

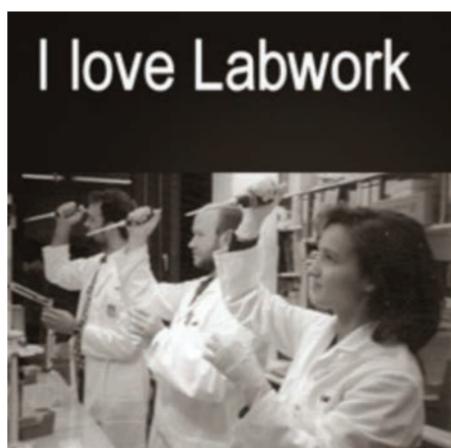
Industry Report

40 years of Laboratory Technology

Jacqueline Balian, GAMBICA, jacqueline.balian@gambica.org.uk



40 years ago, when GAMBICA was first formed, the first few cases of Kaposi sarcoma were being reported in gay men in New York. That was the start of the AIDS epidemic, although we did not realise that for a few years. A death sentence in 1981, AIDS is now a manageable disease, but it took many years to develop effective treatments and there is still no vaccination available. That is in sharp contrast to the remarkable performance in manufacturing a vaccine for the sometimes-fatal virus we are now facing, COVID-19, in less than a year.

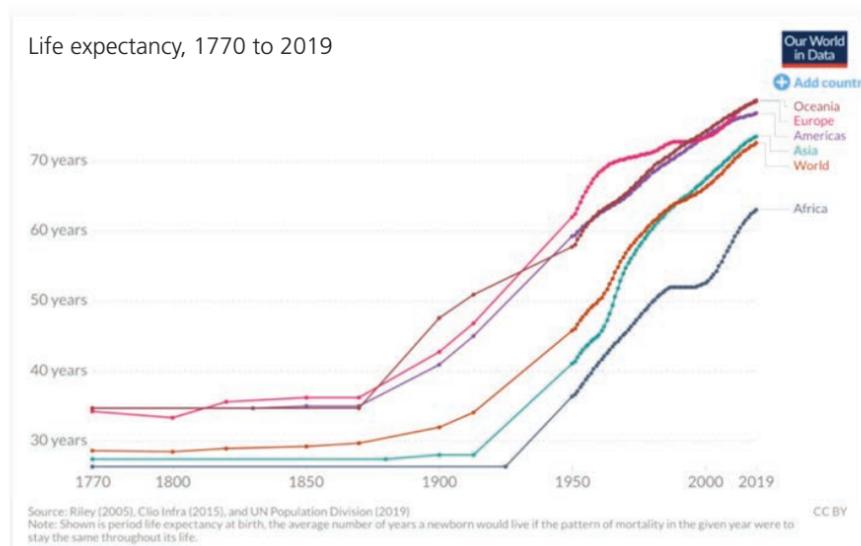


This acceleration really demonstrates the pace of change in research and that change has been made possible by a raft of scientific discoveries which have been applied in the laboratory. Notably the launch in 1981 of the first personal computer, which has had a huge impact on scientific research, as did the ground-breaking work on the world wide web.

Even the less spectacular scientific advances, like the 1988, data packet algorithm which provided a solution to the information highway traffic jams of the early 80s and the increasing speed of data access have

changed so much about the way we work today.

In the 1990's, supercomputers stored information at the frustratingly slow rate of 1 to 10 million bytes a second. Today, supercomputers can save a billion bytes a second. This speed of processing has enabled a new generation of laboratory equipment linked not only in order to automate activity, but to design experiments and to collect and sift through the enormous amounts of data produced in record-breaking time. This everything on-line, Internet of Things approach will inevitably become ubiquitous in laboratories and lab equipment is already changing to take these customer needs and aspirations into account.



The speed of change accelerated again in 2001 when we sequenced the human genome making possible a vast new range of bespoke new medicines. Already this, and other scientific advances are having a marked impact on longevity.

Of course, not all developments have been as welcome.

In 1982 we started to get news about the melting of the polar ice caps, and scientific evidence for climate change has grown hugely since then. While political interest in climate change has had its ups and downs, the universal hope is that science will help us find a way of avoiding the worst of the currently predicted effects - because another growth area seems to be in politicians who don't believe in science. Fortunately, Donald Trump is out of the White House - for now.

Science and its interface with engineering has seen an enormous reduction in the cost of renewable energy, allowing the UK to massively decarbonise its energy generation even if we cannot get our teenagers to turn the lights off.

This particular change is likely to have a major impact on the market for laboratory equipment, as laboratories, data centres and catering kitchens make up the three most power-hungry components of the UK building stock.

As Tony Collins of Priorclave points out in his predictions for the future: "The big issue on the way to 2061 will undoubtedly be climate change and the industry will have to be strong to ensure that its response is practical rather than a box ticking exercise. Effort will be needed to reduce energy and other resource usage without reducing performance. The emphasis may turn to longer lasting products to reduce the whole life carbon footprint, something that might be to the advantage of UK and EU manufacturers."

While energy efficiency was important during the 1970s, it had pretty much gone out of fashion by 1981 and refrigeration was a big beast in terms of energy use. Now energy efficiency is top of the mind stuff.

Old versus new: Thermo Scientific freezers then and now

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- Best overall temperature uniformity: < 5.2°C with door openings, < 4.0°C with no door openings
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- 5 year standard warranty plus 7 additional years on V-drive compressors*

Forma Scientific

*Restrictions and exclusions apply. Warranty is void if the unit is not maintained as set forth in the operation and service manuals.

Of course, equipment today looks very different too, not least because controls have had to be adapted to mimic the user-friendly interfaces we have come to expect from our mobile phones, even though this has not been easy for the less mass-market laboratory industry to achieve."

Old vs new: Waters' LGC equipment then and now



Waters vintage 1980s mass spectrometer took up rather more space than today's benchtop QDa Mass Detector.

Old vs New: Priorclave's autoclaves then and now



So those are some of the changes in the last 40 years, what do the next 40 years hold?

One thing is clear to see, equipment which was once the preserve of the research laboratory is now making its way into all walks of life. Applications for laboratory instruments reach into food science, forensics, archaeology, to scrape just the tip of the iceberg. So, markets for lab equipment have expanded hugely and will continue to do so.

James Hallam, Vice President - Europe, Middle East, & Africa, Waters Corporation agrees: "If the next 40 years are anything like the last, then I think you'll see analysis continue to move out of the laboratory and into the field at a more rapid pace where in one form or another, analytical measurements will be made closer to the source of the sample whether that's a patient in surgery or a drug coming off a continuous manufacturing line. Perhaps we'll see wearable sensors and hand-held devices that will one day monitor our exposure to airborne or surface-borne biological or chemical contaminants that will help us avoid sickness and lead safer and healthier lives.



Andrew Rodwell and Tony Collins of GAMBICA's autoclave group

"In the lab, instrument technology, artificial intelligence and machine learning will come together to reveal insights into human biology and that will allow us to find and validate elusive biomarkers of disease and human health that will inform standard medical care for many years into the future."

GAMBICA members have, of course, watched the UK lab industry carefully and indeed shaped it over the years. GAMBICA Board Member, Tony Collins, has the following predictions for the lab industry:

"While the biggest advances over the past 40 years have been in computing and IT, it looks like the turn of biological sciences in the years to come. There will be more automation and remote monitoring and control leading to lower staff numbers doing more theoretical work while the practical work is carried out remotely.

"The last 40 years has seen declining numbers at trade shows both domestic and international and these will probably die out well before 40 years' time. Climate change issues will only speed this along and will lead to much less face-to-face selling, a trend that is already starting."

Tim Collins, who was head of the lab tech sector at GAMBICA from October 2005 right up until the end of 2018 thinks that a big change will be the increasing use of electronics, software, remote activity and the use of AI.

"I think the interesting things will revolve around new techniques and/or sensors - where is the next really game changing technique or analytical tool, who is working on them as R&D spending in both industry and government is focused on short term gains, which means more software rather than new ground breaking fundamentals.

"Added to that while the benefits of AI, internet etc bring better service to scientists we should not forget the interface to humans. After all it always ends up with a human somewhere."

John Lees of LTE Scientific notes that: "Whilst there are challenges at the moment, the future is (potentially) actually pretty bright.

"The impact of the COVID-19 pandemic and Brexit have both placed severe strain on all aspects of UK life. However, the result of both these events have the potential to provide a significant boost to the UK life science sector in the future.

"With regards to the pandemic, the UK has demonstrated its World-class strength in the way that it researched the virus and rolled out successful vaccines. The life science sector (not surprisingly) has come through the pandemic relatively unscathed so far, and I believe the UK's position as a leading research hub will attract significant National and inward investment in the future.

"Whilst Brexit has thrown up a number of challenges for many, it offers the chance for UK manufacturers to increase their share of the domestic market, but this will require significant lobbying and for the Government to fully support this by providing the necessary opportunities for UK-based manufacturers.

Do you agree? To celebrate GAMBICA's 40th anniversary we are sharing photos and reminiscences on social media, so do send in anything you have - I am sure it will jog a few memories. You can get them to me at Jacqueline.balian@gambica.org.uk

Anyway, we can mark the passing of the years without feeling sad - because after all - *Old chemists never die - they just fail to react.*



The 2017 GAMBICA annual lunch



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