotics.

The Biochemical department was also still incubating the technological explosion awaiting it in the subsequent decade. Again, methodology was all manual, restricting the number of determinations that could be performed during a single day such that group associated tests, for example LFTs, were performed in batches once a week. Most methodology was colorimetric, originating from the 1920s or 1930s. In general, colorimetric comparison had been, and for some continued to be, visual. A basic system using permanent stained glass disc standards, the Lovibond Comparator was widely used until the advent of the photoelectric colorimeter. Instructions for building one on a Do-It-Yourself basis was advocated in *Recent Advances in Clinical Pathology* (1947), but the commercial EEL Colorimeter became available from 1951. Calculations were assisted by the mandatory slide rule kept in one's white coat pocket, whilst results were expressed in milligrams per decilitre.

As there were no automatic pipettes, all calibrated pipettes required mouth suction without any form of protection, occasionally resulting in mouth contamination. The only exception was a pledget of cotton wool inserted in those used for amylase determinations to prevent contamination of the sample by saliva. Other possible hazards to be experienced included a shower bath of mercury resulting from the implosion of the glass volumetric apparatus of Van Slyke used for the determination of bicarbonate as total carbon dioxide content, or fire resulting from the combined disposal of a cigarette end (smoking was not banned in the laboratory except in Bacteriology) and acetone, used to dry washed glassware required for immediate re-use, in the same sink.

The two most frequently requested determinations were blood sugar and blood urea. For the first, the method of Folin and Wu (1920) was employed, involving the heating of a water bath by a Bunsen burner and the measurement of the reduction of a blue copper solution. For the second, both titrimetric and colorimetric methods were available. Urea was converted to ammonium carbonate by incubation with urease contained in Jack Bean meal (*Canavalia ensiformis*). Addition of an excess of weak alkali liberated ammonia as a gas which was aspirated into acid of a known standard and estimated by back-titration with a standard alkali. Alternatively, after incubation, proteins were precipitated and the ammonia treated directly with Nessler's Reagent (1852 and 1924) producing a yellow colour. This was faster, but the reagent, a complex iodomercuric salt, was difficult to prepare. It was usual to make duplicate analyses and take the mean of the two results. An internal control prepared from surplus sera from other patients was used for batch analysis but there was no inter-laboratory control system then in place.

Other analytes commonly determined were albumin, amylase, acid and alkaline phosphatase, bilirubin, cholesterol and total protein. There were other tests for protein variations estimated by turbidometric methods. An anomaly was the virtual non-existence of provision for sodium and potassium testing. Chemical methods were available involving precipitation as insoluble salts of uranium or platinum and then gravimetric or colorimetric assay, but these took some hours or even overnight processing. The laboratory would require 24 hours' notice if they were to be requested. It was not until 1947 that the first papers on Flame Photometric methodology for serum analysis appeared, and commercial instruments were not readily available until after 1953. One common investigation, now obsolete, was the determination of acidity in the Gastric Test Meal.

The laboratory closed at five o'clock and the Resident Pathologist provided the Out-of-Hours service. The tests usually needed were blood cross matching, blood sugar and urea, cerebrospinal fluid cytology, protein and bacteriology, and preliminary bacteriology investigation of various swab samples submitted. This continued into the night such that it was not worth going to bed until 2:00 am. ■

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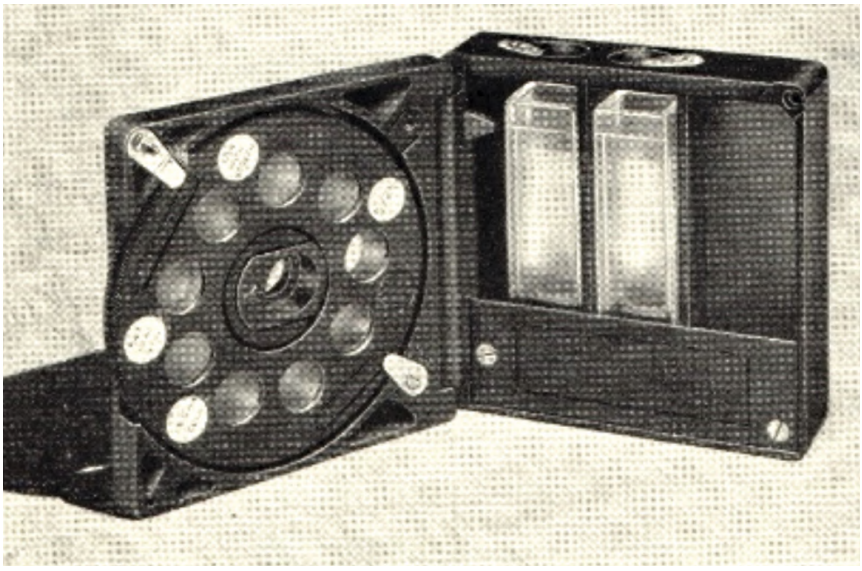

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ACB meetings

by Glyn Davies, former Clinical Biochemist at Broadgreen Hospital, Liverpool

As the ACB approaches its Platinum Jubilee, my thoughts go back to my early days in the NHS and to attendance at the first ACB meetings.

I would probably describe myself as a "grass roots" member of the ACB and apart from being a member of the North West Committee for a time I did not hold any office of note in the organisation. Over the years I must have attended dozens of meetings in all parts of the country including the National Meetings held annually. I think the one we organised in Liverpool in July 1982 was probably one of the last of the old type which were held in university halls of residence before moving on to Focus conferences.

I attended the first refresher course which was held in Birmingham in July 1958, but I must admit that the only thing I can recall is having visited Stratford to see a play at the theatre on the Wednesday evening! I also recall going to the Fourth International Congress on Clinical Chemistry held in Edinburgh in 1960. Again, I cannot remember any of the scientific programme, but some social events were held in a magnificent hall in the University and we also attended the Edinburgh Tattoo!

When I worked in London I attended the early ACB meetings and was present in the inaugural meeting in 1953 which was held, if I remember correctly, in a lecture theatre in the Hammersmith Hospital. As a very junior Biochemist I sat in the back row, whereas in the front row were some of the big names at the time, E. J. King, Professor Maclagan, Professor Wootton to name three only. The early meetings were held on Saturday afternoon with the occasional evening meeting held at various hospitals in London.

After moving to Liverpool I attended meetings of the North West Region which at that time extended east over the Pennines, to York, Leeds and Scarborough. Again the meetings were invariably held on a Saturday afternoon at various hospitals throughout the North West and could involve quite a lot of travelling – in the days before the motorway system was built – and often finding a hospital was a problem, but our guideline was to aim for a tall chimney, which was always part of the hospital boiler house, although this could prove misleading at times amongst the Lancashire mills!

The scientific part of the meeting usually consisted of members' papers, often presenting new methods which had been developed and with the occasional guest speaker. After the tea break there would be a professional meeting when various topics would be discussed, with varying degrees of passion, salary scales, on-call duties, the role of medical lab technicians, these came up for discussion and seemed to be a permanent agenda item. A regular at these meetings was Harold Varley, who worked at the Manchester Royal Infirmary and who published his well-known book on Clinical Biochemistry methods, the only other book available at that time was a small book written by Professor E. J. King. Joint meetings with the Association of Clinical Pathologists were held every so often.

My travelling companion to most of these meetings was Joe Ireland. He was at Alder Hey Hospital, which was about a mile from Broadgreen, and I used to

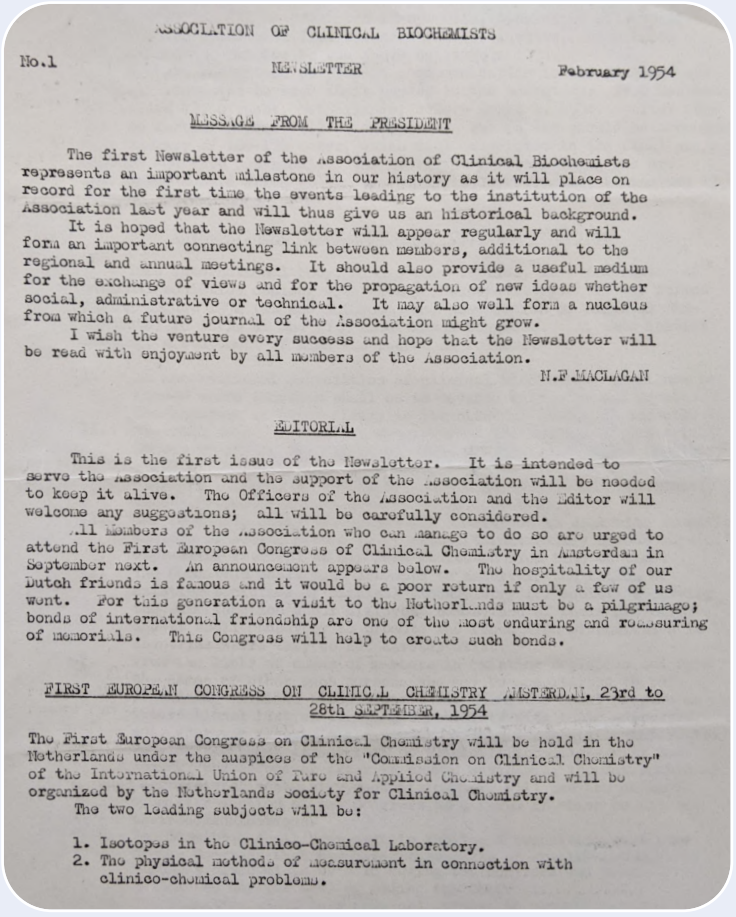
pop over there quite often for a chat. It was rumoured that he had a car but it was never seen and never left his garage!

In the early days of automation, Joe built his own version of a Technicon analyser, designed for micro samples. It looked like a Heath Robinson invention but seemed to work quite well, especially if he was around to "nurse" it! He was the ACB Business Manager at that time and spent a lot of his own time preparing the *News Letter* which was originally a typewritten duplicated publication.

Yes, in those early days the ACB was a fairly simple organisation and I don't cease to wonder at the fact that in the last Handbook I looked through, there were 16 pages devoted to Officials, Committees etc.

That's how we have progressed and developed over 70 years! ■

Photos from the Past



ASSOCIATION OF CLINICAL BIOCHEMISTS

No.1 NEWSLETTER February 1954

MESSAGE FROM THE PRESIDENT

The first Newsletter of the Association of Clinical Biochemists represents an important milestone in our history as it will place on record for the first time the events leading to the institution of the Association last year and will thus give us an historical background.

It is hoped that the Newsletter will appear regularly and will form an important connecting link between members, additional to the regional and annual meetings. It should also provide a useful medium for the exchange of views and for the propagation of new ideas whether social, administrative or technical. It may also well form a nucleus from which a future journal of the Association might grow.

I wish the venture every success and hope that the Newsletter will be read with enjoyment by all members of the Association.

N.F.MACLAGAN

EDITORIAL

This is the first issue of the Newsletter. It is intended to serve the Association and the support of the Association will be needed to keep it alive. The Officers of the Association and the Editor will welcome any suggestions; all will be carefully considered.

All Members of the Association who can manage to do so are urged to attend the First European Congress of Clinical Chemistry in Amsterdam in September next. An announcement appears below. The hospitality of our Dutch friends is famous and it would be a poor return if only a few of us went. For this generation a visit to the Netherlands must be a pilgrimage; bonds of international friendship are one of the most enduring and reassuring of memorials. This Congress will help to create such bonds.

FIRST EUROPEAN CONGRESS ON CLINICAL CHEMISTRY AMSTERDAM, 23rd to 28th SEPTEMBER, 1954

The First European Congress on Clinical Chemistry will be held in the Netherlands under the auspices of the "Commission on Clinical Chemistry" of the International Union of Pure and Applied Chemistry and will be organized by the Netherlands Society for Clinical Chemistry.

The two leading subjects will be:

1. Isotopes in the Clinico-Chemical Laboratory.
2. The physical methods of measurement in connection with clinico-chemical problems.

Front page of edition No 1 of the ACB Newsletter – February 1954. The first Editor was Arthur Jordan from Sheffield and this issue included an announcement of the first European Congress on Clinical Chemistry held in Amsterdam 23-28 September that year.

Clinical Biochemistry, education and professional recognition; a personal view

by Vincent Marks, retired Consultant Chemical Pathologist

Hospital Clinical Biochemistry barely existed when I joined the ACB in 1958, just five years after its formation by a group of hospital Biochemists led by Professor Earl King and some, mainly academic, Chemical Pathologists.

At the time of joining, I was a Registrar in Clinical Pathology at the Institute of Neurology, Queens Square, London, specialising in Chemical Pathology. I had just acquired, there being no higher qualification in laboratory medicine at that time, membership of the Royal College of Physicians of Edinburgh after completing one year's apprenticeship in all four branches of Pathology at St George's Hospital, London.

At Queens Square, I developed a special interest in both laboratory and clinical aspects of Endocrinology, of which there was a plentiful supply of clinical material because, in a hospital specialising in neurological disorders, none of the other junior staff had any interest in it.

I was fortunate to have as my tutors David Marrack, a Senior Registrar with a profound knowledge of Medical Biochemistry, who recruited me to the ACB, and Dr Gerald Curzon, a PhD Chemist researching Wilson's disease, who subsequently became a Professor of Neurochemistry.

In 1962 after completing an MRC research fellowship under Professor Charles Gray at King's, I was appointed to the newly created post of Consultant Chemical Pathologist to Epsom District as well as to the established post of Area Pathologist. This provided laboratory services to 11 Mental Health Hospitals, especially West Park Hospital which hosted the main laboratory.

My job specification was to build up and provide a consultative Chemical Pathology service to Epsom District Hospital, where previously there had been none, and to continue the clinical and research activities undertaken by Dr W W Kay, my predecessor at the Area Laboratory. My task was facilitated by the Principal Biochemist, Mr Denys Fry, and three other graduate scientists in addition to a large, well staffed and equipped laboratory.

Three important inventions/innovations in Clinical Biochemistry had occurred between the time I entered the profession and me becoming a Consultant. They were automation, radioimmunoassay and a growing appreciation of Clinical Biochemistry as a speciality within Pathology.

Through the ACB I met Ron Nunn, a senior non-medical hospital Biochemist and founder member of the ACB, who rapidly brought me up to speed vis-a-vis the medical politics of Laboratory Medicine.

In southern England, laboratory and medical consultative biochemical services were largely provided by medically qualified Chemical Pathologists under whom graduate scientists played a subservient role. Elsewhere in the country, biochemical

services were provided largely by chemists, a minority of whom had any postgraduate training and whose departments, except in teaching hospitals, were part of Clinical Pathology.

There was no formal training in Clinical Biochemistry, which was acquired by self-learning or, more rarely, formal apprenticeship to someone who was knowledgeable in the subject. No attempt was made to rectify this until the 1960s.

In the South, Dr Eric Reid, a Reader in Chemistry at the nascent University of Surrey, acting on advice from Mr Ron Nunn and other ACB members, set up an MSc course in Clinical Biochemistry in 1969. It was taught largely by Chemical Pathologists and principal hospital Biochemists in adjoining regions, with contributions by the University scientific staff. The course, which was unique, relied on a recently negotiated scheme known as block release and ran for about 35 years.

The first cohort of seven students started in London and moved to Guildford in 1970. Students were medical graduates who already worked in the NHS as Chemical Pathology Registrars and basic/senior grade hospital Biochemists. They were released on full pay in order to attend three, 10-week residential terms spread over two years.

I replaced Eric Reid when, in 1970, I was appointed Consultant Chemical Pathologist to the Guildford Hospitals and Professor of Clinical Biochemistry in Professor Parke's Department of Biochemistry, University of Surrey.

With help from Professor Ian Wootton, the recently appointed Chief Scientist to the Department of Health, I negotiated with several regional scientific officers to recruit a number of supernumerary basic grade Biochemists. They would do their apprenticeship in approved laboratories and, when graduated, fill the ever-growing number of NHS Biochemist posts. The course was also open to overseas students who were full-time and spent their university vacations as clinical laboratory apprentices in participating laboratories.

To supplement the existing university teaching staff, I recruited a medically qualified Clinical Biochemist as senior lecturer, Dr David Williams, who assumed day-to-day management of the course. Its contents were described in detail in two volumes, edited by David and me, joined, for the first volume of the first edition, by my old friend and mentor Ron Nunn.

Graduation with an MSc gave exemption from the primary exam for membership of the Royal College of Pathologists, which students were advised to join rather than taking the MCB examination, run jointly by the ACB, Royal Institute of Chemistry and the two Royal Colleges of Physicians and Pathologists.

Possession of the MCB, like membership of the College, signified completion of training. The two qualifications ran in parallel until 1990 when, as Vice-President of the College and President of the Association, I enabled a merger whereby former MCB holders were offered full membership of the College without further ado and the exam phased out.

I have always contended that Clinical Biochemistry (Chemical Pathology) is, like Haematology and Microbiology, as much a clinical as a pathological discipline. Indeed at St Thomas's, where I was a student, George Prunty, Professor of Chemical Pathology, ran a metabolic unit investigating and treating patients with endocrine and metabolic disorders. He had no visible contact with the hospital Biochemistry service, which was part of Pathology! I am delighted, therefore, that the Colleges of Physicians and of Pathologists have recently instituted a conjoined specialist qualification in Chemical Pathology/Metabolic Medicine for medical graduates ensuring that the clinical and laboratory aspects of the discipline are inextricably linked, as they undoubtedly should be. ■

A career in Clinical Pathology: 1961 to 1996

by Eva Lester, formerly of North Middlesex Hospital

In 1961 I embarked on a career in Clinical Pathology. As a senior house officer I was expected, after a very haphazard training programme of just a few days (as was usual in much medical education), to perform all the emergency on-call work in Chemical Pathology, Haematology and Microbiology without supervision. In Clinical Biochemistry this was mainly done with ill maintained flame photometers, manual glucose and urea methods and worst of all the Van Slyke apparatus. We junior doctors were not allowed near the recently acquired single channel autoanalysers. The results I produced were unreliable but at least I did not kill anyone by crossmatching blood wrongly.

I was one of the first candidates for the primary MRCPath exam of the newly established Royal College of Pathologists which at first required two disciplines. I passed the final examination, which was now focused down to Chemical Pathology, in 1972. The development of Clinical Biochemistry from then until I retired in 1996 was fast and exciting, stimulated by two parallel trends, firstly the enormous strides in laboratory methodology, automation, immunoassay, computerisation and external quality control, and secondly the advances in clinical medicine, drug treatment, renal dialysis, transplant surgery and resuscitation.

I was lucky to be in the right places at the right time. In the 1960s the Royal Free Hospital had one of the earliest renal dialysis units and the Hammersmith Hospital was evaluating Technicon multichannel autoanalysers, calcium and iron assays and initiated an external quality control scheme for which Clinical Biochemistry was the first discipline within the NHS to accept the need.

I was at St Albans District Hospital in 1970 when the senior surgeon, Sir Reginald Murley, who was the President of the Royal College of Surgeons, was an enthusiast for liver transplantation and volunteered us to provide donors for the liver cirrhosis team from King's College Hospital. The laboratory worked with them through the nights but initially all the patients died and the hospital administration lost heart.

In 1980 the North Middlesex was the first District General Hospital in the North East Thames Region to receive a prototype whole laboratory computer system. It never got as far as Histopathology and the computer firm collapsed, but the replacement system was successful and one of our biochemists was largely responsible for the hospital records system.

Over the 70 years of the ACB those of us working within the National Health Service have experienced and still are experiencing setbacks and frustrations, but the advances in treatment for patients are enormous and provide hope for the future. **Good luck for the next 70 years.**

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Four incredible female Biochemists and the impact of their discoveries

Co-written by Chloe Austin, Danielle Bell, Leanne Young and Georgia Pretlove-Smith

Dr Nina Carson (1923-2007)

by Chloe Austin, Clinical Biochemistry STP at Nottingham University Hospitals NHS Trust

Dr Nina Carson was a Northern Irish Consultant Paediatrician who was pivotal in the provision of newborn screening of inborn errors of metabolism (IEM) across Northern Ireland, and also described the biochemical properties of the previously unknown disease, homocystinuria. After graduating from Queen's University, Belfast in 1946, Nina held multiple different roles throughout her 37-year-long career, including Assistant Clinical Pathologist, Clinical Research Fellow, Senior Lecturer and Consultant Paediatrician.[1]

In 1963, while completing an MD, Nina identified many cases of undiagnosed phenylketonuria (PKU) in children and adults with mental disabilities, while also identifying a new disease, homocystinuria.[1] This prompted her to improve the newborn screening services for IEM disorders offered in Northern Ireland, as early diagnosis and treatment of PKU can prevent any severe symptoms. She was involved in the improvement of the screening test for PKU and assisted with the introduction of the newborn heel prick screening (Guthrie) programme in the late 1960s. Throughout the rest of her career, she contributed to the improvement of the newborn screening programme (including the introduction of screening for congenital hypothyroidism), the understanding of homocystinuria and its treatment, and also the treatment for patients with PKU as a member of the Medical Research Council Steering Committee for Phenylketonuria.[2]

Gerty Cori (1896-1957)

by Danielle Bell, Clinical Biochemistry STP at NHS Grampian

In 1947 Gerty Cori, a Czech-American Biochemist, became the third woman to win a Nobel Prize in science and the first woman to obtain the Nobel Prize in Physiology or Medicine for her part in the *"discovery of the course of the catalytic conversion of glycogen"*.[3]

Gerty married her husband, Carl, in 1920 before emigrating to the United States for better opportunities after the First World War. The couple collaborated in the majority of their research together but despite Gerty's research experience, she struggled to get a research job because of

her gender, forcing her to take assistant positions. She was paid a fraction of her husband's salary, as she was told she could impede his career.[4] While working at Washington University, in 1939, they isolated glucose-1-phosphate (Cori ester) which is needed for glucose conversion, followed by the discovery of phosphorylase, an enzyme needed to break down muscle glycogen.[5] Glucose metabolism was named after the couple, known as the Cori Cycle.[6] After 13 years, Gerty was offered the same job position as her husband, followed by a promotion to Professor months before the Nobel Prize Award. She remained in this position until her death in 1957. Her research has been vital in the development of diabetes treatments and she is considered one of the pioneering women in Biochemistry.

Cathy Sturgeon (1951 – present)

by Leanne Young, Clinical Biochemistry STP at The Royal Wolverhampton NHS Trust

Cathy Sturgeon is a Consultant Clinical Scientist in Clinical Biochemistry. Cathy completed her degree at the University of Birmingham where she majored in Chemistry and followed by a PhD. After this she then headed to Miami to do a postdoc. Eventually she settled down in Edinburgh where she had her first post at the Regional Hormone Laboratory. It was here that she started to make her mark in the world of tumour biomarkers. She developed an in-house tumour marker assay for carcinoembryonic antigen (CEA). It was this development that then led on to a tumour marker service at the Royal Infirmary in Edinburgh. Not only did she play a major role in tumour marker diagnostics, Cathy also had a position in the United Kingdom National External Quality Assessment Service (UK NEQAS) centre in Edinburgh. In 1988 she was invited to set up a scheme for tumour markers, which included CEA. Throughout her career she had many great opportunities that she took in her stride, yet always maintaining modesty. She has visited over 30 countries throughout her Clinical Scientist career, broadening her experiences and knowledge. From a young age Cathy knew she wanted a career in Chemistry and her sheer talent and determination saw her through her career. Alongside her laboratory work, she was also an Honorary Lecturer at the University of Edinburgh. One of her many great achievements was winning The Morton K. Schwartz Award for Significant Contributions in Cancer Research Diagnostics in 2009. (Adapted from ***Clinical Chemistry* Volume 62, Issue 11, Catharine Sturgeon** [accessed on: 18/05/2023]).

Dorothy Crowfoot Hodgkin (1910-1994)

by Georgia Pretlove-Smith, Clinical Biochemistry STP at Nottingham University Hospitals NHS Trust

It was early on in her research career that Dorothy became engrossed with the use of X-ray crystallography to map the structure of complex organic molecules, particularly insulin. The majority of her research took place at Oxford, during which time she was diagnosed with rheumatoid arthritis.

After a particularly severe flare-up in her mid-twenties, Dorothy lost significant

mobility in her hands that prevented her from operating her laboratory equipment. Undeterred, accessibility modifications were made to the equipment, and Dorothy continued on to be the first to map the final structure of Vitamin B12 and Penicillin. Her team were the first to report the β-lactam structure of penicillin which consequentially led to the mass production of the antibiotic.[7]

In recognition of her research, Dorothy was awarded the 1964 Nobel Prize in Chemistry "for her determinations by X-ray techniques of the structures of important biochemical substances". Following this prestigious accolade, Dorothy finally solved the atomic structure of insulin after three decades of research in 1969, allowing for the eventual mass production of insulin.[8] It is reported that Dorothy elected to spend the majority of her Nobel Prize winnings in funding the relocation of foreign research students to the UK. Outside of her research, Dorothy was a champion against social inequalities and world conflict, and was consequently elected President of the Pugwash Council from 1976-1988. Dorothy dedicated a large portion of her life travelling the world and giving talks about her research and the importance of insulin in diabetes.[9] ■

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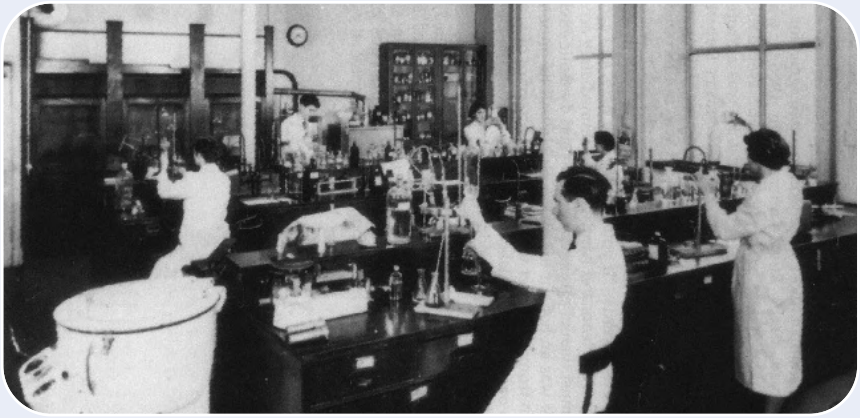

Castle Street Laboratory, Maryfield Hospital, Dundee, 1957. Photo supplied by Elliott Simpson

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Memories from the Mesozoic era

by Graham White, slowly retiring BMS, Hampshire

As I approach retirement after a career of 45 years I often look back at how things have changed when teaching the future generation. I was very fortunate to join the Royal Air Force as a 'lab tech' and then receive my first posting to Ely in February 1978. This was a small hospital catering for local residents and serving personnel.

There were no automated analysers, we used test tubes for everything except sodium and potassium. Urea and electrolytes were started daily at 14:00 with results available (handwritten) at 16:00. Liver function tests were performed twice a week with calcium and cholesterol once per week. Investment in 1983 bought us the automated joys of the Technicon Quantachem; a pneumatic driven beast that ran one test at a time but this was soon replaced with the Hitachi 705 enabling us to offer a service more in line with today's technology.

On arrival, the junior staff were responsible for making up the analytical reagents and it was fascinating to note many chemicals in the store cupboard were from the 1940s; no such thing as expiry dates. A newly posted Pathologist wanted to start running HbA1c and we went with a method using BioRad columns. The downside was that one of the handmade buffers required 13 g of potassium cyanide. We did keep a cyanide antidote kit close by but I often wonder whether it was more for reassurance than of any practical use.

The most unpleasant analytical task was always the 3-5 day faecal fats; these were kept in the cupboard as long as possible until the requesting consultant starting chasing the results. Luckily for us, one of our Pathologists hated the test and managed to stop all requests in less than one minute. A junior houseman came in to complain that he still didn't have the results. Our pathologist took the sample and houseman to the toilet, threw the entire sample down the pan and asked the houseman if he could see any fat globules in the water and then flushed the toilet.

Staff were required to work in all disciplines. There was no electronic issue of blood and a crossmatch used to take a minimum of 90 minutes. We had a programme where World War II Far East Prisoners of War (FEPOW) would be assessed as inpatients and the parasitology findings could be very interesting.

Following basic training, higher training was using the old, two year Higher National Certificate (HNC) route but promotion was dependent on passing internal exams. Naturally not everything was work and Wednesday afternoon was for sport. If you were chosen to represent the station at a sport you had that afternoon off; if you were not chosen you covered for those who were more talented than yourself.

I do find myself missing those days but the lessons on analytical principles in test tubes I still use in teaching today. I was also privileged to work with many great and inspiring people.

RAF Ely, as I knew it, closed in 1992, but my time there will always be fondly remembered. I left the RAF in 1996.

Per ardua ad astra. ■

Pioneers at Great Ormond Street Hospital

by Alistair Horman, Consultant Clinical Scientist in Chemical Pathology, and Derek Burke, Lead Healthcare Scientist, Enzyme Unit (both Great Ormond Street Hospital)

As we celebrate the 70th anniversary of the ACB, it's a good time to pause for thought, take a sip of coffee and reflect on the many discoveries and accomplishments that have been made in the profession throughout those 70 years. One might take a walk through the modern lab – past the mass spectrometry suite or the banks of automated analysers. Of course Clinical Biochemistry wasn't always like this, but that didn't deter our predecessors from making the advances they did and today we stand on their shoulders and we admire their achievements.

At Great Ormond Street Hospital (GOSH) there is a rich tapestry of scientific accomplishment and excellence and it's a tough ask to put these into a meaningful compendium, but we thought on this special occasion we would try.

Historically, the Clinical Chemistry laboratories at GOSH were in the hospital itself next to the metabolic and endocrine wards, and other lab services lay within the Institute of Child Health (ICH) on Guilford Street. It was in both these places that pioneers drove advances in the field of clinical chemistry. One such pioneer was Barbara (later Dame Barbara) Clayton. She was appointed Professor of Clinical Chemistry at GOSH in 1959 but by this time she had already made significant contributions to the field of endocrinology through her PhD at Edinburgh and research work at St Thomas's Hospital in London. At GOSH she lobbied government to introduce screening for phenylketonuria (PKU) in newborns and not only delivered one of the first newborn screening services for PKU in the UK in 1969, but also worked with milk manufacturers and the hospital's dieticians to optimise the special diets that children with this condition needed.

Ten years later she pioneered newborn screening for congenital hypothyroidism and GOSH became the first lab in the UK to offer this test. We wonder what she would have made of recent proposals to introduce genetic testing at birth. Later, she developed an interest in toxicology and helped raise awareness of the dangers of lead exposure by measuring lead in children's blood. She was a member of the Royal Commission on Environmental Pollution whose recommendations later led to the banning of lead in petrol and paints.

In the 1960s, Clinical Chemistry techniques still relied on large sample volumes but Barbara made it one of her missions to push laboratories towards the adoption of 'ultramicro' systems and published detailed practical means to achieve this – something

Dame Barbara Clayton

that was especially important in the paediatric setting. These days perhaps we take for granted how much chemistry can be performed using a tiny sample.
At various times in her life, she was President of the RCPath, the ACB and the SSIEM and a member of the GMC and Department of Health education committees. It shouldn't be overlooked either that much of her career blossomed at a time when much fewer women worked in the profession. She was rightfully made a Dame of the British Empire in 1989. A stunning career and true pioneer.

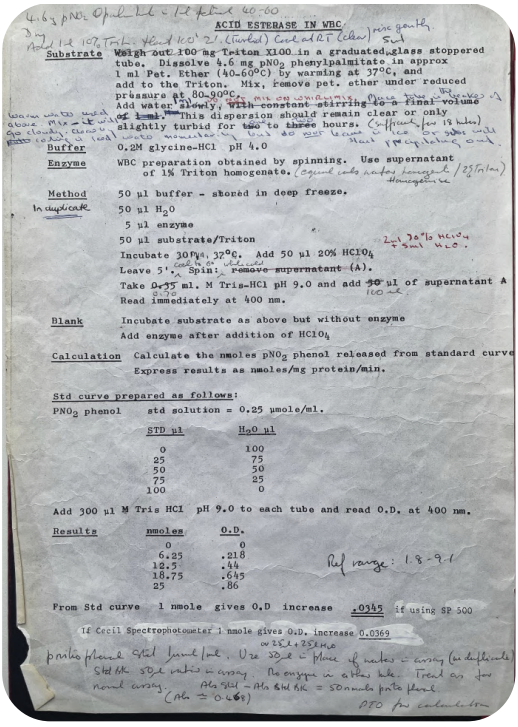
Since its beginnings in 1959, the enzyme laboratory at GOSH quickly became a centre of excellence. Today it serves as a reference centre and houses nationally commissioned services for lysosomal and glycogen storage disorders. Whilst these services blossomed under its collective staff, a number of key individuals drove advances in these specialist fields over this period. Dr Des Patrick was appointed Professor of Enzymology at ICH in 1977. He published many papers that contributed to our understanding of several inherited disorders of intermediary metabolism and related pathways. These included glutaric aciduria type 2, maple syrup urine disease, tyrosinaemia type 1, cystinosis and gamma-glutamyl transpeptidase deficiency, but it was in the field of Enzymology that he was best known. His *Nature* paper in 1969 was the first to describe acid lipase deficiency in Wolman disease (now termed LALD). He had also earlier made advances in understanding Gaucher disease. This condition was first described in 1882 in a 32-year-old female with massive splenomegaly. Later characterised by the accumulation of hepatic glucosylceramide, it was Professor Patrick and others who demonstrated a deficiency in B-glucosidase activity in this condition. Amazingly, it was the accumulated substrate in spleens from

Time for tea – Enzyme lab staff take a break on the roof including Tony Whitfield, Liz Young and Des Patrick

Gaucher patients that was isolated and used as substrate in the B-glucosidase assay, the end-point being liberation of glucose. However, diagnostic approaches to lysosomal enzyme deficiencies were undergoing somewhat of a revolution. Historically, these had relied heavily on clinical findings and histochemical analyses and the advent of electron microscopy added further detailed evidence of tissue storage. With respect to enzymology Professor Patrick had already demonstrated a ten-fold increase in sensitivity in the B-glucosidase assay by using a synthetic colorimetric substrate p-nitro-phenylglucoside. This was further improved with a one-hundred-fold increase in sensitivity using fluorogenic '4-MU' substrates and soon the enzyme lab had applied this to the diagnosis of Tay-Sachs, Sandhoff and Fabry diseases, as well as GM1 gangliosidosis, mannosidosis, fucosidosis and several of the mucopolysaccharidoses (MPS disorders). A blossoming era began and the production line was prolific – a test for metachromatic leukodystrophy in urine using p-nitrocatechol sulphate, a home-synthesised natural substrate for the diagnosis of Krabbe leukodystrophy, Alcian blue to quantify urine

mucopolysaccharides and qualitative methods employing 1D and 2D electrophoresis. Some extraordinary individuals helped push these developments including Tony Whitfield, Guy Besley, Roly Ellis, Paul Willcox, Paul Whiteman and Bryan Winchester. A major breakthrough was the application of many of these methodologies in other tissues – first cultured fibroblasts, then amniotic cells and chorionic villus sampling that opened the door to accelerated pre-natal testing. Much of this work was realised by Liz Young.

All of these methodologies exist in routine use to this day and in other centres across the UK. Clearly genetics now serves as an important adjunct, but we know that genetics cannot always provide a reliable answer and traditional biochemical assays remain essential. The field is emerging now with an ever-growing plethora of biochemical markers that add further information to a storage disorder phenotype and these need the specificity and speed that can only be delivered by mass spectrometry. GOSH labs continue on this journey to evaluate such markers, but the traditional methodologies still play a part. A fusion of the old and new is our current evaluation of the use of microfluidics to determine enzyme activity in dried blood spots – it uses the same principles as current enzyme assays but uses robot-controlled nanolitre quantities of reagent and substrates. And it can be used to test for Gaucher disease. Penny for the thoughts then of our predecessors as they tussled to extract glucocerebroside from human spleen using acetone, chloroform, methanol, boiling ethanol, filtration, crystallisation and pyridine. All for a 20% yield. It was worth the effort guys, thank you. ■



ACID ESTERASE IN WBC

Substrate — Weigh out 100 mg Triton X100 in a graduated glass stoppered tube. Dissolve 4.6 mg pNO_2 phenylpalmitate in approx 1 ml Pet. Ether (40-60°C) by warming at 37°C, and add to the Triton. Mix, remove pet. ether under reduced pressure at 80-90°C. Add water slowly, with constant stirring to a final volume of 1 ml. This dispersion should remain clear or only slightly turbid for two to three hours.

Buffer — 0.2M glycine-HCl pH 4.0

Enzyme — WBC preparation obtained by spinning. Use supernatant of 1% Triton homogenate.

Method — 50 µl buffer - stored in deep freeze.

In duplicate — 50 µl H_2O
5 µl enzyme
50 µl substrate/Triton
Incubate 30 min. 37°C. Add 50 µl 20% $HClO_4$
Leave 5'. Spin; remove supernatant (A).
Take 0.35 ml. M Tris-HCl pH 9.0 and add 50 µl of supernatant A
Read immediately at 400 nm.

Blank — Incubate substrate as above but without enzyme
Add enzyme after addition of $HClO_4$

Calculation — Calculate the nmoles pNO_2 phenol released from standard curve
Express results as nmoles/mg protein/min.

Std curve prepared as follows:
PNO_2 phenol std solution = 0.25 µmole/ml.

STD µl	H_2O µl
0	100
25	75
50	50
75	25
100	0

Add 300 µl M Tris HCl pH 9.0 to each tube and read O.D. at 400 nm.

Results	nmoles	O.D.
	0	0
	6.25	.218
	12.5	.44
	18.75	.645
	25	.86

Ref range: 1.8-9.1

From Std curve 1 nmole gives O.D increase .0345 if using SP 500

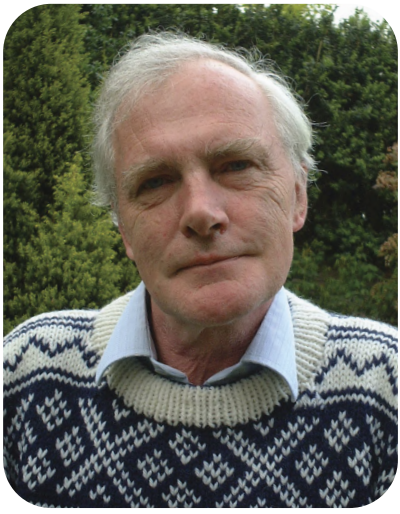
If Cecil Spectrophotometer 1 nmole gives O.D. increase 0.0369

Acid esterase SOP from the 1970s

Setting up a digital microfluidics assay to measure enzyme activity in dried blood spots

Clinical Biochemistry is fun!

by Gordon Challand, retired Consultant Clinical Biochemist



Scott of the Antarctic spoke of the wonder of making the first footsteps. Situated as it is at the junction of three disciplines, Clinical Biochemistry offers endless opportunities to make the first footsteps across discipline boundaries and to the world beyond. And what other subject offers you the opportunity to save a young girl's life with a simple phone call? A 12-year-old, who had been prescribed aspirin for joint pain, produced a set of alarmingly elevated liver function tests. No-one would have looked at these until her next outpatient visit three weeks ahead. The Consultant paediatrician was at first inclined to dismiss the results as 'obviously a laboratory error' (something we hear too often) but I politely corrected this idea and convinced him of the probability of Reye's Syndrome, which has I believe an 85% mortality rate. The Trainee who was sitting with me at the time probably still remembers this.

I started work as a Clinical Biochemist in 1970 at St Bartholomew's Hospital in Smithfield and was soon thrown in at the deep end. A local GP phoned the laboratory and demanded to speak to a doctor. There was no-one else around with a doctorate qualification, so I was sent to answer the phone and tried to explain the diagnosis of diabetes mellitis, greatly to everyone else's amusement. However, I soon graduated upward, and was shown by my boss a box the size and shape of a small wardrobe. He said, "that is a computer, can you make it do something useful?" What an opportunity, it was a DEC computer with a princely 8K of store, I even taught it to say 'please' when asking a user to do something.

St Bartholomew's Hospital has a fascinating history; it was old when William Wallace was put to death outside. This gave me the opportunity to explore history and Departments other than my own. One day, I was asked to stay late to show a group of Japanese visitors around, and invited to a light supper in the Great Hall. This was a long way away from a light supper, in a magnificent double cube hall with a staircase painted by William Hogarth. I also found the Old Pathology Museum, which among other delights included a human ear, bitten off a sailor in an open boat during the Second World War by a fish. The sailor insisted on eating the fish, but was persuaded to part with its head, which enabled its identification as a Spanish mackerel. I also found the Sherlock Holmes room, complete with a plaque saying those immortal words 'I perceive you have been in Afghanistan, Dr Watson'. I was lucky enough still to be at St Bartholomew's Hospital's 850th Anniversary, when the late Queen came to visit.

In those days, we were encouraged to move between different posts since this was considered to be for the overall good of the service. We thus had the opportunity to explore different hospitals and departments and to make new friends. Later, this was reversed, with the danger of creating insular departments unresponsive to new ideas. Similarly, a policy of encouraging study leave to improve education opportunities was reversed, and I was even once told I was not entitled to study leave.

I wanted to describe modern management in terms of mathematical entropy (increasing disorder), but this was beyond me and the opportunity to make another first footstep was lost.

Other opportunities can arise. For some years, I had been asked to give lectures both in the UK and abroad. This was because Conference Organisers decide a list of topics, and then decide who to ask to give each one. When they couldn't think of anyone else, they asked me. I particularly liked the request that I talked on the subject of 'Lifestyle Illnesses'. No-one minded if I took time off to give a lecture, just so long as I did not ask for any expenses. They probably preferred me to be away. I thus found myself teaching all over the world and discovered that teaching was perhaps the most fun of all. Surprises could arise. I was asked by a group of Chinese University students to join them one evening in the campus bar. What did they want me to talk about? Manchester United Football Club, a subject about which I knew virtually nothing.

A second delight occurs at many conferences: we share the hotel and conference facilities with other professional groups and have the opportunity to observe them in action. I certainly remember two; First, in Amsterdam, the convention of tattooists. I've never seen anything like it! Second, in Denpasar in Bali, the women's international Japanese martial arts competition. The hotel was full of delightful young ladies who were unbelievably polite to everyone, but then kicked hell out of each other in the ring.

Once when in Beijing, I was taken to see a Lama from Lhasa who was sitting on the floor surrounded by acolytes and had been told that I taught a lot in China. He asked what the best thing was about teaching. I replied, 'to see your students do well'. He laughed and said 'You must come and see me again and we will talk some more. Sadly, that opportunity never came. Making good professional contacts and interactions, together with professional friends, is so important, and in my career in our wonderful subject, I had so much fun. Persevere and the fun can still be found. ■

Nil illegitimae carborundum!
to paraphrase Margaret Atwood
***A Handmaid's Tale*, 1984**

Alkaline phosphatase: a trip down memory lane

by Dr David Wile, retired Consultant Chemical Pathologist, Liverpool

In 1987, I was appointed as a Registrar in the Department of Chemical Pathology at the Hammersmith Hospital where the Head of Department was Professor Donald Moss, who had an established international reputation as an Enzymologist and who wrote with Ralph Henderson and John Kachmar the chapter on enzymes in *Tietz*. The enzyme research in the department centred on alkaline phosphatase (EC 3.1.3.1 orthophosphoric-monoester phosphohydrolase), in particular the isoenzymes thereof, much of the work being undertaken by Dr Katrine Whittaker. Donald Moss had tasked her with teaching me – and I was soon introduced to a water bath with a stirrer inside it, out of which at the top protruded a very long and very accurate (1/10th degree Celsius) mercury in glass thermometer. The day came when I was allowed to carry out the whole procedure unsupervised – and I unfortunately caught the sleeve of my white coat on the top of the thermometer and it snapped! There was not another one in the stores so one had to be ordered from Baird and Tatlock which took 10 days to arrive, with a consequent hold up to the process!

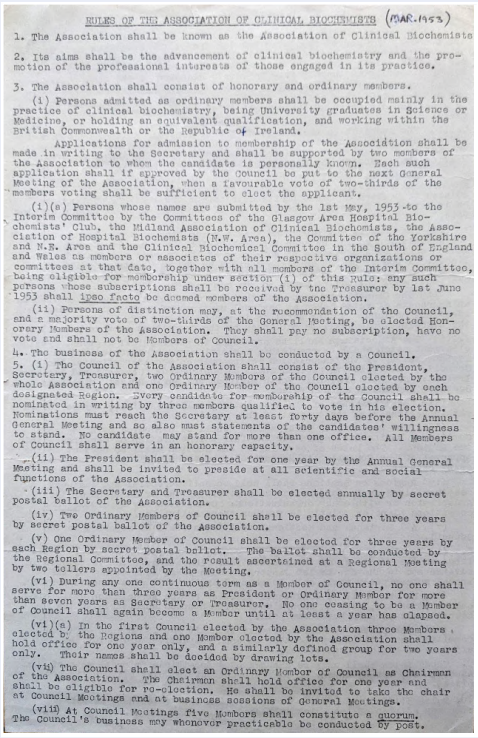
The serum samples were placed in thin-walled glass tubes called Dreyer tubes and sealed with parafilm, making sure the samples were below the water level. The samples were then heated for *exactly* 10 minutes, using a stopwatch, at 56°C and then put into iced water. The cooled samples could then be analysed to ascertain how much ALP activity they possessed. The optimal activity of the isoenzymes *in vitro* is about pH10 and the most widely used substrate for ALP at the time was paranitrophenol phosphate (pNPP) which is colourless. The product of enzyme action, 4-nitrophenol (4NP), is yellow coloured, enabling colourimetric assay. However, you had to be careful which manufacturer's assay you used as some worked at 37°C, others worked at 30°C and one I seem to remember at an even lower temperature. Liver ALP is more heat stable than bone ALP and placental ALP is remarkably heat stable preserving activity after 30 minutes at 65°C. By measuring the amount of activity as a percentage that was present after heat inactivation treatment, you could work out

Professor Donald Moss

which was the dominant isoform.

It was also possible to use cellulose acetate electrophoresis at alkaline pH to separate ALP isoforms, followed by incubation with a buffered substrate for which a chromogenic system was added to visualise the enzyme in the gel. However, the real, and clinically useful, advance came with the use of neuraminidase. The *brief* treatment with neuraminidase removed the negatively charged sialic acid residues of the bone ALP more readily than those of the liver isoform so that the mobility of the bone isoform was reduced more than that of the liver. The intestinal isoform does not have any sialic acid residues (it is asialated) and so remains in the same place in both the pre-treatment and treatment lanes. Nowadays, wheat-germ lectin is used, which binds to sialic acid residues and therefore retards the bone isoform more than the liver isoform. For many years, laboratories relied on sample exchange to monitor the performance of ALP isoform testing but an EQA scheme has now been established by IMMQAS. We hope this scheme will be a vehicle to improve the pre-analytical, analytical and post analytical aspects of ALP isoform analysis in the modern era. ■

Photos from the Past



RULES OF THE ASSOCIATION OF CLINICAL BIOCHEMISTS (MAR.1953)

1. The Association shall be known as the Association of Clinical Biochemists

2. Its aims shall be the advancement of clinical biochemistry and the promotion of the professional interests of those engaged in its practice.

3. The Association shall consist of honorary and ordinary members.

(i) Persons admitted as ordinary members shall be occupied mainly in the practice of clinical biochemistry, being University graduates in Science or Medicine, or holding an equivalent qualification, and working within the British Commonwealth or the Republic of Ireland.

Applications for admission to membership of the Association shall be made in writing to the Secretary and shall be supported by two members of the Association to whom the candidate is personally known. Each such application shall if approved by the Council be put to the next General Meeting of the Association, when a favourable vote of two-thirds of the members voting shall be sufficient to elect the applicant.

(i)(a) Persons whose names are submitted by the 1st May, 1953 to the Interim Committee by the Committees of the Glasgow Area Hospital Biochemists' Club, the Midland Association of Clinical Biochemists, the Association of Hospital Biochemists (N.W. Area), the Committee of the Yorkshire and N.E. Area and the Clinical Biochemical Committee in the South of England and Wales as members or associates of their respective organizations or committees at that date, together with all members of the Interim Committee, being eligible for membership under section (i) of this Rule: any such persons whose subscriptions shall be received by the Treasurer by 1st June 1953 shall ipso facto be deemed members of the Association.

(ii) Persons of distinction may, at the recommendation of the Council, and a majority vote of two-thirds of the General Meeting, be elected Honorary Members of the Association. They shall pay no subscription, have no vote and shall not be Members of Council.

4. The business of the Association shall be conducted by a Council.

5. (i) The Council of the Association shall consist of the President, Secretary, Treasurer, two Ordinary Members of the Council elected by the whole Association and one Ordinary Member of the Council elected by each designated Region. Every candidate for membership of the Council shall be nominated in writing by three members qualified to vote in his election. Nominations must reach the Secretary at least forty days before the Annual General Meeting and so also must statements of the candidates' willingness to stand. No candidate may stand for more than one office. All Members of Council shall serve in an honorary capacity.

(ii) The President shall be elected for one year by the Annual General Meeting and shall be invited to preside at all Scientific and Social functions of the Association.

(iii) The Secretary and Treasurer shall be elected annually by secret postal ballot of the Association.

(iv) Two Ordinary Members of Council shall be elected for three years by secret postal ballot of the Association.

(v) One Ordinary Member of Council shall be elected for three years by each Region by secret postal ballot. The ballot shall be conducted by the Regional Committee, and the result ascertained at a Regional Meeting by two tellers appointed by the Meeting.

(vi) During any one continuous term as a Member of Council, no one shall serve for more than three years as President or Ordinary Member for more than seven years as Secretary or Treasurer. No one ceasing to be a Member of Council shall again become a Member until at least a year has elapsed.

(vi)(a) In the first Council elected by the Association three Members elected by the Regions and one Member elected by the Association shall hold office for one year only, and a similarly defined group for two years only. Their names shall be decided by drawing lots.

(vii) The Council shall elect an Ordinary Member of Council as Chairman of the Association. The Chairman shall hold office for one year and shall be eligible for re-election. He shall be invited to take the chair at Council Meetings and at business sessions of General Meetings.

(viii) At Council Meetings five Members shall constitute a quorum. The Council's business may whenever practicable be conducted by post.

5. (ix) Casual vacancies in the Council shall be filled by appointment by the Council, the person appointed holding the office until the next Annual General Meeting. A successor shall then be elected in the appropriate way to fill this post for the balance of its term. Such a person shall not be disqualified thereby from immediate election to the same post.

(x) The Council may appoint ad hoc or standing committees along or in conjunction with other bodies. The activities of these committees shall be under the direction of the Council to whom regular reports shall be made.

6. (i) The Association shall hold an Annual General Meeting. The Council may convene other General Meetings. Notice of a Meeting shall be posted to members at least four weeks before the Meeting. The Annual General Meeting shall receive the reports of the Secretary and Treasurer.

At General Meetings thirty members shall constitute a quorum. Any special resolution to be proposed at a General Meeting shall be circulated to members at least thrity days before the Meeting. Voting shall be in person or by proxy. The Chairman of the Meeting shall have a casting vote.

(ii) The Council may recommend that any question at issue be decided by the Association voting by secret postal ballot. The result of such a ballot shall be ascertained at a Meeting of the Council and shall be published. A postal ballot shall be decided by the requisite majority of the votes received from not less than thirty members within thirty days from the posting of the ballot paper to the members.

(iii) The Council may recommend that any question at issue be decided by an aggregate of votes taken at Regional Meetings of each Region voting on identical motions. Voting shall be in person or by proxy. The result of the aggregate vote shall be published by the Council as soon as possible.

7. (i) The Association shall be organized in geographical Regions. Regional organization shall be regulated, Regional boundaries varied and new Regions set up by the Association acting only on recommendation of the Council. The following Regions shall be designated: Scotland and Northern Ireland; Northern England; North Midlands and North Wales; Midlands; Southern England and South Wales.

(ii) Local branches of the Association, called Sections, may be formed within Regions with the consent of the Council.

(iii) The business of each Region shall be conducted by a Regional Committee, having due regard for the fair representation of Sections within the Regions. The Rules of each Region and Section shall be subject to the approval of the Council. All Members of Committees shall serve in an honorary capacity.

(iv) Regions or Sections shall hold Scientific, social and business meetings alone or in conjunction with other Regions or Sections of the Association or with other organizations. Committees may appoint ad hoc committees alone or jointly to further these activities.

(v) All Regional and Sectional activities shall be reported to the Council.

8. (i) Ordinary members shall pay a yearly subscription of thirty shillings to the Treasurer of the Association. The subscription is payable in advance and is due on the 1st January in each year. The amount of the annual subscription shall only be changed by the vote of a General Meeting.

(ii) No one shall be considered a member of the Association until his subscription and, save in exceptional circumstances acceptable to the Council, all arrears have been paid.

(iii) The Treasurer shall normally transmit yearly to each Regional Committee ten shillings per member of each respective Region for the expenses of Regional activities.

9. These Rules shall only be changed by a two-thirds majority vote of the Association, voting in any of the ways set out in Rules 6(i), 6(ii) and 6(iii).

10. Rules 3(i)(a) and 5(vi)(a) together with this Rule shall be deleted from any edition of the Rules published after 31st August, 1953.

The Rules of the Association of Clinical Biochemists (March 1953)

How automation completely changed TDM analysis in Laboratory Medicine

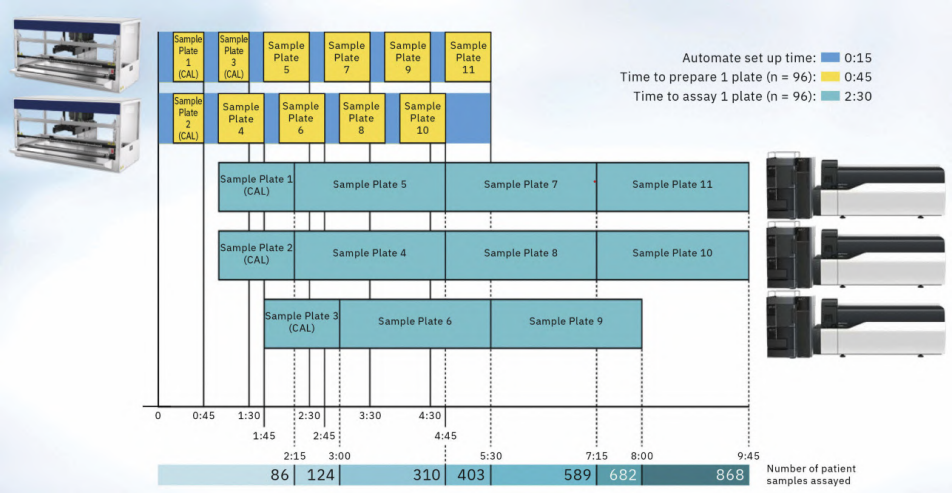
by Patty Pan, Shimadzu UK Ltd

Before techniques such as GC-/LC-MS were used for therapeutic drug monitoring (TDM) analysis, the 1980s used immunoassays and HPLC to provide appropriate results. In the late 1990s, TDM objectives (i.e. to reduce patient risk by adjusting drug dose within the target concentration range) were defined. From around 2000, mass spectrometry developed from room to benchtop size.

In recent years, NHS England has consolidated hospitals into 29 pathology networks. These hub hospitals unify their sample analysis, leading to more efficient workflows and potentially saving the NHS money. Consequently, sample numbers at hubs are increasing, emphasising requirements to develop both automated sample preparation and clinical LC-MS analysis.

TDM analysis, from multiple biofluid matrices, requires complicated and/or time-consuming sample preparation, increasing the likelihood of introducing human error, potentially impacting outcome. Time to develop and validate in-house methods is often overlooked, not to mention the time taken for training and troubleshooting. From the 2010s, an effective, accurate and time saving approach using standardised reagent kits on a fully automated LC-MS was available to streamline TDM analysis

During this time, solutions included off-line automated sample preparation (liquid handling) and options for online, fully automated, LC-MS clinical analysers. Each offers benefit for clinical TDM users. Off-line automated sample preparation is



Example of configuration for high-throughput analysis with automated sample preparation and CE-IVD / IVDR class A devices

flexible and adaptable for existing in-house methods; however, human intervention is often required. Fully automated LC-MS clinical analysis minimises human intervention, meaning staff can focus on other tasks. These automated LC-MS analysers work with in-house methods but are perfect with commercial CE/IVD (IVDR) reagent kits. A significant benefit, especially for support, arises from a complete solution (reagent kit, hardware and software) from a single vendor.

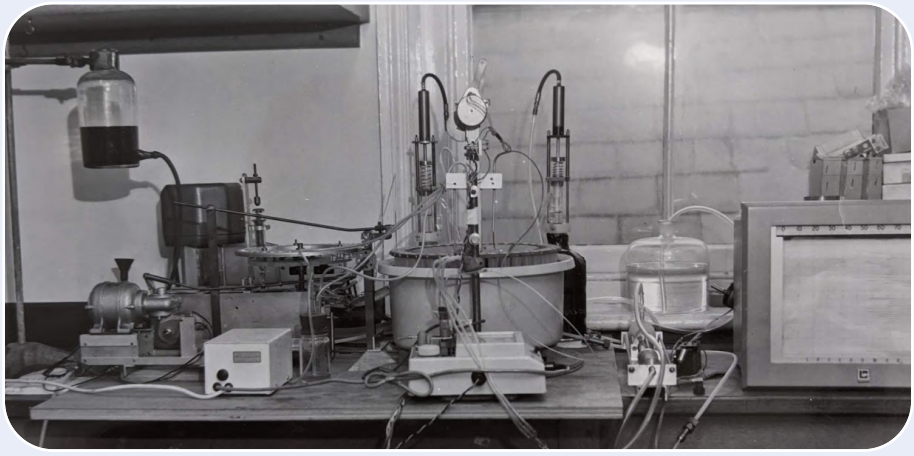
Increasing samples and rapid reporting expectation coincides with many hospitals upgrading to newer, more secure, LIMS. With modern automated LC-MS clinical analysers compatible with HL7 supports there are enhanced NHS digital requirements.

Subsequently, the next bottle neck might be data review and processing. However, data flags accelerate data review allowing for rapid quality checks, data acceptance, and highlight samples and/or analytes of relevance. Newer AI assistance algorithms embedded in future-facing software further streamlines data processing. This reduces error and increases confidence, facilitating more consistency for clinical decisions and inter-laboratory results.

An interesting example is Vitamin D. Sample numbers are enormous and certain hospitals report both 25-OH Vitamin -D2 and -D3, typically using automated offline sample preparation. Given the demand, hospitals are replacing LC-MS methods with an automated immunoassay for total Vitamin D. Here, the driver is reduced clinical demand for specific D2 and D3 levels. However, the precision and accuracy of LC-MS results allows for more informed clinical decisions, e.g., for immunosuppressant, anti-fungal, anti-depressant drugs and drug abuse.

In summary, clinical laboratories have moved from manual pipetting to automated sample preparation with the aim to have a modern automated laboratory. With these automated clinical LC-MS platforms, not only are results faster and more dependable, but this improved efficiency reduces NHS costs. In the future, autonomous, AI driven, analytical platforms will improve this further. ■

Photos from the Past



Clifford Riley's garage – could this be a first version of the multiple analyser?

Recognising the importance of the child in Laboratory Medicine

by Tim Lang, The Newcastle upon Tyne Hospitals NHS Trust

Paediatric Laboratory Medicine has often been an important but neglected area in the laboratory. However, over the last 70 years it has seen many significant developments that have contributed to the improved survival and management of the child. A panel of esteemed Paediatric Biochemists from the UK and Canada were interviewed to give their opinions on what they felt were these significant improvements.

Professor Jim Bonham, Sheffield Childrens' Hospital and President of the International Society of Neonatal Screening

The 70th anniversary of the ACB also marks the 60th anniversary of the introduction of whole population newborn screening in the US. Since the pioneering work of Robert Guthrie to describe a means of detecting phenylketonuria shortly after birth, it is estimated that 750 million babies have been tested and 60,000 children with PKU have benefitted from the life changing treatment that newborn screening can enable.

Newborn screening exemplifies a real partnership of clinical medicine and the design of new treatments alongside the potential offered by novel laboratory techniques to detect and monitor a growing range of conditions.

My laboratory career has seen the use of bacterial inhibition assays being replaced by fluorimetry and in the 1970s, along with the advent of immunoassay, an expansion in the scope of newborn screening to include a greater range of disorders.

The 1990s marked a paradigm shift in the laboratory with the advent of high throughput MS/MS thanks to the work of Chace and Millington. With that, the model moved from 'one disorder – one test', to 'one test – many disorders' and today many children can benefit from the early detection of up to 50 conditions shortly after birth as a result.

Of course, new and exciting developments have continued, and currently, advances in genomics sit alongside metabolomics to offer both new treatments for a growing number of rare disorders and the potential to increase those that can be detected at birth from 50 to many hundreds as new and effective treatments become available.
The Genomics England study scheduled to begin later this year marks an important milestone in this journey.

During almost fifty years in laboratory medicine, it has been an honour to be part of a truly worldwide effort to deliver the benefits of new technology in the lab providing access to new treatments at the bedside to a growing number of children with rare conditions.

The potential for Laboratory Medicine to change lives for the better has never been greater.

Professor Khosrow Adeli, Toronto SickKids, Canada, and President of the International Federation of Clinical Chemistry and Laboratory Medicine

I have been working in paediatrics for over 25 years and when I first started at The Hospital for Sick Children in Toronto (now known as Toronto SickKids) it was clear through my interactions with clinicians that there was a lack of appropriate reference ranges for children. Working in a large tertiary centre it was presumed that we had all the answers. With my previous research background, I proposed an initiative during a paediatric focus group at a Canadian Society of Clinical Chemists' meeting which we developed into the cross Canadian Laboratory Initiative on Paediatric Reference Intervals (CALIPER project). Since 2009 we have recruited over 14,000 healthy children and established paediatric reference intervals for +200 laboratory biomarkers, recently completing the biochemistry and haematology databases. The uptake of these reference intervals has been astounding both locally and globally. However, ideally the aim would be for individual countries to establish their own databases for their populations using direct and indirect methodology.

During my own 35-year career I have seen many emerging technologies being implemented. Genetic testing arrived in the 1980s but Clinical Chemistry did not take advantage of embracing this development at the time, which I see as a missed opportunity. One area that has been transformative in Paediatric Biochemistry has been the introduction of mass spectrometry from the early 1990s. In my own lab we were early adopters and now have nine Mass Spec analysers used in a variety of areas including inherited metabolic diseases, newborn screening, therapeutic drug monitoring and endocrinology. This technology has many scientific and economic benefits which has enabled it to become an established technique. It has also supported the expansion of newborn bloodspot screening.

An exciting development that I believe will support patient care in the future is the use of Multi-Omics. We have just proposed an extension to the CALIPER project to investigate the differences between a control cohort of children and cohort of patients with type 2 diabetes and obesity integrating proteomics, metabolomics, genomics and lipidomics. In the future 'Health Signatures' will provide potentially valuable information with the integration of 'omics' and artificial intelligence to support better individualised healthcare.

Professor Anne Green, Retired, Birmingham Children's Hospital

This year will be 100 years since the establishment of the first Paediatric Chemistry Laboratory by Evelyn Hickmans at Birmingham Children's Hospital (BCH) in 1923 so it is a fitting time to celebrate its success as part of the 70th Anniversary of the ACB. Evelyn was undoubtedly the first Paediatric Biochemist. My career started in 1968 with one of the first MSc courses in Clinical Chemistry at Birmingham and my inspirations were Professor Barbara

Clayton from GOSH and Dr Noel Raine from BCH. I have seen a huge number of developments over the years which have improved the quality of analysis and promoted the closer working together of clinicians and scientists for the benefit of the patient.

When I started, the volume of sample needed for some assays was an order of magnitude greater than today's requirements. Arterial/venous puncture would be required to collect the necessary 10-20 mL to perform the required tests in a small infant. Timed urine collections were commonly needed to be able to measure the required substance accurately and five-day collections for faecal fats were a regular feature. With the development of better tests, some of these are now thankfully consigned to history. Development of capillary sampling for more analytes was a major step forward and laboratory-based phlebotomy essential so that these precious samples were collected appropriately first time thereby avoiding any additional puncture.

External Quality Assurance was lacking for paediatric biochemistry at the start, so it was key to establish appropriate schemes in cooperation with Dr David Bullock and the late Professor Tom Whitehead from NEQAS. Access to appropriate clinical material was not always available so laboratories would begin to produce their own to enable standardisation and improved quality. The same was true for internal quality control material which didn't meet the needs of this specific population.

A particular theme during the early stages of my career was the identification of new disorders as a result of new technologies. During my Master's project in 1968 I developed a colorimetric method for methylmalonic acid to detect B12 deficiency at the same time as the first cases of methylmalonic acidaemia were reported. Gas chromatography for urine organic acids was developing at this time and with more metabolites being detected, it became a challenge deciding which had pathological significance or was just an interesting variation. It was a steep learning curve as most of the samples we tested came from children with clinical problems. This issue is similar to those arising from the current expansion of information acquired from genomics studies. The recognition of vitamin responsive disorders was especially pleasing as therapy with the vitamin would prove to be curative in some cases.

One thing that I believe was key to the success of Paediatric Biochemistry was the formal and informal collaborations and networks that were established over the years. I was involved with the formation of several national and international interest groups such as the IAPLM, BIMDG and MetBioNet who each spearheaded the production of evidence-based practice guidelines and consensus documents. The creation of the bespoke higher specialist training schemes for clinical scientists to support this area has enabled the provision of the future specialist workforce with sharing of valuable knowledge and experience. ■

Clinical Scientist training: a journey through the decades

by the Derbyshire Pathology Clinical Scientist team

Clinical Scientist training has undergone quite a transformation since the formation of the ACB 70 years ago. Through it all, the ACB has been a constant presence, providing training resources and guidance from dedicated experts in the profession. Here, the past and present Derbyshire Pathology Clinical Scientist team talk about their different training experiences, from the 1960s through to the current day.

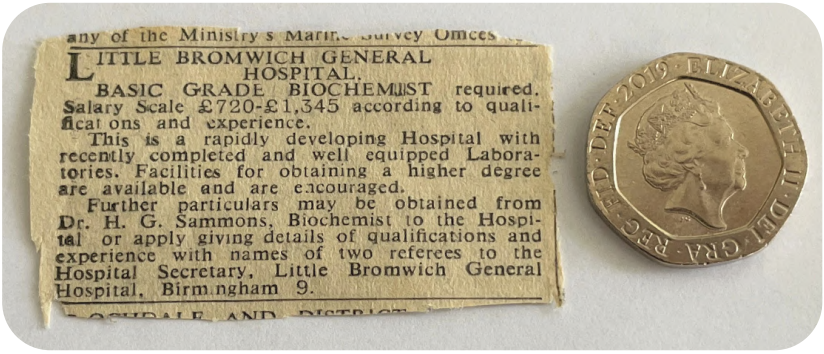
1960s – Peter Hill (retired)

It was during my final Easter vacation in April 1963 that my dad noticed a small advert in the Situations Vacant columns of *The Daily Telegraph* for a Basic Grade Clinical Biochemist at Little Bromwich Hospital in Birmingham (see the advert below with 20p piece to show how small it was!). Little Bromwich Hospital became East Birmingham Hospital around 1963 and then subsequently Heartlands Hospital.

I wrote to Dr H. G. Sammons enquiring about the job. His prompt reply stated "our policy here is to train people in Clinical Biochemistry whilst they are at the same time studying for a higher degree. The higher degree may take a little longer than usual but at the same time the individual becomes trained in a career which nowadays has tremendous possibilities". He encouraged me to apply saying "your training would be quite suitable for this sort of career". I applied and received a reply requesting me to attend for an interview on Monday 27 May – but if that was inconvenient to suggest an alternative date! As I was in the middle of my final exams, it was rearranged for Monday 10 June. I attended the interview and was delighted to receive an appointment as Basic Grade Biochemist at a starting salary of £800 per annum, beginning in September 1963.

My first degree was BSc (Hons) 2.1 in Physiology and Biochemistry from Southampton University, so I was able to register for a PhD at Birmingham University which was awarded in December 1967 for my thesis 'Studies on alkaline phosphatase and 5'-nucleotidase in human subjects in health and disease'.

The professional exam at that time was the Mastership in Clinical Biochemistry (MCB) which I was awarded in November 1968. I don't recall how the syllabus for the


any of the Ministry's Marine Survey Offices.

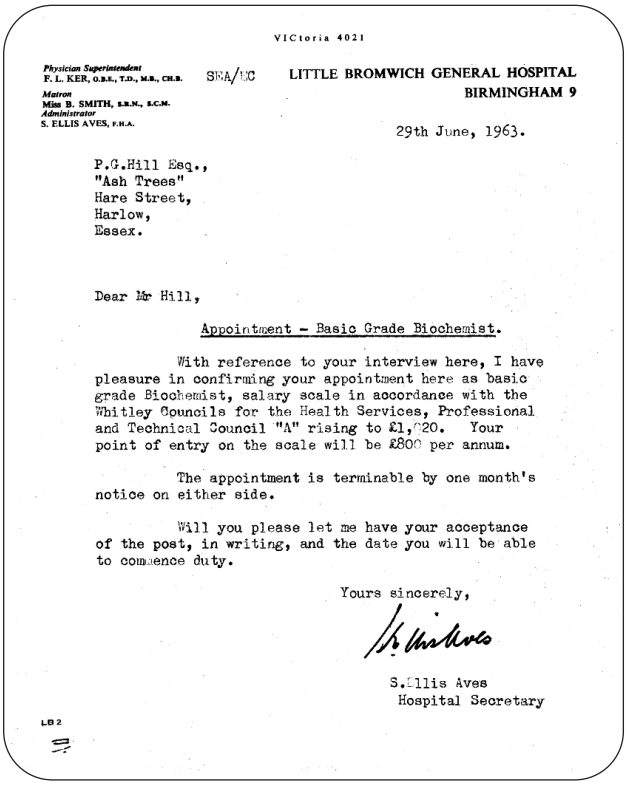
LITTLE BROMWICH GENERAL HOSPITAL.

BASIC GRADE BIOCHEMIST required. Salary Scale £720-£1,345 according to qualifications and experience.

This is a rapidly developing Hospital with recently completed and well equipped Laboratories. Facilities for obtaining a higher degree are available and are encouraged.

Further particulars may be obtained from Dr. H. G. Sammons, Biochemist to the Hospital or apply giving details of qualifications and experience with names of two referees to the Hospital Secretary, Little Bromwich General Hospital, Birmingham 9.

Advert for a Basic Grade Clinical Biochemist in The Daily Telegraph in April 1963



VICtoria 4021

Physician Superintendent
F. L. KER, O.B.E., T.D., M.B., CH.B.
Matron
Miss B. SMITH, S.R.N., S.C.M.
Administrator
S. ELLIS AVES, F.H.A.

SEA/EC

LITTLE BROMWICH GENERAL HOSPITAL
BIRMINGHAM 9

29th June, 1963.

P.G.Hill Esq.,
"Ash Trees"
Hare Street,
Harlow,
Essex.

Dear Mr Hill,

Appointment - Basic Grade Biochemist.

With reference to your interview here, I have pleasure in confirming your appointment here as basic grade Biochemist, salary scale in accordance with the Whitley Councils for the Health Services, Professional and Technical Council "A" rising to £1,020. Your point of entry on the scale will be £800 per annum.

The appointment is terminable by one month's notice on either side.

Will you please let me have your acceptance of the post, in writing, and the date you will be able to commence duty.

Yours sincerely,

S.Ellis Aves
Hospital Secretary

LB2

Peter Hill's appointment letter as Basic Grade Biochemist at Little Bromwich Hospital, Birmingham

MCB was covered. I did much of my revision for the exam by being paid to give evening class lectures for the lab technicians (as they were then called) at the old Matthew Boulton Technical College!

HGS (Sammy) encouraged his Trainees to write papers and contribute to meetings. I published several papers during my time working with him until my wife and I left Birmingham in June 1970 to go to work in the Christian Medical College Hospital in Vellore, South India.

1980s – Julia Forsyth

My experience of initial training in Clinical Biochemistry four decades ago was a superb opportunity. I began my career as a probationary Biochemist at St James in Leeds and navigated the challenges of a winter of NHS strikes and Saturday morning working to rule in the lab.

I learnt the intricacies of calcium, phosphate and magnesium metabolism from Dr Brian Payne and was welcomed into the St James Clinical team. Ever impatient in one's early 20s, I moved onto the University of Surrey MSc course in Clinical Biochemistry with a placement at King's College Hospital, London.

As the first Trainee Clinical Biochemist at King's, as part of the Southeast Thames Regional training scheme with Surrey University, I had the benefit of the full attention of the King's team; William Marshall, Cadje Moniz and Joan Butler gave me a superb grounding in Clinical Biochemistry. I was able to see patients presenting with Addison's, phaeochromocytoma, porphyria and many more. Dr Michael Norman, as a full-time research scientist, was a very patient supervisor for my dissertation. In the three

terms we spent in Guildford I followed in the footsteps of many who had the privilege to learn from Professor Vincent Marks and we also benefited from clinical and scientific teaching from a vast number of experts who came to Guildford from all over the country. In our weekly sessions at St Luke's, Dr Peter Goddard taught us the skills of differential diagnosis – start with the common causes.

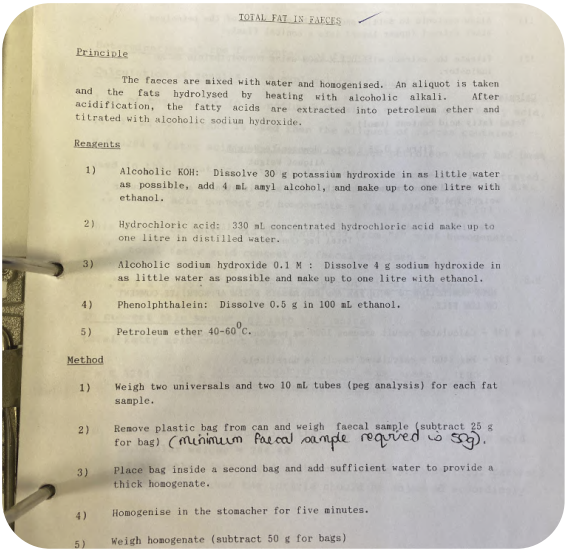
The experience of Trainees four decades ago was perhaps more variable than I observe our STPs experiencing today, but it was an amazing opportunity to learn from very experienced members of the profession and an excellent basis to then build on, to gain fellowship of the RCPath.

Since then, I hope I have been able to provide a positive training experience for Clinical Scientists, similar to my experience in my early career.

1990s – Gina Frederick

I started training in August 1992 in the Old Medical School at Leeds General Infirmary when Ian Barnes and the late Rick Jones were Heads of Service. I had seen an advert in New Scientist, and this piqued my interest, so I applied and was successful. I was one of the first to start the new Grade A Training scheme. It was a four-year scheme with two days a week in the second year spent in Manchester attending MSc lectures and an MSc project in the third year. Training was recorded in the blue Grade A training book and we had end-of-year assessments each year. In those days, training was very much hands-on, working in the Lab as another pair of hands. We didn't have a desk, there was no study time at work, all study was done at home. We rotated through the different sections, six months in automation, six months in specials (oh the joy of faecal fats!), six months in Immunology (where we had to make our own electrophoresis gels by pouring agarose gel between glass plates) and six months in Steroid Endocrinology with the infamous pipe-smoking Bob Oakey, where the air had the sweet smell of organic solvents and some immunoassays had to be incubated for three days! We also had brief rotations through Haematology and Microbiology – I'm not squeamish but sputum pots were a step too far!

We used to do regular ward rounds in those days, I was allocated to ICU.



TOTAL FAT IN FAECES

Principle

The faeces are mixed with water and homogenised. An aliquot is taken and the fats hydrolysed by heating with alcoholic alkali. After acidification, the fatty acids are extracted into petroleum ether and titrated with alcoholic sodium hydroxide.

Reagents

1) Alcoholic KOH: Dissolve 30 g potassium hydroxide in as little water as possible, add 4 mL amyl alcohol, and make up to one litre with ethanol.

2) Hydrochloric acid: 330 mL concentrated hydrochloric acid make up to one litre in distilled water.

3) Alcoholic sodium hydroxide 0.1 M : Dissolve 4 g sodium hydroxide in as little water as possible and make up to one litre with ethanol.

4) Phenolphthalein: Dissolve 0.5 g in 100 mL ethanol.

5) Petroleum ether 40-60°C.

Method

1) Weigh two universals and two 10 mL tubes (peg analysis) for each fat sample.

2) Remove plastic bag from can and weigh faecal sample (subtract 25 g for bag) (minimum faecal sample required is 50g).

3) Place bag inside a second bag and add sufficient water to provide a thick homogenate.

4) Homogenise in the stomacher for five minutes.

5) Weigh homogenate (subtract 50 g for bags)

An extract from Gina Frederick's training book

Ward rounds on ICU were usually led by an anaesthetist. I just happened to mention to one such anaesthetist that I would love to watch open heart surgery and next thing I knew, I had the best view in the house for triple bypass surgery, stood on a stool at the patient's head. Eye-opening, to say the least!

In those days, Focus was a huge event. As a Trainee, there was never any problem with attending and everything was fully funded, no questions asked. I remember the first year we went to Focus in Brighton. We stayed at the Grand Hotel and had a room on the front with a balcony. On the third day, they served oysters outside the conference hall. First and only time I have ever had food poisoning!

Training has evolved and changed hugely over the decades. It is so much more formal these days. Is it better? Depends on your viewpoint. But it was definitely more fun 30 years ago!

2000s – Sarah Knowles

My training fell in a bespoke time where I started training as a grade A with a local training course (every other Friday) but halfway through this morphed into an MSc with the University of Birmingham. I was in the first cohort of Trent Grade A trainees to complete the local course but end up with an MSc – very odd graduating from a university you never attended for a single lecture!

2010s – Emma Evans

During the summers of my undergraduate degree, I worked as a medical laboratory assistant in my local biochemistry lab and it was here I discovered the role of the Clinical Scientist.

I was part of the first cohort to experience the new Scientist Training Programme (STP) that started in September 2011. I applied through a national recruitment process which included a written application detailing previous experience, qualifications and a personal statement. I also had to specify which discipline I preferred and rank order my top four locations. I was invited to the interview which consisted of several timed stations (10 minutes per station) where interviewers asked a range of questions including scientific scenarios, leadership examples, current guidelines and knowledge of career progression. The entire process was overwhelming and felt a bit like speed dating – you didn't know what to expect behind each station until the bell dinged.

I was initially placed on the reserve list and then later offered a place at Royal Preston Hospital. I started in autumn 2011. The first year of the STP consisted of an academic block release to the University of Manchester for introductory lectures and a workplace-based programme covering three-month rotations in Biochemistry, Haematology, Immunology and Genetics. The second- and third-year academic blocks focused on your specialist discipline and completion of a research project. Once completed, I obtained an MSc in Blood Sciences with a specialist pathway in Clinical Biochemistry.

As well as completing work-based Biochemistry-specific competencies in the final two years, there was also time to spend on an elective placement. I split this time between gaining an insight into Microbiology and spending more time in a specialist Paediatric Biochemistry Laboratory at Alder Hey Children's Hospital.

Overall, my experience of the new STP was positive. I felt supported at my base hospital and their experience training Clinical Scientists under the old training framework made it easier to adapt to the new programme. The time spent in other disciplines during the first year was

beneficial. It allowed me to broaden my clinical knowledge which is especially useful when you see patients' presenting comorbidities spanning multiple disciplines.

2020s – Aaron Doherty

Looking back to my first day on the programme, I am amazed it was eight months ago! The time has gone so quickly. I have learned so much since starting the STP, this year has been all about me getting a feel for different aspects of clinical science; I have been on rotation through Chemistry, Immunology, and am drawing a close on my Haematology rotation (soon to start in Genetics). I like how the university-taught part of this year is concordant with the rotations, the university block consisted of four weeks split up into the four different specialties that I am planned to rotate through, plus a week learning professional practices. This enabled me to apply what I learned at university into a clinical setting, which had a really positive impact.

This year is the first of the new STP curriculum and having spoken to older cohorts of the STP, there are some changes to how the competency side of the programme is assessed. The old curriculum had more laboratory-based competencies compared to this year's curriculum, but this year's curriculum focusses on more aspects that a clinical scientist will find themselves involved in day-to-day such as quality meetings and change processes.
I think the new curriculum is a lot better tailored for the role of a Clinical Scientist compared to the older curriculum, it helps first year trainees appreciate the importance of some tasks Clinical Scientists do which are not often spoken about as much.

Thank you to the ACB from all of us for your guidance and support over the last seven decades of training Clinical Scientists! ■

Photos from the Past

The Editorial team in 1988 from left to right:
Ian Watson, Simon Olpin, Nigel Lawson and Jonathan Berg

A productive partnership

by Mick Henderson and Keir Bailey, Specialist Laboratory Medicine, Leeds Teaching Hospitals Trust

Keir was a relatively new Trainee Clinical Scientist when lockdown happened. I was a newly retired consultant. We had met briefly in the months before but not worked together. Following a brief online chat about training we decided to have a go at regular online tutorials. We met once a fortnight and gradually worked through a comprehensive syllabus of basic topics. Keir would prepare a presentation on each topic and I would add comments and my experience as the discussions unfolded. Keir did an amazing job and her enthusiasm shone through. We both thoroughly enjoyed the sessions and learnt a lot. It was lovely for me to go back to so much of my own basic training that I had not studied in detail for many years. Even as a consultant on-call for the Blood Sciences lab I had remained familiar with the things I needed to know to help the lab and to answer clinical queries, but that is relatively limited in scope. One of the joys of our subject is that it is always changing. We very much helped each other ease into our new roles and I remain grateful to Keir for that!

I have seen many changes in my 40-year career in the NHS, and have many fond memories of working with and for the ACB. The Association can rightly be proud of its track record in promoting and providing training. As a Regional Tutor I was particularly a fan of the annual training reviews that could identify early deficiencies in training and help rectify them. The superb ACB training courses added up to a really comprehensive training syllabus which helped me to train for the MRCPath 40 years ago and also gave me many lifelong friends. We then organised one of these courses in Leeds in 2005. It was a lot of fun as well as, hopefully, being incredibly useful for the participants. These helped set the groundwork, in my mind, for the SSIEM Academy courses which we set up jointly between ERNDIM (the metabolic EQA provider) scientists and SSIEM clinicians in 2008, and these continue to be oversubscribed.

I have lived through many changes and have to say most have been for the best. I can remember staff smoking in the labs and leaving their smoking tab ends balancing on the ends of benches! It was also common practice for everyone (consultants included) to go to the pub every Friday lunchtime. Work was a lot slower on Friday afternoons! Looking back there seemed to be more fun in the labs in those days, but then I'm looking back to my own youth, so I think that impartiality is definitely impaired. It would be hard for today's trainees to imagine though the (often shocking) state of the handwritten or hand typed method sheets that we worked from which were often substantially over written and with crossings out. Document control had not been invented, or at least, had not arrived in clinical labs until the late 1990s with the onset of laboratory inspections. Good governance is now taken for granted but it has taken us, collectively, a great deal of hard work to get to this point of high standards and good practice. Key to that has been good co-operation between professions and I would be the first to pay credit for many of the changes and improvements to my superb BMS colleagues, and of course the ACB,

which has always been at the forefront of education and training for all levels of staff. The ACB has also always worked effectively and closely with the College providing a powerful collaboration.

Keir

I was five months into my Scientist Training Programme (STP) when lockdown was announced. My training quickly changed from being in the lab every day to self-directed learning at home. This was good as it gave me time to read around new topics, but it was also difficult to lead my own training, especially as I was completely new to Clinical Biochemistry. Using the intuition of someone who is a natural teacher, Mick kindly asked if I would like to start one-to-one, online biochemistry tutorials. Although initially daunting, these quickly became one of my lockdown highlights. I would prepare a talk on a subject that was new to me and deliver it to Mick; Mick always made sure that there was lots of time for discussion and stories to help reinforce my learning. Reflecting on the tutorials, the combination of Mick's deep understanding of Clinical Biochemistry and my inexperience made an excellent contrast to learn from one another. I cannot thank Mick enough for being so generous with his time and knowledge.

Towards the end of my STP training I joined the ACB and attended my first UKMedLab (previously Focus) online. Even through virtual attendance, it became apparent what a large field Clinical Biochemistry was; a nexus of different disciplines converging to provide blood testing for patients. Another important date for me was the day after I completed my STP training, when I attended an STP Training Day organised by the Trent Northern Yorkshire (TNY) ACB Regional Tutor: it was the first time I had met other Biochemistry STP Trainees in the region. This was a wonderful morning

Keir Bailey and Mick Henderson

learning together and sharing experiences. Now things are relatively 'back to normal' I am looking forward to attending UKMedLab23 in Leeds this year and socialising with other Trainees at the ACB Residential course in the summer. I now have a Band 7 position in Specialist Laboratory Medicine at Leeds and feel grateful that I can continue working and training there. I am lucky that I still regularly see Mick, although this time face-to-face when he comes into the department to give Biochemical Genetics tutorials.

Keir and Mick

Looking back on our Clinical Biochemistry careers, at either ends of the spectrum, it is clear our most memorable and valuable experiences have been ones we have shared with others. The ACB has been fundamental in facilitating and encouraging these partnerships and has provided varied opportunities to network and learn from one another. The emphasis the ACB places on supporting and providing for Trainees of all levels is something we hope will continue for another 70 years. ■

Happy Birthday ACB, long may you thrive!

Upgrading Biochemistry services in Ghana in the 80s

by Dr Jude Joseph Fleming, retired Clinical Scientist, West Hertfordshire NHS Trust

My wife Denny and I spent two years from 1987 to 1989 working at the School of Medical Sciences (SMS), University of Science and Technology (UST), Kumasi, Ghana. We were recruited by British Overseas Medical Services (BOMS) and interviewed by Professor Eldyrd Parry at the Wellcome Institute in London.

We had never been overseas to work before and were in touch with our new departments before our departure. Denny would be in the Department of Medicine, and I would be in Molecular Medicine, but most of our time would be spent at the Komfo Anokye Teaching Hospital (KATH), about 20 minutes' drive from the medical school.

My department asked me to bring any chemicals I would need to set up new tests and improve their existing tests. We also brought some basic lab equipment such as plastic beakers, measuring cylinders and pipettes, which were all sourced from Low Cost Technology. As we had a shipping allowance, all was sent by sea along with some household items.

At the School of Medical Sciences, I gave lectures and taught the whole Clinical Biochemistry syllabus to medical students. Lectures started at 7.30 am. After lectures finished, I drove to Komfo Anokye Teaching Hospital which was around 5 km away. Here, there was a small laboratory upstairs providing Biochemistry services and downstairs another laboratory provided Microbiology and Parasitology testing.

I totally depended on two books: the Monica Cheesbrough textbook *Medical Laboratory Manual for Tropical Countries* and the WHO document LAB/86.3. They both contained the recommended methods for essential Clinical Chemical tests; in addition, Cheesbrough had a list of essential equipment suppliers. The main chemicals I remember bringing were 0-cresolpthalein complexone for serum calcium, 0-toluidine for glucose estimation and 2.4 dinitrophenylhydrazine for AST estimation. For creatinine, we used end-point Jaffé reaction with acidification to correct for non-creatinine chromogens.

I was asked to help improve safety in the lab; upgrade the laboratory methodology to the WHO recommended methods; introduce an internal quality control system; start participation in a Birmingham run external quality assurance scheme, using about four lyophilised samples per annum and try and begin some research. There was a very good HoD, Dr Margaret Frimpong, and I had three MSc qualified staff to help me.

There were challenges however, as we had to bring distilled water with us from UST daily. I had brought rubber gloves for our staff which we had to wash and reuse, and a few lab coats. The safe disposal of blood samples was an important issue and we would treat the blood with overnight soaking in hypochlorite before disposal. I also brought a laboratory grade detergent for the glassware rather than using Daz or Omo washing powder. We had a simple colorimeter, but the flame emission spectrometer was broken and did not get repaired over the two years we

spent there. On the teaching side, a challenge came when I failed one whole year of medical students in their written Clinical Chemistry exams. The SMS Medical Board backed me in making them all re-take the exam. The re-take resulted in over 90% of the students passing (to my immense relief). Communication was challenging as there was no telephone network at that time and the mail was quite infrequent. We often travelled to Accra, a drive then of around six hours, to the main Korle-Bu Teaching Hospital or other offices, only to find the person we had hoped to see was out of station.

So, what was achieved in the Biochemistry services? The WHO recommended analytical methods for serum were established. Serum calcium became available for the first time in the hospital. We produced a reference range for serum albumin in healthy Ghanaian women and published a letter in the Lancet with our findings in patients with eclampsia (*Lancet* March 11, 1989). Laboratory safety was improved, and we used daily IQC, using repeat specimen testing. The department was subsequently able to source the required chemicals to keep the tests going and protective equipment such as the rubber gloves were imported.

Outside of work: we had to take daily and weekly anti-malarials and I lost a lot of weight at first. We enjoyed time with our Ghanaian and Western friends.
We loved going to St George's Church and exploring the country, visiting places such as Moli Game Park, Akasombo Dam, Boabeng Fiema Monkey Sanctuary, and of course the fantastic beaches. Driving on the right side of the road and negotiating some fairly large potholes was, at first, challenging!

We remember Ghana with much affection as a vibrant country with people of tremendous warmth and hospitality, of great food such as fufu with chicken, groundnut soup and red beans and plantain (red-red) fried in palm oil.
At times, more exotic food was tried, including grass cutter and forest snails.
A couple of highlights were going to see the fantastic Ashante Kotoko football team at their stadium in Kumasi and meeting the Asanatehene (ceremonial ruler of the Ashanti people). We still have the great wood-carvings and beautiful kente cloth.

Between our time in Ghana and now, there has been so much development within the country. We are still in touch with Ghanaian friends and we still say that some of the happiest memories of our life were from Ghana. ■

Thank you!

I would like to thank each and every one of the authors who took the time to contribute to this special issue. We are indebted to you all.
We were inundated with articles, from long retired to newly appointed Members, and this just goes to show what an amazing profession we are.
Thank you also to the ACB Office and the ACB News team for all your help and advice on this issue, especially to Nikki Williams.

We have enjoyed reading all the articles, we hope you do too.

Gina Frederick, Lead Editor, ACB News

From print to PDF: the evolution of *ACB News*

By the *ACB News* team past and present

It would be rather impolite to produce a special issue celebrating the ACB's 70th anniversary without also mentioning the 'almost' 70th birthday of the *ACB News Sheet*.

As we approach our 683rd issue we take time to reflect on the history of the *ACB News.*

Gordon Challand and John Lines wrote an excellent article 'A celebration of *News Sheet* Editors' in the 402nd issue of *ACB News* (October 1996). Gordon has kindly given us permission to reproduce it in full or part here and we are indebted to him for his assistance in writing this article.

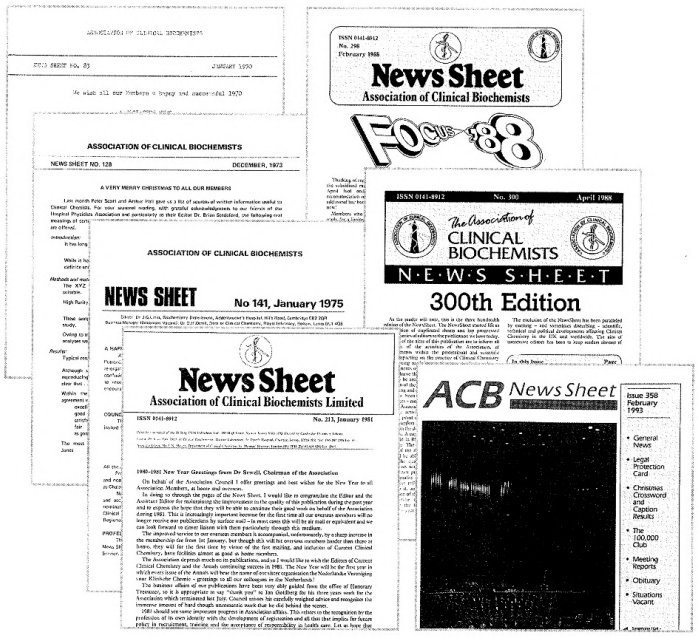
As Gordon says "*The News Sheet*, which is preserved in the ACB's Archives and in the Cambridge University Library, gives a continuous record of the development and growth of our professional organisation. They also show the development of printing and publishing techniques; and the continuing evolution of style, of character, and of content of our monthly magazine". We hope that this special celebratory issue will add to that history.

"The first *ACB Newsletter* was published in February 1954, just 11 months after the formal establishment of the Association. Its Editor, Arthur Jordan, wrote 'it is intended to serve the Association and the support of the Association will be needed to keep it alive'. An introductory article by the first President (N. F. Maclagan) acknowledged that its publication represented an important milestone, and went on to say 'it will form an important connecting link between members … and … provide a useful medium for the exchange of views'."

It was initially a quarterly publication, morphing into the *Proceedings* in the late 1950s when Harold Varley was Editor. In February 1963, George Higgins published a new monthly magazine, *News Sheet No 1*. In 1967, the *Proceedings* and the *News Sheet* (now with John Lines as Editor) became separate entities. After editing his 100th issue, John Lines handed over to Gordon Challand. Gordon is credited with the idea of including advertising in the *News Sheet* to generate income and make it self-sufficient. He set up a meeting with Peter Carpenter from a small firm in Tooting and since then, the ACB's association with PTM Publishers and PRC Associates has continued and flourished.

Gordon handed over the reins to Andre de Bats in 1977, and 1979 saw the appointment of the first Associate Editor, John Mount. Andre introduced more innovation to the *News Sheet* and officially registered it as a magazine. Joe O'Meara took over as Editor in 1984 and introduced both colour and the first crossword. In 1988, Jonathan Berg became Editor, having joined as an Associate Editor in 1985. Jonathan introduced the first colour photographs and was not only Editor, but also reporter and photographer. He holds the record for being the longest serving Editor on *ACB News* – 28 years and 342 issues, which is over half of all the issues ever published! During Jonathan's editorship, Sophie Barnes also joined as Associate Editor and probably holds the record for being the longest Associate Editor.

Ian Hanning also served a very long stint (15 years), first as an Associate Editor,



Some News Sheet milestones from across the years

then as Editor, taking over from Jonathan in 2017.

The current Editor, Gina Frederick, took over from Ian in 2021 after serving as an Associate Editor since 2015. Ian and Gina saw us through the COVID era during which time we saw *ACB News* go from monthly to bimonthly and from a printed issue to an emailed PDF version.

As well as Editors changing, the *News Sheet* itself has also undergone somewhat of a transformation.
It originally started life as typescript sheets held together with staples. In 1963 this changed to foolscap paper. The Editors did most of the writing, reporting, editing, duplicating and mailing! In November 1973, the first printed, folded and wire-stitched *News Sheet* was published by Piggott Printers. Advertisements first appeared in 1978, 1979 saw the first use of colour, with colour photographs in 1989. Over the years, there have been several makeovers, handled by designer John Williams. In 1997, the name was changed to *ACB News* by Jonathan Berg.

Editors have come and gone but did you know there are many other people involved behind the scenes which help *ACB News* run like a well-oiled machine. Mike Cartwright from Piggott Printers, John Williams, designer and the delightful duo Sue Ojakowa and Nikki Williams are the longest serving members of the *ACB News* team, in fact, they have even worked on *ACB News* longer than Jonathan – Sue having worked on 422 issues to date! Here's a reflection of time spent on *ACB News* from two of the longest serving members, Jonathan and Nikki:

Jonathan Berg

I took over as Editor of *ACB News* having been the Assistant Editor to Joe O'Meara who was moving out of the laboratory to hospital IT on the way to becoming Head of IT for the House of Lords. The work involved in producing the monthly magazine was considerable. I worked as the only Clinical Biochemist in a busy District General Hospital in West Bromwich. There was no way that I

Fun facts about *ACB News*

- A copy of every issue of *ACB News* is kept in the British Library and in Cambridge University Library.
- The first *Newsletter* was published in 1954.
- The first editor was Arthur Jordan.
- The first copy was just a typed sheet of white paper.
- The first printed copy was issued in 1973.
- 1979 saw the official registration of the *News Sheet* as a magazine (ISSN 0141-8912).
- The longest serving editor is Jonathan Berg (and he was also chief photographer).
- Gordon Challand has the record for the greatest number of errors found whilst proofreading.
- Colour photos were introduced in May 1989 by Jonathan Berg.
- So far, it has achieved continuous production through 682 issues.
- The identity of the Crossword and Sudoku author is a tightly held secret!

could do any of the editorial work during the working day and so I set up a home office and employed staff to help with the process from the outset.

In 1988 this was before the advent of email or even fax machines. Copy was provided to the printers in typed or even handwritten form and sometimes as electronic files. Proofs were posted between the printer in Cambridge and Birmingham by post and many times the journey to the main sorting office in Birmingham city centre to catch the 9pm post was made to try and meet deadlines. Gradually things changed with fax machines helping and then the advent of email and also digital images leading to a revolution in how we produced the magazine.

The late 1980s were an amazingly dynamic time in pathology with huge advances in technology. All this new technology needed marketing and *ACB News* benefited with a huge amount of paid advertising. We could produce 48-page issues, within which nearly 50 percent was advertising. In the 1990s *ACB News* for a time became extremely profitable to the Association.

I changed the content of *ACB News*, with sometimes edgy and investigative articles and always irreverent subheadings that were probably often lost on the readership. Monthly cartoons were introduced and if things needed saying then we did that alright. The editorial line was clearly independent from the organisation and that was key at some difficult times. Perhaps the biggest change was the introduction of photos and a move to full colour printing, which made it much more commercial for advertisers and also a platform for my own photographic excesses. We resisted the pressure to go to A4 size and I once justified this by telling the annual meeting of the Corporate Members that it was a better size to read on the toilet!

Nikki Williams, typesetter

In January 1988 I started work in the Reprographics Department at Piggott Printers and the *ACB News Sheet* became one of my regular jobs. Back then it was laid out on an Itek Digitek system and printed on a small Heidelberg press. After the printed sheets were folded, they were collated by hand before being manually placed on the stitching machine.

Everyone in the factory and the office helped out at this stage boxing up the finished copies so the mailing department could take over.

The early 90s saw the introduction of Apple Macs and dedicated print to plate software and throughout the 2000s the printing presses became larger as the computers became smaller . . . and everything became much, much faster.

Ten-colour presses perfecting the printed sheet (printing both sides at once) became the norm. The turnaround from a signed off PDF to copies of the (now renamed) *ACB News* door matting was a matter of a few days.

Until 2016 there was a monthly printed issue and we regularly worked on several months' issues at any given time. In 2017 we moved to bi-monthly issues and in early 2020 we moved to the current PDF format. The world of digital publications is constantly evolving and we are now looking at ways to give the reader a better user experience.

This will be my 388th issue! Over the last 35 years, I have worked closely with four Editors and many Associate Editors. Members of the Executive Committee and office staff team have come and gone and I can honestly say, it has been my pleasure and a privilege to work with so many people who make a difference to the world of Laboratory Medicine and who give up their valuable time to work on the *ACB News.* Happy 70th birthday to everyone in the ACB! ■

References:

- A Celebration of News Sheet Editors by G. S. Challand and J. G. Lines. *ACB News Sheet* Issue 402. 20 October 1996 pp 50-52.
- *ACB The First Forty Years.* Broughton P., Lines J. 1996; London, The Association of Clinical Biochemists. pp 37-40.

Photo by Jonathan Berg

External quality assessment (EQA) – a scientific discipline which has come of age

by Dr David Bullock, formerly Director of Birmingham Quality, founding Chairman and first President of UK NEQAS

During the ACB's first decade its members, notably Tom Whitehead (a founding Member) focused attention on developing internal quality control (IQC) techniques. Tom, however, felt this to be insufficient – 'you only find out how good you are at golf when you play against other people' – and started interlaboratory comparisons locally and regionally. He gained funding from the Ministry of Health to establish a National Quality Control Scheme for Clinical Chemistry for two years only, as 'by then the problems will have been solved so we can stop!'. It started in 1969, alongside a similar haematology initiative by Mitchell Lewis, funded (much more generously) by the Nuffield Foundation.

As the usefulness of these services became accepted (albeit grudgingly by some), their scope was broadened, initially by the addition of Microbiology. The Department of Health (DH) assumed responsibility for their funding (marginal costs only), establishing an overall professional guidance committee (ACALS; Secretary Peter Woodford) and scheme-related steering groups. Scope was broadened further by creating additional centres and schemes covering specialised areas within the main disciplines, e.g. hormones, coagulation, transfusion and virology. Several centres were also invited by the World Health Organisation (WHO) to institute international schemes, to support multi-country clinical research projects and to increase awareness of the need for improving quality assurance measures.

Tom Whitehead: We never knew whether he cared more about laboratory quality or sweet peas, but he was passionate about both!

Terminology was addressed at a WHO workshop in 1980, reported by Tom and Peter. This promulgated EQA as the correct term, replacing 'EQC', emphasising its retrospective nature and its ability to assess the overall state of the art, individual laboratory performance, analytical procedures and the materials used, as well as to assess changes in these over time. Scientific appraisal and investigation of the processes and uses of EQA progressed, with David Bullock's PhD thesis (thought to

be the first on EQA) stretching university page limits even without references and appendices.

Based on practical experience, for EQA to be effective participants must have confidence in the scheme design, which can be achieved by providing:

- sufficient recent data, from
  - frequent distributions
  - rapid feedback of information
- an appropriate basis for assessment, through
  - stable, homogeneous specimens
  - reliable, valid target values
- effective communication of performance data, using
  - structured, informative and intelligible reports
  - a running scoring system.

Though all evidence of the effectiveness of EQA is necessarily circumstantial, these principles have been tested through changes in scheme design. They have been extended across UK NEQAS in Laboratory Medicine and adopted by many providers worldwide.

EQA organisations across Europe shared their experiences, initially through meetings of the Joint Commissions for Standardisation and later those convened by the Bureau Communitaire de Reference (BCR). These led to collaborations and international comparisons. A particular success story was for specific proteins, where UK-led comparisons proved that calibration was the main source of variation, prompting the production and validation of a European reference material, CRM470. Cooperation was put on a more permanent basis by creation of the European Organisation for EQA Providers in Laboratory Medicine (EQALM), with substantive UK contributions to EQALM and its working groups through to the present.

The Thatcher government's emphasis on competition (knowing that this would be at the expense of comparability!) led to the DH stepping back from UK NEQAS operational oversight. Though centres continued to operate independently from their NHS hospitals, UK NEQAS established a Charity to provide coordination, accountability and commonality of ethos under a Code of Practice. The previous excellent working relationships between UK NEQAS and Regional EQA schemes were a casualty of the DH's changes; most were lost, though a few became national. There was one benefit, however – schemes became fully funded, and therefore no longer a burden on their host Trusts (though there has been considerable friction at times).

The UK made valuable contributions internationally. ISO Guide 43 on proficiency testing was redrafted here, leading to Clinical Pathology Accreditation (CPA) Standards for EQA and later ISO Standard 17043. UK NEQAS centres worked with WHO to stimulate and guide several countries in establishing national EQA services and conducted courses in quality assurance for WHO and British Council. UK scientists have also contributed to IFCC courses in developing countries.

The DH recognised EQA as a scientific discipline within healthcare science. EQA professionals were therefore invited to prepare National Occupational Standards, as a basis for assessing staff competence and career progression within the discipline.

Laboratory Medicine (and its quality) are nowadays primarily reliant on the *in vitro* diagnostics (IVDs) used. Post-market surveillance is therefore crucial, and EQA provides information unsurpassed in its reliability on IVD performance in everyday practice in the real world. European Standard EN14136 delineated requirements beyond ISO17043 for EQA data to be used for this purpose, primarily ensuring independence from commercial interests. UK NEQAS has therefore developed the respect of the diagnostics industry for

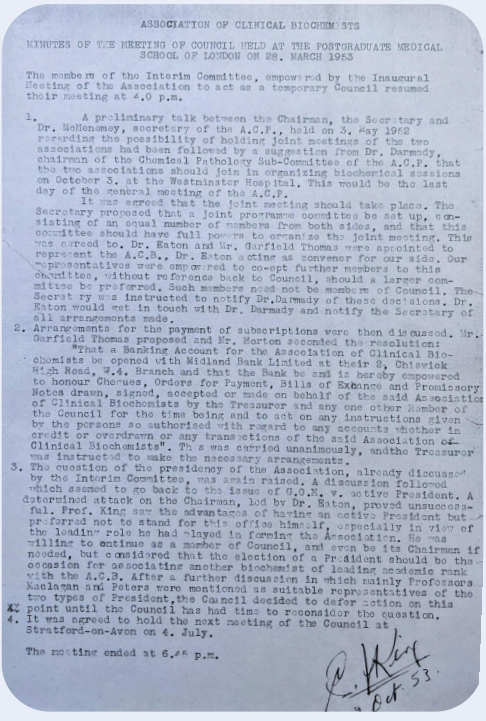
providing an honest ongoing assessment of their products' performance.

The network of organising centres and schemes has continued to flourish. Many schemes have introduced or extended the interpretative elements within their service. The UK NEQAS organisation has funded a pan-disciplinary Pre- and Post-analytical Quality monitoring service (PREPQ), which provides a system for comparing performance for a dozen indicators using Sigma metrics, reflecting end-to-end quality.

The resilient group of EQA scientists within UK NEQAS has in recent years enabled rapid establishment of national EQA services in response to changing Government and healthcare requirements. These include sample handling and DNA extraction for the 100,000 Genomes Project, markers of acute and chronic kidney disease, support for the extended Newborn Screening, and COVID-19 antigen and antibody tests. Services were introduced for networks, with online reporting via NPEx and increasing use of dashboards, and engagement with MHRA, NICE and Guideline groups. The well-established face-to-face Participant Meetings have been augmented by a wide range of online educational webinars and videos.

Nowadays, effective EQA, including working with participant laboratories and their IQC programmes as well as diagnostics manufacturers, is an essential requirement for continuous improvement of reliable laboratory medicine services for patients worldwide. ■

Photos from the Past



ASSOCIATION OF CLINICAL BIOCHEMISTS

MINUTES OF THE MEETING OF COUNCIL HELD AT THE POSTGRADUATE MEDICAL SCHOOL OF LONDON ON 28. MARCH 1953

The members of the Interim Committee, empowered by the Inaugural Meeting of the Association to act as a temporary Council resumed their meeting at 4.0 p.m.

1. A preliminary talk between the Chairman, the Secretary and Dr. McHenemey, secretary of the A.C.P., held on 3. May 1952 regarding the possibility of holding joint meetings of the two associations had been followed by a suggestion from Dr. Darmady, chairman of the Chemical Pathology Sub-Committee of the A.C.P. that the two associations should join in organizing biochemical sessions on October 3. at the Westminster Hospital. This would be the last day of the general meeting of the A.C.P.
It was agreed that the joint meeting should take place. The Secretary proposed that a joint programme committee be set up, consisting of an equal number of members from both sides, and that this committee should have full powers to organize the joint meeting. This was agreed to. Dr. Eaton and Mr. Garfield Thomas were appointed to represent the A.C.B., Dr. Eaton acting as convener for our side. Our representatives were empowered to co-opt further members to this committee, without reference back to Council, should a larger committee be preferred. Such members need not be members of Council. The Secretary was instructed to notify Dr.Darmady of these decisions. Dr. Eaton would get in touch with Dr. Darmady and notify the Secretary of all arrangements made.
2. Arrangements for the payment of subscriptions were then discussed. Mr. Garfield Thomas proposed and Mr. Morton seconded the resolution:
"That a Banking Account for the Association of Clinical Biochemists be opened with Midland Bank Limited at their 2, Chiswick High Road, W.4. Branch and that the Bank be and is hereby empowered to honour Cheques, Orders for Payment, Bills of Exchange and Promissory Notes drawn, signed, accepted or made on behalf of the said Association of Clinical Biochemists by the Treasurer and any one other Member of the Council for the time being and to act on any instructions given by the persons so authorised with regard to any accounts whether in credit or overdrawn or any transactions of the said Association of Clinical Biochemists". The was carried unanimously, andthe Treasurer was instructed to make the necessary arrangements.
3. The question of the presidency of the Association, already discussed by the Interim Committee, was again raised. A discussion followed which seemed to go back to the issue of C.B.E. v. active President. A determined attack on the Chairman, led by Dr. Eaton, proved unsuccessful. Prof. King saw the advantages of having an active President but preferred not to stand for this office himself, especially in view of the leading role he had played in forming the Association. He was willing to continue as a member of Council, and even be its Chairman if needed, but considered that the election of a President should be the occasion for associating another biochemist of leading academic rank with the A.C.B. After a further discussion in which mainly Professors Kaelayan and Peters were mentioned as suitable representatives of the two types of President,the Council decided to defer action on this point until the Council has had time to reconsider the question.
4. It was agreed to hold the next meeting of the Council at Stratford-on-Avon on 4. July.

The meeting ended at 6.45 p.m.

Association of Clinical Biochemists – Minutes of the Meeting of Council held at the Postgraduate Medical School of London, 28 March 1953

Lab Tests Online-UK: the patient resource about laboratory tests for the digital era

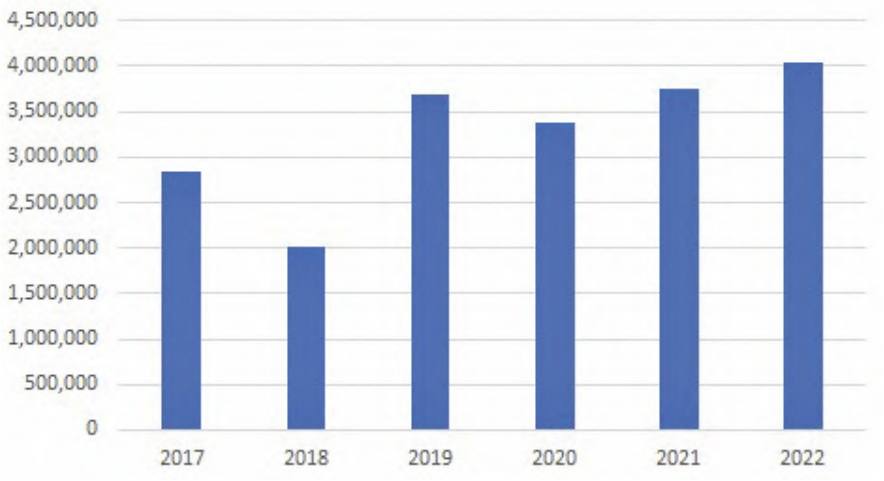
by Rebecca Powney, Luton & Dunstable Hospital

The launch of Lab Tests Online-UK

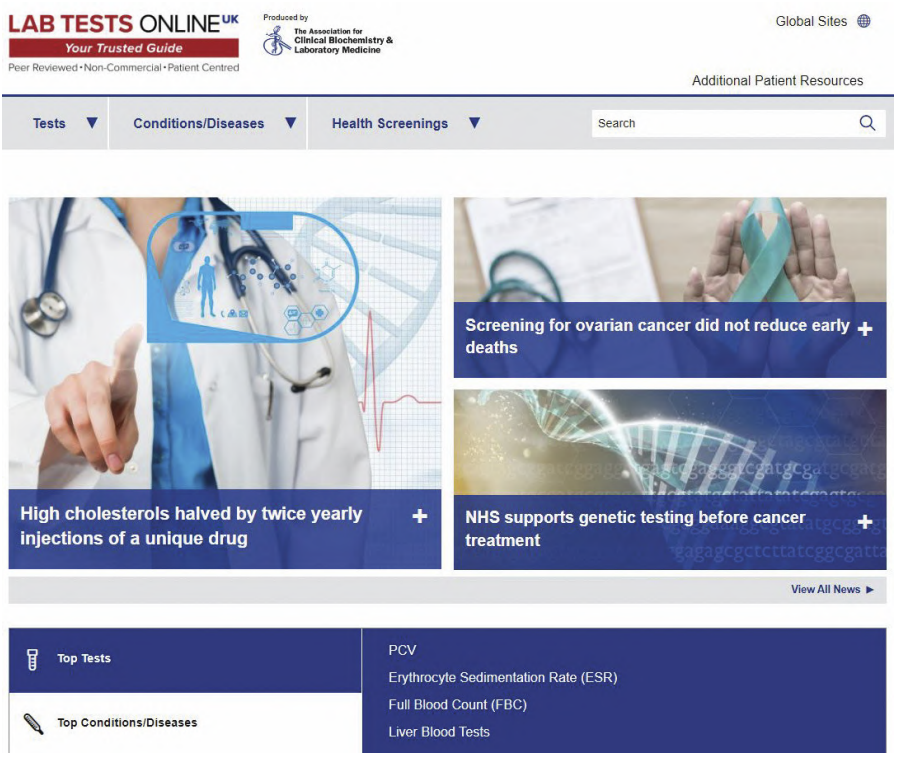
The Lab Tests Online-UK website was launched in 2004, a key development in the laboratory-public interface, providing an online platform to engage with patients and inform them about laboratory tests.

The Lab Tests Online-UK (LTO-UK) website has been developed by NHS laboratory professionals and provides detailed, peer-reviewed information to help patients understand laboratory tests. The website is patient-centred and provides detailed descriptions of laboratory tests, conditions and news on advances in laboratory medicine, using language intended for patients to understand. Patient liaison and lay representatives sit on the Board and comprise part of the editorial team to ensure that content is suitable for lay readers and that the decisions taken regarding the website are patient-centred.

The Lab Tests Online concept originated in the USA and was developed into a website by the American Association for Clinical Chemistry (AACC), where it launched in 2001. The UK laboratory profession recognised the potential of this site at an early stage and the ACB were successful in obtaining sufficient funding from the Health Foundation and the Department of Health (England) to develop a UK site. LTO-UK was launched by the Minister of Health, Rosie Winterton, in June 2004.



Lab Tests Online-UK website traffic



Where we are now

Although the site has developed and grown over the past 19 years, the foundations of being patient-centred, peer-reviewed and non-commercial remain the same. The licence for the site was originally held by the AACC and, following commercialisation of the US site in 2020, the licence was transferred to the ACB in 2021, opening up a wealth of opportunities for the future development of the website.

The site now includes 306 tests and 119 conditions and the tests span the breadth of laboratory medicine disciplines from andrology to virology. The popularity of the site continues to increase year on year, with over 4 million visits to the site last year, an increase of 8% compared to the previous year.

One of the fundamental pillars of LTO-UK is its non-commerciality, leaving the site free from commercial bias. Funding is gratefully received from the ACB, IBMS and RCPath, with administrative support and hosting provided by the ACB.

Under the auspices of the ACB, the LTO-UK Board govern and manage the website. The Board comprises volunteers from across the laboratory disciplines and includes representatives from each of the three professional bodies that fund the site. Editorial work is all performed on a voluntary basis by a team of suitably qualified laboratory doctors and scientists with a managing editor and deputy overseeing and finalising editorial work. The information on the site is continually reviewed and updated, with additional pages added as required, and news articles published on a regular basis.

The evolving laboratory-patient interface and the crucial role of LTO-UK

The NHS England Patient Online programme was launched in 2015, following the announcement in 2011 by the then Secretary of State for Health, Jeremy Hunt, that all patients in England would be given access to their full digital GP record (including test results) by April 2015. More recently, this commitment has been added to the General Medical Services (GMS) contract, which now mandates GP practices to enable full online record access for all patients, and has led to a more significant increase in uptake by patients. The majority of GP systems are now able to allow patients full online record access. According to NHS England data, as of February 2023, 21% have full online record access (including test results), a significant increase from the 13% who had full online record access in March 2022.

In relation to laboratory medicine, this means that patients with detailed coded record access can view their laboratory test results as soon as they are filed on the GP system. Access can be directly via the GP system or via a plethora of third-party apps, including the NHS App, which can access the same GP system data feeds.

LTO-UK is in a unique position to support patients, compared to other patient information resources about laboratory tests, owing to the information on the site being written and reviewed by NHS laboratory professionals with no commercial bias.

In addition to high quality content, the different ways in which the site can be accessed provides a unique opportunity to engage patients to view and use LTO-UK content. This includes being able to access embedded links alongside test results on electronic records, direct access via the LTO-UK URL, and search engine-directed and embedded links from other websites (eg NHS.uk).

The future of Lab Tests Online-UK

The transfer of the licence for the LTO-UK site to the ACB has opened up a wealth of opportunities for development that, with the previous restrictions, were not possible. The Board are actively working on plans for the development of the site in the short, medium and long term as they look ahead to its 20th anniversary in 2024. The immediate challenges faced are around editorial availability and security of funding with a sustainable model for both required. The Board are supported by the ACB and are resolute that the defining foundations of the site will remain unchanged, with a patient-centred approach, using peer-reviewed information, whilst remaining a non-commercial resource.

How can you get involved?

Editorial work

The Editorial team welcome interest from laboratory doctors and scientists from all disciplines of laboratory medicine to update the content of the website and to write news articles. Editing and developing website content is an excellent opportunity for CPD activity and to improve lay writing skills – something all laboratory professionals can benefit from.

Marketing and Promotion

The Marketing and Promotion team welcome interest from laboratory doctors and scientists who would like to be involved in promoting the website. Opportunities include exhibitor attendance at annual conferences for the Royal College of General Practitioners and British Society of Haematology. Free marketing materials are available for healthcare professionals to provide to their patients when signposting to LTO-UK is beneficial. ■

Plus ça change, plus c'est presque la même chose: Medical Mycology from 1949-2023

by Richard Barton, Principal Clinical Scientist, Mycology Reference Centre, Department of Microbiology, Leeds Teaching Hospitals Trust

I am a Clinical Scientist working in Mycology at Leeds Teaching Hospitals Trust and have worked for the NHS since 1997. Medical mycology is the study and investigation of fungal disease. When I first came to Leeds, I heard about a scientist called Charles La Touche (pictured). He started working as a Mycologist at the Leeds General Infirmary in 1949, the first full year of the NHS. One of Dr La Touche's roles was to attend patient clinics, examine patients who were suspected of having skin, hair or nail fungal disease, and take samples from them to take back to the laboratory. As a non-patient-facing healthcare professional, the idea of examining patients is both unfamiliar and uncomfortable, without extensive training. In most cases, including in Leeds, the role of sampling patients ended up a job for dermatology (and of course GPs). The exception is the St John's Institute of Dermatology in London where laboratory staff still see and sample patients, and I have learned so much from scientists like Dr Sue Howell who had this role for many years (though who retired this year). However, for most of us, we just get the sample dissociated from the patient, and that much, at least, has changed.

Dr Charles La Touche

During the pandemic, while sorting out offices in Leeds to create more space to socially distance, an old diary was unearthed that was identified as belonging to Charles La Touche from 1949 (just four years prior to the founding of the ACB). It is a fascinating piece of NHS history, as Dr La Touche carefully documented the patients he saw, the samples he took, and in many cases made careful drawings of the sites of infection, lesion by ringworm lesion. There is even a picture of a small dog with a lesion, presumably thought to have been the source of a zoophilic infection in a patient. What is clear is that extensive skin lesions on the head, torso, arms and legs appeared to be common back in 1949. Some of these infections would have been spread between people,

A culture plate of an isolate of T. indotineae

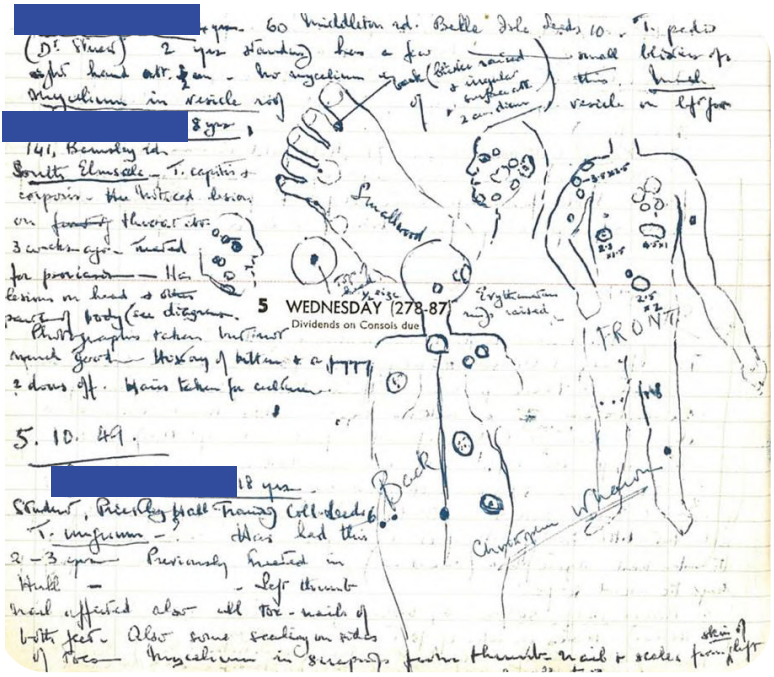
perhaps living in cramped conditions due to the limited housing only four years after the end of World War II. We know that diseases like *Trichophyton rubrum* infection, which were relatively rare in Europe at the beginning of the century, were effectively imported following the mass movements of people, both refugees and military personnel, during and after World War I and II.

During my early years at Leeds, being taught by the late Professor Glyn Evans (who was hired by Dr La Touche in the late 1960s), the emphasis was on fungal toenail disease and the new treatment with terbinafine – for which the lab in Leeds contributed to one of the key trials demonstrating its efficacy. The vast majority of samples were derived from the two extremities of the body; the toenails, and scalp scrapings. These samples were examined microscopically for the presence of fungal hyphae and the spores that can sometimes form *in vivo* arthrocondida. Part of the sample was also placed on agar plates designed specifically to grow fungi, particularly dermatophyte fungi, to correlate with the microscopic results.

Onychomycosis, a fungal infection of the nails, particularly toenails, was, and still is, very common. Some estimates suggest that up to 23% of all adults will suffer from a fungal toenail infection at some point in their lives. At the other end of the body, scalp ringworm is a disease of pre-pubertal children and, while less common than onychomycosis, can cause severe lesions, scarring and hair loss. Detailed investigation of samples is important for understanding the epidemiology and advising on management.

In general, up until recently, cases of tinea corporis or tinea cruris (dermatophyte infections of the torso and groin respectively), of the kind that Dr La Touche documented in his drawings and notes, were few and far between.

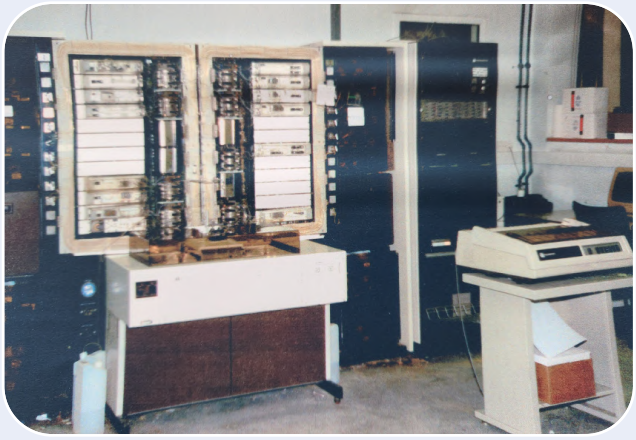
About five years ago I was involved in a case of a 14-year-old boy who had presented to dermatology with *tinea corporis* following a trip to India. The patient had failed treatment with terbinafine – a normally highly effective antifungal – and we identified the causal agent as an odd looking dermatophyte which, by DNA sequence analysis, I determined was within the species complex we call *Trichophyton interdigitale*. Due to the treatment failure I decided to refer the isolate to the mycology reference laboratory in Bristol for sensitivity testing (a specialist service we do not have in Leeds) and it was resistant to terbinafine – a rare finding for a dermatophyte. Over several years I have supported the dermatologist in struggling to treat this patient with alternative antifungals, and recently I have determined that the isolate is in fact the species *T. indotineae* described as new in 2020. *T. indotineae*, which has emerged as a pathogen in India and some other Middle Eastern countries due to the wide availability of unregulated pharmaceutical products, is either completely resistant to, or less susceptible to terbinafine. It has spread by travel to



A page from Dr La Touche's clinic diary with drawings of patient's lesions

many other countries, including the UK. It is difficult to treat with other antifungals and infections frequently present with the kind of extensive lesions on the body, groin, legs and arms with which Dr La Touche would have been familiar. Since that first case in 2018 we have now seen many more in Leeds and this infection is even more common in parts of London and other conurbations.

Thus, looking back over 70 plus years in mycology, while much has changed, some patterns of disease and required investigations stay the same or re-emerge. Or to paraphrase Jean-Baptiste Karr: *'Plus ça change, plus c'est presque la même chose'.* ■



Photos from the Past

A photo of the SMAC at the end of its life. The next day it was ripped out and replaced! Photo supplied by Angela Parnham, Wansbeck Hospital

"...and it seems like only yesterday!"

by Dr Joanna Sheldon, Consultant Immunologist (semi-retired)

Oh how times have changed in the 40 or so years since I first walked into an Immunology lab. How we worked back in the 80s would be totally unrecognisable and totally unbelievable to most Immunology staff of today. Can you imagine a lab where a quarter of the staff smoked, many of them while working at the bench? The careful use of a rubber glove was the only protection – to cover the smoke detector from setting off the fire alarms. The only people in the hospital who had a computer were the statistics department, so the formula for calculating standard deviation was sellotaped on the back of the lab calculator. Every reagent we used we made from the actual chemicals from the chemical store; imagine making 0.9% NaCl, Biuret reagent, PBS, stains and de-stains, barbitone buffer and agarose gels before you could do any analysis. We had to be careful with the money – we used to buy antiserum direct from the antibody 'farms'. A litre each of anti-IgG, IgA and IgM would last us about a year and at £2/mL, was good value for money although the £6,000 was a big chunk of our £56,000 annual consumables budget.

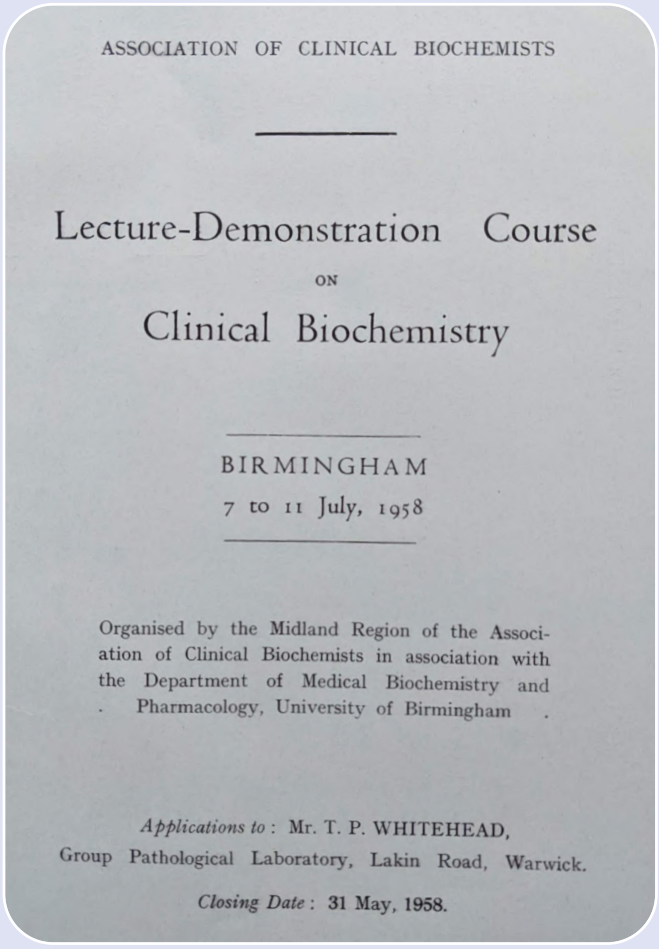
There were lots of major leaps forward in how we did things. Changing immuno-electrophoresis (IEP) to immunofixation was a huge improvement. Labs were using immunofixation when the IEP wasn't clear, so we dropped the IEP and went straight to immunofix. Cellulose acetate to agarose as support medium for electrophoresis was another big change and the introduction of capillary zone electrophoresis was a revelation. The quantification of immunoglobulins has also seen some big changes. In the early 80s we used laborious gel techniques that would take days to generate results, the slightly more automated Hyland nephelometer was quite a step forward but the introduction of the essentially automated and robust Beckman ICS was a huge improvement in the overall service. For the specific IgE testing it seems unbelievable that the allergens were coated onto little perforated paper discs that we would manually add to the relevant tubes before the samples were added. It was a depressing moment to check the tubes only to find an empty one – and even more depressing to find another tube with two discs.

You may think that this sounds a bit challenging in comparison to today's 'open the kit' and automated working, but we probably had more fun than we have today. There was very much a sense of us all working as a team. There was wonderful camaraderie – parties were a regular occurrence, for people leaving, big birthdays, Christmas, Easter and sometimes for no particular reason. You may all find this surprising, but an unused and well-washed sharps bin is a good size for 'lab punch'. Every few weeks, the intercom would buzz and Professor (Hobbs) would invite us all into his office for drinks. We often were served the slightly dubious bottles that he had been given on his many lecture tours, or the wine from the departmental wine store – yes, we had a wine store!

It is interesting to think about the changes over such a long time – I think we had a greater sense of the significance of what we were doing. We were so involved

in every step – from manually writing people's names in a day-book to preparing the reagents, following the method for the tests and then writing the results on paper reports, so we felt totally involved and responsible. Greater satisfaction and probably greater jeopardy. If there was something wrong with a reagent, we made it up ourselves; if the analyser wasn't working, we tried to repair it. The best part of the lab 'back in the day' was that there was an overriding principle of striving for excellence and the patient was the most important person in the whole process. As we move into a new era of ever-increasing automation and high-throughput I hope that the next generation of Immunologists remembers this principle, and also remembers to enjoy the privileged position they are in, in being able to make a real difference to patient care. ■

Photos from the Past



ASSOCIATION OF CLINICAL BIOCHEMISTS

Lecture-Demonstration Course

ON

Clinical Biochemistry

BIRMINGHAM

7 to 11 July, 1958

Organised by the Midland Region of the Association of Clinical Biochemists in association with the Department of Medical Biochemistry and Pharmacology, University of Birmingham

Applications to: Mr. T. P. WHITEHEAD, Group Pathological Laboratory, Lakin Road, Warwick.

Closing Date: 31 May, 1958.

A flyer for a Lecture Demonstration Course in 1958. Note the fee for a five-day course was £3 3s 0d!

Top left: Miss Wilson, Department of Biochemistry, RMCH, Jan 1952
Top right: Biochemistry Lab, RMCH, Jan 1952
Below: Tom Whitehead, President 1981-82, opening a Congress in Brighton in 1979. Sitting to his left is Dame Barbara Clayton (President 1977-1978)

Drones, dried blood spots, doorstep lab tests and telemedicine:

A mission towards eco-friendly Laboratory Medicine Practice

by Dr Jayagandan Jayamani, Clinical Biochemist, New Mowasat Hospital, Kuwait

Healthcare organisations produce millions of tonnes of clinical waste every day, causing a direct impact on the environment in terms of carbon emissions. No country is an exception to this ongoing destruction of the environment. Though it is completely unavoidable, healthcare providers should try to work responsibly to keep the damage to a minimum. In any healthcare organisation, laboratories are one of the major contributors to clinical waste.

As laboratories have moved away from an era of using glassware and making up their own reagents to using disposable pipettes and tourniquets, we generate clinical waste in almost all categories. While we accept the fact that laboratory reports contribute significantly to practising evidence-based medicine, we also cannot deny the fact that not all tests requested are urgent or of absolute necessity.

On the positive side, our profession has seen huge advances in technology over the last 70 years meaning what once would have required several millilitres of blood can now be done on only a few microlitres. With the advances in dried blood spot testing, anything could be possible in the future. COVID-19 has pushed us beyond anything we thought might be possible and leads us to think about how laboratory testing may progress in the future. Here are a few thoughts:

What if clinical laboratories decentralised their services? To start with, they could make the phlebotomy and sample collection services available at the patient's doorstep. What if, in order to achieve this, we could design and develop micro or nanobots capable of collecting venous or capillary blood samples or other relevant biological specimens? The robots would need to be smaller and lighter in order to easily fit inside small drones.

Every healthcare provider could have dedicated control rooms to deploy and receive incoming drones. These control rooms would need trained technologists to load drones with robots and sample collection essentials, receive drones, unload robots, and collect samples from them. Appointment booking, selecting lab tests or uploading lab test requests, selecting an address for sample

collection etc would be made accessible through a dedicated software application. Drones would be equipped with specialised biometric scanners and other security systems to verify the patient's identity. In addition, we would need drone stations for those who live in locations that are more difficult to access.

In conjunction, we would need to expand the repertoire of tests that utilise dried blood spots (DBS). By doing so, sample collection and transportation would become much easier, and collection drones could make multiple stops and reach out to many needy patients in one trip.

Additionally, we should work to enhance the testing menu of Point-of-Care Testing (POCT) devices so that they can cater for routine follow-up of all non-communicable diseases. If we could achieve all the above-described ideas, this would permanently switch off many car engines, which otherwise would do regular patrols to a hospital or a laboratory. As we already have the technology to deliver lab reports directly to care providers, getting medical advice for dose adjustments or treatment modifications will not be a big challenge. At first glance, the idea may appear unrealistic and unsafe, but the truth is that defense research and development already have the required technologies. If drones can carry destructive missiles and drop them accurately on exact coordinates, they can also save lives. Drones carrying dried blood spots will be a game changer in the delivery of laboratory services in the future. This may appear as inconceivable, but what if it really was possible? It would certainly make laboratory tests accessible, even to those living in the remotest locations, and aid us in achieving goals like 'Health for All' and 'Net Zero'. ■

Photos from the Past

Back page adverts from 1954 editions of The Clinical Scientist – the official publication of the American Association of Clinical Chemists (AACC)

Healthcare Excellence Legacy within the UK – Elite performance with UNIVANTS-recognised best practices

by Colleen Strain, PhD, Abbott, Core Diagnostics, Scientific Leadership

As the ACB achieves its platinum anniversary of 70 years, the UNIVANTS of Healthcare Excellence Awards celebrate their own momentous anniversary of five years. The **UNIVANTS of Healthcare Excellence program** recognises integrated clinical care from teams who have strategically mobilised insights from laboratory medicine to enable greater outcomes and improved patient care. As the ACB and UNIVANTS celebrate their milestone anniversaries of excellence in healthcare and laboratory medicine, we reflect upon outstanding health achievements that have originated in the UK, with varied and elite recognition through the UNIVANTS of Healthcare Excellence Award Program.

Since inception, the UNIVANTS of Healthcare Excellence program has recognized 53 best practices from around the world, of which 18.9% (n=10) have originated from within the UK, including three global top winners. The next country with the closest number of recognised best practices is the United States with 11.3% (n=6). The overwhelming and impressive best practices originating in the UK span topics such as HIV detection, COVID-19 innovations, liver function testing, cancer, sepsis and more (see table on next page), with each one tackling and measurably improving patient outcomes and care.

Standout Best practices from the University of Dundee (2019), Oxford

UNIVANTS 2019 winners: University of Dundee, UK. From left to right: Elizabeth Furrie, Ian Kennedy, Jennifer Nobes, Michael Hugh Miller, John Dillon, Ellie Dow.

Best practices from the UK with recognition from the UNIVANTS of Healthcare Excellence Program

Care initiative	Location	Recognition	Year
Integrated clinical care strategy improves emergency patient flow	The Royal Wolverhampton NHS Trust	Principle winner	2018
Intelligent liver function testing (iLFT): A cost-effective way to increase early diagnosis of liver disease	University of Dundee	Top winner	2019
Improving the safety of mothers and babies using angiogenic biomarkers for pre-eclampsia	Oxford University Hospitals NHS Foundation Trust	Top winner	2019
Identifying untreated Hepatitis B and Hepatitis C via Opt-Out Screening Program in urban ED settings	Guy's and St Thomas' NHS Foundation Trust	Distinction	2019
Use of faecal immunochemical tests unlocks the door to efficient and effective investigation of patients with new bowel symptoms	NHS Tayside	Distinction	2020
Procalcitonin: A successful clinical formula for the early recognition and management of sepsis in the Emergency Department	The Princess Alexandra Hospital NHS Trust	Achievement	2020
COVID-19: Using data, innovation and collaboration to support better patient outcomes	North West London Pathology	Achievement	2020
Sustained 97% opt-out HIV testing in the Emergency Department: Getting to zero AIDS	Croydon University Hospital	Top winner	2021
Addressing COVID-19 clinical and translational challenges via multidiscipline integrated diagnostics networks	UHCW NHS Trust & Warwick Medical School	Distinction	2021
Improved patient pathway for diagnosis, follow-up and monitoring of multiple myeloma: A multi-disciplinary collaboration to improve the pathway from the initial request to long-term monitoring	Hampshire Hospital NHS Foundation Trust	Achievement	2021

University Hospitals NHS Foundation Trust (2019) and Croydon University Hospital (2021) received global top recognition.

The Intelligent Liver Function Testing (iLFT) initiative from the University of Dundee, led by Dr Ellie Dow and Dr John Dillon, aimed to increase early detection of liver disease to enable improved prognosis and treatment, while reducing costs and improving patient outcomes. To achieve their goals, they mobilised a combination of clinical and laboratory data to help generate diagnosis/investigation plans and clinical management plans. The impressive results of this initiative enabled a 43% increase in appropriate diagnosis of liver disease enabled by a 59% increase in the appropriate investigation of abnormal LFTs. Through detection and intervention iLFT has a cost-effectiveness ratio of £284 per correct diagnosis.

The best practice from Oxford University sought to improve the diagnosis and management of women presenting with suspected pre-eclampsia. Under the leadership of Dr Tim James and Dr Manu Vatish, this integrated clinical care team successfully initiated and expanded the use of key angiogenic biomarkers (sFlt1 and PLGF). The new availability of insights associated with these markers

UNIVANTS 2019 winners: Oxford University Hospitals NHS Foundation Trust, UK. From left to right: Guy Checketts, Tim James, Julia Eades, Manu Vatish, Matthew Covill

enabled enhanced patient safety through a 20% reduction in inappropriate discharges for patients with previously unknown pre-eclampsia and reduction of inappropriate admissions, all while positively affecting clinical confidence.

Most recently, Croydon University Hospital was awarded top recognition for their opt-out HIV screening program in the Emergency Department. This integrated clinical care team, led by Dr Ian Cormack, recognised that within the devastation of undiagnosed HIV was an opportunity to improve identification of undiagnosed HIV, reduce stigma and improve patient outcomes. Through their opt-out screening program, the inpatient mortality rate for patients with newly diagnosed HIV fell from 23% (2017/18) to 0% (2020/21), the rate of AIDS defining illnesses in newly diagnosed patients was reduced from 78% (2005-2010) to only 4% (2020-2021), with a corresponding 31% reduction in admission rates. This initiative also achieved an impressive 60% re-engagement rate for patients who had previously defaulted from care (a notoriously difficult group to reach). Through early identification and intervention, the cost savings associated with this initiative include an estimated £326,000 in avoided admissions, lifetime savings of >£2 million from mitigated transmissions, and >£30,000 in savings associated with reduced intensive care admissions.

These three top recognised teams highlight outstanding examples of healthcare excellence with measurable improvements in outcomes for patients, payers, clinicians and health systems. Even more impressive, they are joined by seven other teams from the UK with recognition of distinction and/or achievement, surpassing all other global regions for best practices of healthcare excellence.

As we look forward to the next five years and beyond, the possibilities for best practices within the UK are boundless. If the past is any representation of the future, then we can expect continued improvements in patient-centered and cost-effective care with many more outstanding best practice examples from the UK, and opportunities for recognition through the UNIVANTS of Healthcare Excellence Awards.

To learn more about UNIVANTS, how to apply and learning opportunities, please visit **UNIVANTS of Healthcare Excellence**. ■

UNIVANTS 2021 winners: Croydon University Hospital, UK. From left to right: Leslie Perry, Ian Cormack, Linda Cheyenne Vaccari, Sarah Horne

Images credit: UNIVANTS

I remember when . . .

by William Marshall

The earliest records of chemical analyses being made for diagnostic purposes all related to the examination of urine. The Wellcome Collection in London includes several artworks dating from the early 17th century of European apothecaries or physicians examining flasks of patients' urine, and from even earlier, **a 14th century Byzantine miniature of this subject**. *The First Forty Years* (Broughton P., Lines J. 1996; London, The Association of Clinical Biochemists) includes a reproduction of the frontispiece of a '…litel treatise conteyninge the jugement of urynes most necessary for all such as be desirous to know the state of their owne bodys…' published in 1553. And reference was made in a previous article in this series to an ancient Egyptian urine test for pregnancy (*ACB News* 679: October 2022). They were also aware of glycosuria ('mellitus' is the Latin for 'sweetness'). I could not find any references to the diagnoses that might have been made on the basis of simply looking at urine but one might suppose that cloudiness might have been interpreted as indicating the presence of some abnormal component, and that an abnormal colour might also have raised a suspicion that all was not well.

The Anglo-Irish writer and natural philosopher Robert Boyle 1627-1691 (of Boyle's Law fame) is generally thought to have been the first to suggest that examination of the blood might be useful as an adjunct to the diagnosis of disease, although this has been disputed (Knight H, Hunter M. *Med Hist*, 2007 Apr 1; 51(2):145-164). Boyle's crucial publications in the field were *Memoirs for the Natural History of the Human Blood* published in English in 1684 and subsequently in Latin – still the *lingua franca* of science at this time – and Apparatus Ad Historiam Naturalem Sanguinis Humani (1685).

The late 17th and early 18th century saw the birth of organic chemistry and the increasing application of chemical techniques to biology. In the early records of the Royal Berkshire Hospital, Gordon Challand unearthed what is probably the first report of a chemical analysis in the UK. This report, dated 1827, related to a renal stone comprising lithic (uric) acid and lithate of ammonia, but renal stone analysis had been performed for many years before so that cystine was the last major component of renal stones to be identified (by Wilfred Hyde Wollaston (1766-1828), who also discovered rhodium and palladium). He is commemorated in the name of the mineral wollastonite, used as a flux in steelmaking.

The first use of the term 'chemical pathology' that I have been able to find is in 'Lectures in Chemical Pathology', a transcript of a Royal College of Physicians' Goulstonian Lecture by Henry Bence Jones in 1847. A chemist and a physician, he is remembered in the name of the urinary protein found in many patients with myeloma. J. W. L. Thudicum, a Neurochemist at St Thomas's Hospital, London, used the term 'chemical physiology' in his *Manual of Chemical Physiology, Including Its Points Of Contact*

With Pathology. Thudicum's name will be familiar to medics as it is attached to the nasal speculum that they will have encountered in their learning of ENT. 'Clinical Chemistry' appears first to have been used by Charles Ralfe, a Physician at The London Hospital, in his manual published in 1883.

Until recently, we were unable to settle on a single name for our specialty. Clinical scientists and many medics understandably didn't like 'Chemical Pathology' since it has connotations of forensic pathology (particularly among the general public and in the media). Medics were concerned that 'Clinical Biochemistry or Chemistry' doesn't emphasise that they are medical practitioners, though this has probably become less of a concern with the development of roles incorporating both Biochemistry and Metabolic Medicine. Our Association has used the term 'Clinical Biochemistry' since its formation. My friend and mentor, the late Arthur Miller, was clear (though controversial) on the subject: his view was that the science was what went on in the laboratory; chemical pathology was its application on wards and in clinics. Our Association (though not the discipline) is now undergoing a name change to encompass its increased scope: the use of 'laboratory medicine' seems appropriate because there are several areas where the traditional separation of the various laboratory disciplines has become blurred, and tracked analysers often incorporate non-biochemical analyses, the laboratory disciplines (with the exception of histopathology) being lumped together as 'blood sciences'.

Pathology laboratories were initially established in medical schools and connected to the teaching of Chemistry but by 1896, there were at least four hospital laboratories in the UK. The number gradually increased, with one at St Thomas's in 1896 and at the Westminster Hospital, London, in 1900. The major work

A medical practitioner examining a urine flask.
Oil painting after David Teniers the younger. Photo credit: The Wellcome Collection

of these laboratories was in bacteriology, and in the early 1890s the development of chemical analyses on serum proceeded only slowly. A critical development was the invention of the hypodermic syringe, to allow atraumatic venepuncture. The first chair in biochemistry in London was established at the Middlesex Hospital, London, in 1927. Its holder was Charles (later Sir Charles) Dodd, who was appointed at the age of 24 and had a career lasting for over 40 years. The first non-medical scientists in the UK were Evelyn Hickmans and Hilda Traught, both in Birmingham, whose hospitals have always been at the forefront of the development of the subject. Further chairs were established, and when I joined the profession in the early 1970s, every London medical school had a medical professor of Chemical Pathology, and the work of hospital laboratories was firmly established as being essential to the practice of medicine. It is increasingly so, yet I think that all the chairs in the subject (in London, at least) have been disestablished or are not held by *bona fide* Clinical Biochemists (apologies to any concerned to whom this does not apply). Few hospital laboratories are able to conduct significant research. Most method development is now largely conducted by the industrial organisations that support our work. On the plus side, many laboratories are now run by highly trained and competent scientists, with medics using their medical training by being increasingly directly responsible for patient care.

With the increase in activity came an increase in the need for professionalism, e.g. training, examinations, ongoing education and standard setting. To this end, The Royal College of Pathologists was founded in 1963 and our Association in 1953. These events, and the early history of the organisations, have been well chronicled in 'Foster W.D. Pathology as a Profession in Great Britain. London: The Royal College of Pathologists, 1963' and Broughton and Lines (*loc cit*). Elliott Simpson's ***Clinical Biochemistry in Scotland – a random history***, is also relevant to those early years.

What further changes, I wonder, will the two organisations record in their centenary editions?

I thank Drs Karen Poyser and Gordon Challand for their comments on an early draft of this article.

Photos from the Past

Professor H. Gemmell Morgan, Dundee 1948 to 1966 and Glasgow 1966 to 1988 in his office in the McLeod Street Laboratory, 1977. Professor Morgan was Chair of the Association of Clinical Biochemists from 1983-1984 and then President from 2000-2002.

Future perspectives

In this June issue of *ACB News*, as we look back at 70 years of ACB history, it seems quite fitting to also be looking forward to what the next 70 years may bring. The *ACB News* Team are delighted to introduce our new regular feature – Future Perspectives. We had a great response to our call for columnists for this feature, but there were two applicants that stood out and who we thought could complement each other by bringing differing perspectives and views to this column. We loved the idea of having an accomplished and high-profile Clinical Scientist teamed with a group of enthusiastic Trainees. So, without further ado, *ACB News* is pleased to present to you our new columnists: the very talented Katy Heaney (Consultant Clinical Scientist, Berkshire and Surrey Pathology Services), who featured on the Pathologist Powerlist in 2022 and Jessica Johnson (Chemical Pathology Trainee, Sheffield Teaching Hospitals NHS Trust) representing Trainees from the Clinical Biochemistry Discord Server.

Katy Heaney

Hi, I'm Katy and I am a Consultant Clinical Scientist and the Point-of-Care Testing speciality lead at Berkshire and Surrey Pathology Services. I have always worked in London and the Southeast, had a few roles in our professional body committees along the way and was seconded to the Department of Health and Social Care, and later UK Health Security Agency during the COVID-19 pandemic as Point-of-Care workflow lead for operational supplies. I led the #PathologyRoar campaign to support recruitment into our profession, producing a series of videos about what we do in Pathology. It would be fair to say I have always had an interest in promoting our profession, working with LabTestsOnline and National Pathology Week. I am to be found on social media celebrating lab staff with #IValueLabStaff and occasional posting on baking, art, gardening and cats.

In my 20th year as a Clinical Scientist, I reflect on how the role of *ACB News* has changed in my professional life. As a Trainee I used it primarily for job adverts, back in the day when Trusts were allowed to advertise on more than just NHS Jobs, and of course Deacon's Challenge for my studies. In my middle grade years, I would peruse over a cuppa the articles on education days and the business of the ACB. In more recent times I am looking for it to expand my knowledge base and to pique my interest in something beyond my current scope. What is the future of our profession? What is coming in the next five or ten years and do we have the workforce to meet those needs? I am interested in innovation, system design and working beyond our silos to improve patient care with a responsible eye on budget. It is after all, our taxpayers' money and the healthcare system we all use and need.

My intention is to bring you some articles to widen knowledge. How many years old were you when you learnt about NHS England regional structures or the role of the Chief Scientific Officers? Some interviews, some experience and some deliberately to give us an opportunity for conscious, proactive opinion holding. It can be far too easy in our high-pressured working lives to hold an opinion accidentally or with our unconscious bias holding the reins. If you are interested in

bringing our colleagues' attention to a new venture or innovation in Pathology, please get in touch. My role is very multi-disciplinary but in the POCT sphere, and during a recent tour around our Microbiology Department I was delighted to see the automation progress compared to the last time I was walking the floors; so please contact me if you feel your department is taking strides into using modern technology and want to raise its profile. I hope to bring you some ideas and information that will enlighten and warrant a chat over a cuppa with your colleagues on how it reflects on your own practices and laboratory services.

Jessica Johnson

Hi, I'm Jessica and I'm a 3rd year Chemical Pathology Trainee in Sheffield. I grew up on the small Caribbean island of Nevis and came to the UK for university.

When *ACB News* asked Trainees to write a regular column on future perspectives and insights into laboratory medicine, it seemed a daunting task. Trainees are, by definition, at the beginning of our laboratory medicine journey, so it was hard to imagine opining on the future of the profession with the regularity required for a bimonthly column. That's why I pitched the idea of multiple Trainees from the Clinical Biochemistry Discord Server writing the column.

I started the Clinical Biochemistry Trainee Discord Server two years ago in my first year of Chemical Pathology training. A Discord Server is an Internet chatroom. It is a less intimidating environment where trainees come together to learn, prepare for exams, and, most importantly of all, make friends. We have now grown into a nice community, and always welcome new members! **Feel free to join the Trainee Discord.**

The Trainees Discord Server has a wealth of combined experience and together we felt that we could provide a regular column. We hope to provide a perspective on things that seem to be on the horizon, such as AI, diversity in reference ranges, patient access to results, metabolomics and much more.

Devon Buchanan

Hi, I'm Devon and I use *they* and *she* pronouns. I am a senior Clinical Scientist who trained at Synnovis at King's College Hospital, London, where I now work. I completed the NHS Scientist Training Programme in 2021.

I joined the Trainee Discord Server when it started in January 2021. As I grew up with the internet, I was used to taking part in these sorts of communities and they had given me the confidence to do things that I would have been too intimidated to do otherwise. For example, a discussion on the Discord Server convinced me to write a letter to the editor of the British Medical Journal that was published as the letter of the week. I would not have had the confidence to do that without the encouragement of my peers.

When *ACB News* advertised for a Trainee to write a regular column, I felt under-qualified to write about the future of laboratory medicine, but I took up Jessica's offer to write collaboratively for the column, because I knew that our friendly community could help myself and others contribute in ways that wouldn't happen without it. ■

ACB News

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Speaker photos courtesy of each individual speaker

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