



TOOZE: JOHN TOOZE ARCHIVE; LEPTIN: JUERGEN SCHWARZ/AP/GETTY; GANNON: UDO RINGEISEN/EMBL PHOTOLAB

Directors: John Tooze launched *The EMBO Journal*; Frank Gannon lobbied for better funding; Maria Leptin is forging new alliances.

Fifty years of EMBO

Georgina Ferry reflects on the evolution of the European Molecular Biology Organization, founded to help Europe to compete with the United States.

It began during the Cuban Missile Crisis in 1962. The nuclear physicist Leo Szilard went to Geneva in Switzerland “because he thought America was going to be bombed”, recalls Sydney Brenner, a founding member of European Molecular Biology Organization (EMBO). There, Szilard met Victor Weisskopf, the head of CERN, Europe’s particle-physics lab. “They wanted to found CERB, Centre Européenne de Recherche Biologique,” says Brenner. “Nuclear physics and molecular biology would go together.”

That catalysing moment gave rise to an organization that, taking cues from the Rockefeller Foundation and the Cold Spring Harbor Laboratory in the United States, has acted as a matchmaker, educator, benevolent godparent and advocate for Europe’s life scientists. EMBO’s elected membership has included 79 Nobel prizewinners, and its fellowship schemes have supported thousands of young researchers.

EMBO owes its origin and evolution to the enduring challenge of making European scientists better connected and thence more competitive. How, as it celebrates its half-century, is EMBO remodelling itself for the very different landscape of twenty-first-century life sciences?

In the late 1950s and early 1960s, ambitious molecular biologists were leaving Europe for the United States. In 1958,

Jacques Monod, part of a powerful nucleus of molecular biology at the Pasteur Institute in Paris who went on to win a Nobel prize, warned that the new discipline was forging ahead on the other side of the Atlantic because the structure of European universities put up barriers between disciplines, institutions and countries.

Monod’s proposal for a European institute in Paris went unfunded. In Italy, the geneticist Adriano Buzzati-Traverso was more successful. He established the International Laboratory of Genetics and Biophysics (ILGB) in Naples in 1962, with support from the Italian National Council for Nuclear Research. The ILGB paid higher salaries than Italian universities and attracted researchers from abroad.

Meanwhile, Weisskopf at CERN consulted John Kendrew from the Laboratory of Molecular Biology (LMB) in Cambridge, UK, who had that year received a Nobel prize for his structure of the protein myoglobin. Kendrew immediately saw ‘CERB’ as a way to achieve a level of autonomy that was not available to him in Cambridge. He became its principal advocate and driving force.

In September 1963, European molecular biologists met in Ravello, Italy. A powerful group argued that rather than building a lab, a federal organization should foster interaction by providing fellowships to send scientists to laboratories elsewhere in

Europe, and run regular practical courses where they could learn new techniques such as phage genetics. Buzzati-Traverso supported this proposal, fearing that a second international lab would threaten his ILGB.

Ever the diplomat, Kendrew obtained unanimous votes both to work towards the creation of a lab and to set up a federal organization. The new body would be called the European Molecular Biology Organization. Like an academy, it would elect members on merit. With three years of start-up funds from the Volkswagen Foundation, it was incorporated as a non-profit body in Switzerland on 12 July 1964.

THE RIGHT DIRECTION

The character and influence of EMBO owes a great deal to its directors. The first was the British physicist and radiation biologist Raymond Appleyard. He established and ran EMBO’s fellowship scheme with minimal bureaucracy from his office in Brussels while formally employed by the European Atomic Energy Community (Euratom), a body for the peaceful use of nuclear technology. By the end of the 1960s, 14 countries had come together to fund EMBO’s activities: Austria, Belgium, Denmark, West Germany, France, Greece, Israel, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom.

Kendrew finally secured the agreement of

ten of the member states to fund a European Molecular Biology Laboratory (EMBL). With him as its first director, EMBL opened in 1974 in Heidelberg, Germany. It is perhaps not entirely coincidental that EMBL's location on the edge of a pleasant and historic university town bears many similarities to that of the LMB.

EMBL's achievements include the Nobel prize awarded to Christiane Nüsslein-Volhard and Eric Wieschaus in 1995 for their work on early embryonic development. At times, it has been hard for outsiders to grasp the distinction between EMBO and EMBL. What is certain is that neither would have existed without the other.

PUBLISHING AND ASILOMAR

When EMBO, too, moved to Heidelberg in 1973, the British molecular biologist John Tooze took the helm. In 1982, Tooze established and began to edit *The EMBO Journal*, which he ran almost single-handedly until the end of his 20-year term. The journal promoted the EMBO name beyond Europe's borders, and provided a second income stream. It is now ranked nineteenth by impact factor of journals in cell biology and biochemistry.

Tooze took over just as recombinant DNA technology was taking the field by storm. EMBO members, including Ken and Noreen Murray at the University of Edinburgh, UK, ran workshops to introduce European scientists to the new techniques. One of the Murrays' early students was Paul Nurse, who went on to win a Nobel prize and is the current president of the Royal Society in London. "We got lots of hands-on experience and also exposure to some of the great molecular geneticists of the time," he wrote in 2004, in *EMBO: 40 Years of Success*.

In February 1975, after US scientists raised fears about the possible dangers of the DNA technology, a conference in Asilomar, California, agreed a voluntary moratorium on recombinant DNA research. Tooze told the US National Institutes of Health (NIH) that EMBO would be unable to recommend that European researchers adopt the highly restrictive draft guidelines then under consideration, and the organization set up its own recombinant DNA committee. With Ken Murray's help, Tooze organized an experiment to prove that viral DNA was much safer integrated into a bacterial plasmid than it was as part of an intact virus particle (M. Fried *et al. Nature* **279**, 811–816; 1979).

As a result, the NIH held a workshop with EMBO in the United Kingdom, and

subsequently withdrew its draft guidelines that would have required all recombinant research to be carried out in biosafety-level-3 containment. "I think that was a turning point in the regulation of recombinant DNA research in terms of its potential as a biohazard," says Tooze.

POLICY PLAYER

Frank Gannon, a molecular biologist from University College, Galway, in Ireland, took a different approach when he took over in 1994. "I saw EMBO as a way of permeating science throughout Europe with excellence, and of influencing the European Union who were becoming very strong at this stage," says Gannon. To weld EMBO members and fellows into a community, he introduced annual workshops and launched an awards and mentoring scheme called the Young Investigator Programme.

By 2000, the number of countries investing in EMBO had more than doubled and included several Eastern European nations where science was poorly resourced. Many bright young fellows from those countries were making their careers overseas — worsening the state of science in their home nations. So EMBO set up 'installation grants', with support from host countries, to enable returning fellows or researchers to start their own labs. The first countries to volunteer for the scheme were Croatia, the Czech Republic, Estonia, Hungary, Poland, Portugal and Turkey. These schemes, *The EMBO Journal*, two new journals and two big policy programmes to encourage engagement with society and international collaboration saw EMBO grow from 4 to 40 members of staff under Gannon. In 2001, it opened its own building, on land donated by EMBL in Heidelberg.

Next, EMBO went into battle with the European Commission over its policy on grant-making for scientific research. The Framework Programmes of the European Union were 'top-down' funding mechanisms geared towards economic impact. With no European money for bright ideas by individual scientists, there was a growing demand in the scientific community for a European Research Council (ERC), modelled on the US National Science Foundation and any number of national research councils.

BIGGER TENT

EMBO took a lead in lobbying for this change, and the ERC was founded in 2007. In its first five years it disbursed more than €4 billion (US\$5.4 billion) to 2,500 researchers in 480 European institutions. Inevitably a few institutions in a few countries have received a disproportionate share. EMBO and the ERC cling to the principle that all awards should be based on merit alone, and as a result contend with a chorus of complaints

from the countries that feel snubbed.

EMBO's current director is the indefatigable Maria Leptin, a professor at the Institute of Genetics at the University of Cologne in Germany, head of an EMBL lab and president of the lobby group Initiative for Science in Europe. Over the years, career administrators at the tiller of the organization have given way to working scientists who understand the community. They leave the day-to-day running to a professional secretariat set up by Leptin's predecessor, the German molecular biologist Hermann Bujard at the Centre for Molecular Biology at the University of Heidelberg.

The most difficult question that Leptin faces, perhaps more than for any of her predecessors, is what is EMBO for? Its original *raison d'être*, to catch up with the United States in the techniques of molecular biology and to integrate Europe's community in the field, has long since been achieved. Molecular biology has entered the mainstream: few branches of biology can now progress without occasionally manipulating some DNA or solving a protein structure.

EMBO has extended its 1,500-strong membership to new areas such as neurobiology and ecology. Associate members can be of any nationality, and any scientist can apply for an EMBO fellowship to come to a European institution. Countries outside Europe, including South Africa, Taiwan and Singapore, have gained access to EMBO's programmes through cooperation agreements. No longer exclusively European nor exclusively molecular, in 2012 EMBO stopped spelling out its name and adopted the brand 'EMBO: excellence in life sciences'.

EMBO still has problems to solve, old and new. Because of language barriers, pension structures and a host of other factors, it is more difficult for European scientists to move between countries than it is for US scientists to progress around the large number of excellent institutions in their home country. EMBO also has to adapt to shifting career structures. For example, postdoctoral training has changed from a two-year stint to a five-year preparation for independence. EMBO is the first funding organization to have introduced a 'portable pension' for its fellows, and it supports the European Commission's slow progress towards a European Research Area.

The scientific environment in Europe has changed out of all recognition since EMBO's founding 50 years ago. The geopolitical landscape still leaves the organization some mountains to climb. ■

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