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Roger Fourme (1942–2012)

We announce with great sadness the untimely death of Roger Fourme, who played an important role in the advancement of synchrotron radiation research and was one of the founding co-editors of the *Journal of Synchrotron Radiation*.

Roger Fourme first enrolled into a curriculum for training school teachers, but his professors soon convinced him to switch to university studies in physics. After he obtained his PhD in this discipline, he became Assistant Professor at the University of Créteil near Paris, then Full Professor at the Université Paris XI, Orsay, in the late 1970s. There he joined the LURE synchrotron, which he soon placed in a prominent position on the international map of macromolecular crystallography and where he later acted as Head of the Biology Department. In the late 1990s he became an enthusiastic advocate of the construction of the French third-generation synchrotron, SOLEIL. He was one of its Science Directors until he retired in 2007, after which he continued working at SOLEIL as an Emeritus Professor. Roger has published extensively in the IUCr journals, including *Acta Crystallographica* (pre-1970), *Acta Crystallographica Section B* and *Section D*, *Journal of Applied Crystallography* and *Journal of Synchrotron Radiation*. He was a founding co-editor of the latter, reflecting his extensive reach into the field of synchrotron crystallography for life sciences in Europe.

Roger did not believe in grabbing the limelight for himself, but was tireless in pursuing *avant-garde* developments that could benefit the whole field as much as possible. Many who crossed paths or worked with him over the years recalled this after we learned of his untimely death on Christmas Eve at the age of 71, while he was skiing with his sons and grandchildren. Gérard Bricogne, for instance, says ''it was Roger's unique enthusiasm, his radiant optimism, and his faith in how much could be achieved by simply pulling one's own sleeves up, that convinced me to take up a staff position within the French CNRS at the LURE synchrotron, which led to my long-term collaboration with him''.

Roger's scientific contributions are concentrated in the area of experimental phase determination by means of anomalous scattering, in which his name is inseparable from that of his friend Richard Kahn who also died prematurely in the very recent past. Roger

had an acute sense of the importance of establishing ties between people, which led to many collaborative projects in the development of innovative methods and instrumentation. This is exemplified by his joint exploration with George Charpak (long before Charpak won the Nobel Prize for Physics in 1992) of the potential of spherical-drift multiwire chambers as detectors for macromolecular crystallography data collection. The first version of this detector became available at LURE in 1980 (Mark I, known to many as Penelope), equipped with a computer interface that allowed macromolecular crystallography data collection with a tunable synchrotron beam. This enabled Roger and Richard to collect what is arguably the first MAD dataset ever on an unknown protein, namely a terbium derivative of a parvalbumin from *Opsanus tau*. The crash of a PDP cartridge unfortunately led to the loss of the primary images, and the structural results had to be derived from the reduced data as produced by the software current at that time, so that the final publication of this work in 1985 failed to do justice to its pioneering aspects [*FEBS Lett.* (1985). **179**, 133–137]. By that time the commissioning of the much improved Mark II Charpak detector had been completed, and the challenge of providing it with software that could realise the full potential of that masterpiece of instrumentation led Gérard Bricogne to organize the European Economic Community (EEC) Collaborative Workshop on Position-Sensitive Detector Software from 1986 to 1989. This 'EEC MADNES' programme was pivotal in enabling this unique instrument to deliver MAD data of outstanding quality, as was demonstrated when LURE hosted Wayne Hendrickson and Bill Weis in 1991. They carried out a four-wavelength MAD experiment at the Ho edge on crystals of a mannose-binding protein, and obtained experimental phases of extraordinary precision [*Science* (1991). **254**, 1608–1615]. This seminal work demonstrated that traditional heavy-atom complexes could be generally amenable to the MAD phasing method. At about the same time, Roger and Jack Johnson beat the resolution record for a virus crystal with a lattice dimension exceeding 1000 Å, further expanding the scope of synchrotron radiation [*J. Appl. Cryst.* (1984). **17**, 147–153]. Roger also demonstrated that the noble gas xenon could be used for phase determination in protein structures [*J. Appl. Cryst*. (1994). **27**, 950–960]. The method soon found itself in the limelight through its decisive role in the determination of the first structure of the ligand-binding domain of a nuclear receptor [*Nature* (1995). **375**, 377–382]. Roger recently recalled that Richard and he had successfully implemented a set-up for cryogenic cooling as early as 1975, although this remained unpublished.

Roger Fourme, working with John Helliwell, also played a central role in the definition of the instruments bid for macromolecular crystallography at the ESRF. Their report [*ESRP Report* (1983). **IRI-4/83**, 1–36] formed the basis of instrument development for these activities at the ESRF. For the multiwavelength anomalous dispersion instrument Roger and John opted for an ESRF bending magnet. Two other instruments were bid for in the initial instruments suite on ESRF: a multipole wiggler for monochromatic and white beam (time-resolved) work and an undulator notably for virus crystallography data collection. Microcrystal crystallography was proposed as a high-priority development, based on an X-ray undulator. These proposals were incorporated into the ESRF 'Red Book'.

Roger's tendency to be self-effacing about his own achievements was not a sign of timidity: he could be an equally tireless and formidably persistent campaigner when he felt that he was defending the scientific community. These two sides of his personality worked together to remarkable effect in the well known 'Affaire du Synchrotron' in 1999–2000, when Roger undertook to fight a ministerial decision to cancel the previously fully approved and funded construction of the SOLEIL synchrotron. A key element in the success of this campaign was an open letter sent to *Le Monde* by Max Perutz who powerfully argued in favour of the SOLEIL project, following which a review process was set up that eventually led to the reinstatement of the SOLEIL project. Max Perutz's willingness to defend SOLEIL came in no small measure from his appreciation of Roger's deep and selfless commitment to the development of synchrotron radiation as a resource for macromolecular crystallography. This appreciation went back to an episode, some 20 years earlier, recounted by Max Perutz in his autobiographical book *Science Is Not A Quiet Life*, in which Roger had shown up at 3 a.m. during a visit to LURE by him and his post-doc Boaz Shaanan, just to make sure that everything was running well for their high-resolution data collection on deoxy-haemoglobin. This spontaneous act of support, going well beyond the call of duty, amplified through Max Perutz's gratitude and combined with Roger's own tenacious efforts within the campaign for SOLEIL, played a decisive role in enabling a new generation of multi-disciplinary synchrotron radiation research to take place in France.

Roger Fourme facing up a Chinese menu during the IUCr Conference on Advanced Crystallography at High Pressure, 2009, Harbin, China.

Roger Fourme led the organization for the International Symposium for Diffraction Structural Biology (ISDSB) held in 2010 at the Université Paris Sud, and the location of the original French synchrotron facility LURE. ISDSB 2010 was the third such event. This was the first time though that the ISDSB was held outside Japan and also which newly added the electron and X-ray imaging tomography fields to the ISDSB subjects' range. The ISDSB conference series originated in Japan with the initiative led by the 169th committee of the University–Industry Cooperative Research Committee of the Japanese Society for the Promotion of Science (JSPS). The Paris 2010 event hosted by Roger has succeeded to give the ISDSB conference series worldwide popularity by the success of his organization.

Roger's subsequent scientific interests moved on towards macromolecular crystallography under high pressures and towards exploring the potential of ultra-short-wavelength X-rays in producing higher-quality diffraction measurements [*J. Appl. Cryst.* (2012). **45**, 652–661]. It is a testimony to the visionary approaches of Roger that his recent work on the use of high-pressure crystallography to explore the conformational states of proteins made use of a diamond-anvil high-pressure cell which he first described in his PhD thesis article [*J. Appl. Cryst.* (1968). **1**, 23–30], in which single crystals were maintained under high pressure (1–30000 bar) at adjustable temperature (293–493 K).

Roger knew how to transmit the sense of the freedom that can be enjoyed if one does science for the pleasure of seeing it progress through the work of a whole community, rather than nervously watching one's own list of personal publications in high-impact journals. His friend in politics, François Périnet, recalls that when he asked Roger what research needed in order to thrive, Roger used to answer 'freedom, serenity and time'. Roger never forgot that his family was from a modest background, and this is probably why he tirelessly worked towards the dissemination of knowledge and education to the majority of the population rather than to a privileged élite. This was reflected in his strong political commitment towards education for peace in the world, for which he travelled the planet with his wife Josette. He will be remembered as a man of outstanding talent, generosity, tolerance and passionate convictions.

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