

Les grands chimistes des trois derniers siècles

La Fédération des Sociétés Chimiques Européennes (FECS) a établi une liste des 100 chimistes européens qu'elle a jugés les plus grands au XVIII^e, XIX^e et XX^e siècles. Nous la publions ici, avec en introduction, le point de vue de Colin Russell sur la manière dont le choix des noms a été effectué et sur les difficultés pour en choisir 100 parmi tous ceux que l'on aimerait voir figurer sur la liste.

Europe's favourite chemists ?

Choosing Europe's top 100 chemists was never going to be easy, in Colin Russell's view

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The Federation of European Chemical Societies (FECS) is a voluntary association, founded in 1970. It aims to promote cooperation in Europe between those non-profit-making scientific and technical societies in the field of chemistry whose membership consists largely of individual qualified chemists and whose interests include the science and/or practice of chemistry.

The millennium bug does not only bite computers. Human beings are susceptible to it too. Occasionally this may lead to bizarre behaviour patterns that have only one thing in common : an irresistible desire for some kind of celebrations in the year 2000. Often there is only the foggiest idea as to what is actually being celebrated. That it is

notionally 2000 years since the birth of Christ is quite forgotten in general. An additional irony lies in the fact that recent evidence from history, archaeology and astronomy suggests a birth-date about seven years earlier, so the real millennium came and went unnoticed in the early 1990s. However that may be, the grand spirit of revelry and bonhomie cannot be quenched by such mundane considerations, and celebration there shall be. Nor are societies to be left behind in the general euphoria.

In 1998, the Federation of European Chemical Societies (FECS) proposed to celebrate in its own way and to mark the occasion by proclaiming to the world names of the top 100 European chemists. Inclusion in this hall of fame would do little for the individuals concerned for the simple reason that they all had to be dead. However it might gladden the hearts of surviving relatives of a few. It would minister to the pride of nations whose sons and daughters were so honoured, and (if handled properly by the spin doctors) could be a useful reminder to the gene-

ral public of just how much they owe to the chemists of Europe. And that would be a very good thing indeed.

The only problem was this : how on earth does one try to establish such a list and get general agreement for it ? Ask 20 chemists for a short list of their own candidates and you will end up with 20 different answers. Try to be objective and you just give up for lack of agreed criteria. Thus quantitative data gleaned from citation indexes may testify to volume but not quality of a chemist's work. Being a Nobel prize-winner in chemistry was a possible criterion, but there were not enough of these from Europe - Nobel prizes only started in 1901 - and nor are all Nobel prizewinners equal. There are no sales figures to help us as in establishing which releases are « top of the pops » (and no comparable audience reactions, come to that !). So what do you do? You ask the public.

In this case one can hardly enquire of the whole population of Europe. Instead FECS made the sensible decision to devolve the early stages of

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nomination to the member societies. Each was asked to provide its own list. It was suggested that working parties should be established and guidelines were offered. Thus persons proposed should have transformed chemical science and exerted a worldwide influence. They should have conducted the major part of their work in Europe, and so on. The surprising feature of this millennium celebration was that the period concerned stretched back not 2 000 or even 1 000 years, but a little over 200. At one stage it was suggested that the Chemical Revolution (whatever that was) should be a good starting point. This seemed generally understood to be the reforms associated with Lavoisier at the end of the 18th century, though in practice the list included a few who predated - or even opposed - this Chemical Revolution. So, at a stroke, chemical giants like Paracelsus, Glauber, van Helmont, Hales and even Robert Boyle were excluded automatically. And there were certainly no alchemists. Still, rules are rules, and most countries produced a response broadly on the agreed lines.

The result was a spectacular demonstration of variable response. Eight countries did not reply at all. Whereas most that did (including the UK) made an effort to be fair to everyone and to supply an international list, the names provided by no less than 10 countries consisted exclusively of their own nationals. This possibility was quite unexpected but not formally excluded by the rules. Possibly these respondents thought that everyone would play the game this way. Or maybe they just felt the need to keep their own end up. But if all had done this it is hard to see how a reasonable list could emerge, since each respondent was given equal weight in the analysis. It would have meant the same number of names from (say) France, Slovenia, Italy, Portugal and Ireland. Therefore for the early compilation stages it seemed quite fair to set aside the submissions from these 10 societies. That left 20 others who had all tried to be genuinely international. Gratifyingly these included some of the smaller societies such as those from Finland, Slovenia and Cyprus.

Thanks to the indefatigable efforts of the chairman of the Working group for

the history of chemistry, a computer programme was set up to collate these 20 lists. Although societies had been asked to grade their own nominations, at this stage mention at any point on someone's list meant that the individual would be counted, and so a single comprehensive table was generated, showing each name nominated with the number of societies giving that person their vote. The winners were at the top, the losers at the bottom. Only two chemists, Lavoisier and Berzelius, scored 100 per cent, with 20 votes each. Few historians of chemistry would quarrel with that result. Yet the total number of names was a formidable 308, and now the matter was firmly in the hands of a nominated committee to come to a conclusion on the matter. All we had to do was to jettison two-thirds of the names proposed!

This committee, which met in Budapest in July, took some fairly obvious steps at the outset. The first task was to eliminate all those who had a score of only one (ie had been mentioned by only one of the 20 societies). That immediately brought the numbers down to a manageable 112; to have excluded those who scored two would have taken numbers well below the required 100. But how to eliminate a mere 12 chemists? Far from being a simple task it proved to be one requiring considerable subtlety and finesse. Every one of the 112 contenders was considered individually.

Some were removed because they were not deemed to be « chemists », though the use of « professional » titles raises huge problems before the mid-19th century. However Volta as a physicist, Boerhaave as a medical man and Krebs as a biochemist were deemed to be out of the running. Less contentiously several names from the 20th century were dropped for the simple reason that their owners were still alive. Yet others disappeared from view because their main chemical work was performed outside Europe. And at this point the « frozen » 10 lists were considered and a number of their high-scoring extra names were added to the main list. After all the additions and subtractions we were within two or three names of our target, and almost there.

It would be tedious to recount the

very last stages of the debate, some of which had to be conducted by post after the committee had risen. By 8 July the final list had been agreed and all that remained were the fine points of drafting. Lists for the three centuries were arranged in strictly alphabetical order, with no implication of relative merit. Our « 100 best chemists » had emerged.

An exercise of this kind is bound to attract criticism. Perhaps the most ironic note of all was struck by one member of the committee who declared that he did not believe in the value of such exercises and would therefore play no part in them (though he remained as an observer). The rest of us, though sharing many of his doubts, still believed that a credible solution could be found, and pressed on accordingly. We were aware that many aspects of the methodology could be attacked, and ourselves had to make some decisions that did not keep strictly to it. Thus Avogadro the lawyer was admitted, but not several worthy names in modern biochemistry. As often in discussions of this kind the basic question « what is a chemist? » remains tantalisingly unanswered. Then again, the relative weightings of the three centuries (14/42/44) had more than an element of arbitrariness.

Most seriously, in my opinion, was the ambiguity as to whether contributions to applied chemistry were as valid as those to pure chemistry. The general view seemed to be that they were not, and so many famous names from the chemical industry are absent. However Auer, the inventor of the gas-mantle, was considered to have so profoundly affected Victorian society that he is included. Leblanc, whose process founded the alkali industry, does not appear, though his rival inventor Solvay is present. All these cases were subject to much fine tuning and reasons could be given (if anyone were sufficiently interested) for each one of them.

So has it all been worthwhile? As a competitive exercise or an end-of-term report the answer must be decisively « no ». We had neither the mandate, the data, nor even the inclination for such a project. Serious work is currently going on that attempts to acquire and organise quantitative data that may go some way to establishing criteria of excellence (amongst many other things). It is

FECS list of 100 distinguished European chemists

18th century

Bergman, Tobern Olof (1735-1784)
 Berthollet, Claude Louis (1748-1822)
 Black, Joseph (1728-1799)
 Cavendish, Henry (1731-1810)
 Gadolin, Johan (1760-1852)
 Kirwan, Richard (1735-1812)
 Klapproth, Martin Heinrich (1743-1817)
 Lavoisier, Antoine Laurent (1743-1794)
 Lomonosov, Mikhail Vasilievich (1711-1765)
 Priestley, Joseph (1733-1804)
 Richter, Jeremias Benjamin (1762-1807)
 Ruprecht, Antal (1748-1818)
 Scheele, Carl Wilhelm (1742-1786)
 Vauquelin, Louis Nicolas (1763-1829)

19th century

Arrhenius, Svante August (1859-1927)
 Auer, Karl (1858-1929)
 Avogadro, Amedeo (1776-1856)
 Baeyer, Johan Friedrich Wilhelm Adolf (1835-1917)
 Berthelot, Pierre Eugène Marcelin (1827-1907)
 Berzelius, Jöns Jakob (1779-1848)
 Bunsen, Robert Wilhelm Eberhard (1811-1899)
 Butlerov, Alexander Mikhailovich (1828-1886)
 Cannizzaro, Stanislao (1826-1910)
 Claisen, Ludwig (1851-1930)
 Dalton, John (1766-1844)
 Davy, Humphry (1778-1829)
 de Marignac, Jean Charles Galissard (1817-1894)
 Dumas, Jean Baptiste André (1800-1884)
 Faraday, Michael (1791-1867)
 Fischer Emil (1852-1919)
 Frankland, Edward (1825-1899)
 Fresenius, Carl Remigius (1818-1897)
 Gay-Lussac, Joseph Louis (1778-1850)
 Graham, Thomas (1805-1869)
 Hofmann, August Wilhelm (1818-1892)
 Kekulé, Friedrich August (1829-1896)
 Kolbe, Adolph Wilhelm Hermann (1818-1884)
 Laurent, Auguste (1807-1853)
 Le Chatelier, Henri Louis (1850-1936)
 Liebig, Justus (1803-1873)
 Mendel'ëiev, Dmitri Ivanovich (1834-1907)
 Meyer, Julius Lothar (1830-1895)
 Moissan, Ferdinand Frédéric Henri (1852-1907)
 Ostwald, Friedrich Wilhelm (1853-1932)
 Pasteur, Louis (1822-1895)
 Perkin, William Henry (sr.) (1838-1907)
 Proust, Joseph Louis (1754-1826)
 Ramsay, William (1852-1916)
 Solvay, Ernest (1838-1922)
 Stas, Jean Servais (1813-1891)

Sainte-Claire Deville, Henri Etienne (1818-1881)
 Van 't Hoff, Jacobus Henricus (1852-1911)
 Werner, Alfred (1866-1919)
 Williamson, Alexander William (1824-1904)
 Wöhler, Friedrich (1800-1882)
 Wurtz, Charles Adolphe (1817-1884)

20th century

Aston, Francis William (1877-1945)
 Barton, Derek Harold Richard (1918-1998)
 Bosch, Karl (1874-1940)
 Brönsted, Johannes Nicolaus (1879-1947)
 Butenandt, Adolf Friedrich Johann (1903-1995)
 Curie, Marie (1867-1934)
 Debye, Peter Joseph Wilhelm (1884-1966)
 Diels, Otto Paul Hermann (1876-1954)
 Grignard, François Auguste Victor (1871-1935)
 Haber, Fritz (1868-1934)
 Hahn, Otto (1879-1968)
 Hantzsch, Arthur Rudolf (1857-1935)
 Hassel, Odd (1897-1981)
 Haworth, Walter Norman (1883-1950)
 Hevesy, György Charles (1885-1966)
 Heyrovsky, Jaroslav (1890-1967)
 Hinshelwood, Cyril Norman (1897-1967)
 Hodgkin, Dorothy Mary (1910-1994)
 Ingold, Christopher Kelk (1893-1970)
 Karrer, Paul (1889-1971)
 Kendrew, John Cowdery (1917-1997)
 Natta, Giulio (1903-1979)
 Noddack, Ida Eva (1896-1978)
 Nernst, Walther Hermann (1864-1941)
 Pregl, Fritz (1869-1930)
 Prelog, Vladimir (1906-1998)
 Reppe, Walter Julius (1892-1969)
 Robinson, Robert (1886-1975)
 Rutherford, Ernest (1871-1937)
 Ruzicka, Leopold Stephen (1887-1976)
 Sabatier, Paul (1854-1941)
 Semenov, Nikolay Nikolaevich (1896-1986)
 Soddy, Frederick (1877-1956)
 Sørensen, Soren Peter Lauritz (1868-1939)
 Staudinger, Hermann (1881-1965)
 Stock, Alfred (1876-1946)
 Svedberg, Theodor H.E. (1884-1971)
 Todd, Alexander Robertus (1907-1997)
 Tswet, Michail Semënovic (1872-1919)
 Wilkinson, Geoffrey (1921-1998)
 Willstätter, Richard Martin (1872-1942)
 Wittig, Georg Friedrich Karl (1897-1987)
 Ziegler, Karl (1898-1973)
 Zsigmondy, Richard Adolf (1865-1929)

called prosopography. But this exercise is emphatically not part of that. Our overall conclusion must inevitably be impressionistic rather than precise. What we have recorded is not the value of individuals but rather public perceptions about them. And these, of course, depend on many other things than sheer worth.

In terms of national contributions there are few surprises. The « big three », Germany, the UK and France, have respectively 28, 24 and 15 per cent of the nominations. There is then a large gap until Sweden and Russia each gain 5 per cent, all the other countries being below that figure. But one hardly needed an exercise of this kind to establish these orders of magnitude. It would be rather a pity if anyone drew jingoistic conclu-

sions from these data, and even more so if any of the low-scoring countries were to become discouraged. By all means engage in critical historical analysis to find what has been conducive to the successful prosecution of chemistry. Some historians of chemistry are already doing just that, and they deserve every encouragement. But do not suppose that this is what we have done.

What has emerged is a list of 100 men and women who have performed distinguished work in European chemistry, helped to change the physical world that we inhabit, and have been widely recognised by their peers. On the question of peer-recognition the exercise displays another interesting insight. There is a huge gap between an understanding of chemical history glea-

ned en passant by ordinary chemists in the normal course of their work, and that derived from sustained historical study. It confirms the case for doing everything possible to make the historians' work accessible to the working chemist. But that is by the way.

The chief function of our labours will hopefully be to supply a useful tool in the new century's efforts to foster the public understanding of chemistry. One thing is certain, and this is that without a strong human dimension in the communication of chemistry that task will fail. Perhaps our list will be fuel for the popularisers of science, and for chemistry teachers. Making it was fun. If we were to try again next week we should probably come to about the same conclusions. But it would not be quite the same list.