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Dimitri Ivanowitsch Mendeleeff (1834–1907).

This year we celebrate the centenary of the birth of Dimitri Ivanowitsch Mendelèeff, who was born on February 7th, 1834 (N. S.). He will ever have an honoured place in the roll of famous chemists, since on the Periodic Law which he enunciated is based much of our modern classification of the chemical properties of matter, and of our knowledge of the electronic structure of atoms.

Mendelèeff was educated at his native place, Tobolsk, and at Leningrad, where he was appointed to a University Chair in 1866. He resigned his post in 1890, consequent on a difference with the University authorities, who found his independence of spirit something of a nuisance. In 1893 he became Director of the Bureau of Weights and Measures, a post which he held until his death at Leningrad on February 2nd, 1907 (N. S.).

Ever since the discovery of a range of chemical elements, efforts had been made to classify them in groups possessing similar chemical properties. No satisfactory result was achieved, however, until, in 1869, Mendelèeff communicated to the Russian Chemical Society his first periodic table and an enunciation of the Periodic Law according to which "the elements arranged according to the magnitude of atomic weights show a periodic change of properties". For the first time it was clearly recognised that the fundamental periodic property of the elements is valency. In 1871 Mendelèeff published his improved form of the Periodic Table, practically as we know it to-day. The main difference is that now the arrangement of elements is according to the atomic number to which, however, the atomic weight usually corresponds. Where the correspondence ceases we obtain the few anomalies in the Table, which so puzzled chemists who knew nothing of nuclear charges, nor of the existence of isotopes.

In 1871 Mendelèeff from a consideration of the gaps in the Periodic Table made his well-known prediction of the existence and properties of "eka-boron", "eka-aluminium", and "eka-silicon". In 1875, 1879 and 1886, there were discovered, respectively, gallium, scandium and germanium which confirmed these audacious predictions, and finally established the fundamental importance of the Periodic Law.

Mendelèeff was also led to question the correctness of the atomic weights assigned to certain elements as they did not correspond with the Periodic Law, and here again his statements were justified by further work.

One other achievement of the Periodic Law may be mentioned. It could not have been used to predict the existence of elements of zero valency. But when one member of the group (argon) had been discovered, it was clear that other elements similar in type must be sought and their discovery was not long delayed.

The allocation of the rare earths was for years an apparent defect in the application of the Periodic Table. Mendelèeff considered that their installation should be deferred until their properties were better understood. We now know that these elements arise from the fact that at a certain point in the series of elements, each electron added to the system to balance unit increase in nuclear charge, goes to complete inner levels and leaves unchanged the outer valency electrons on which the chemical properties of the elements chiefly depend.

Although the Periodic Law was his out standing contribution to chemical science, Mendelèeff did much work in other fields. His printed publications total 262. These include communications on physical and chemical subjects, books, pamphlets, reports and newspaper articles relating to exhibitions, to Russian industries, to weights and measures, to education, to art, and to spiritualism. He carried out a long series of experiments on the thermal expansion of liquids. His definition published in 1861 of the absolute boiling point

of a liquid as the temperature at which cohesion and heat of vaporisation vanish, and the liquid vaporises irrespective of pressure and volume anticipated Andrews' conception of the critical point. He also directed a number of investigations on the densities of solutions, particularly mixtures of alcohol and water, sulphuric acid and water, and of salt solutions. He gave a good deal of attention to the subject of the elasticity of gases, and to the nature and origin of petroleum.

After his Periodic Law, however, he is best known for his famous *Principles of Chemistry* which has gone through many editions in various languages. In English there are three editions of which the last (1905) is from the seventh and best complete Russian edition (1903). The book is remarkable not only for its text which deals with inorganic chemistry, but also for the voluminous notes which testify to the enquiring spirit of the writer and the restless activity of his mind. As a teacher these same qualities of originality and freshness made him one of the greatest of his time. He had a talent for arousing a desire for knowledge, and students from all faculties of the University thronged his lectures.

We know more of the Periodic Table than ever Mendelèeff knew. We look to greater knowledge to a table which will express the purely unclear properties of atoms. In 2034 when once again returns the centenary of the birth of this great chemist, knowledge of the periodic table will be assuredly deeper and more profound than the knowledge we possess to-day. But time will not dim nor the advance of knowledge obscure the memory of one, who in the early days of modern chemistry, by sheer native genius and application, laid the foundations of possibly the most important generalisation known to chemical science.

Ernst Haeckel (1834–1919).

Zoologists will also remember that this year marks the centenary of another great figure, Ernst Haeckel. Born at Pots dam he was educated in various universities, and one of the three degrees of doctorates that he held was that of Law (an honorary degree) in addition to his qualifications in Philosophy and Medicine. In 1854 he came under the influence of J. Müller in Berlin. Müller left a remarkable impression on Haeckel and in 1858 he commenced to practise medicine like his contemporary Gegenbaur. Soon after the death of Müller which came as a shock to young Haeckel, the latter commenced the study of Radiolaria of the Italian coast and later returned to Berlin. It was about this time that Haeckel came into contact with the famous and perhaps the then revolutionary book, the "Origin of Species" by Darwin. He says 'It profoundly moved me at the first reading.' On the other hand, the other German Biologists were opposed to this trend of thought and regarded the book as 'absolute nonsense'. Haeckel therefore happened to be the pioneer in ushering Darwinian ideas in Germany.

NEWS

MAGNETIC MAPPING OF BRAIN

SHE Corporation introduced the first commercial instruments using Josephson junction technology in the form of a Superconducting Quantum Interference Device, commonly known as SQUID. The SQUID is effectively a low-noise amplifier used to detect exceedingly small magnetic fields, electric voltages, and other physical quantities that can be measured by electrical or magnetic means. As an amplifier the SQUID is more than one million times as sensitive as even the best transistor amplifiers. One of the more recent and commercially promising applications for SQUID magnetic detectors is in the general field of biomagnetism. Recent advances by SHE scientists and customers have permitted magnetic mapping of specific processes within the human brain with a clarity and a spatial resolution that are unattainable by any other nonivasive means.

Further particulars may be had from: John Morrison, *Search*, Lloyd Media, PO Box 340, Mona Vale, NSW 2103.