nearly three times as great—but the continuous increase in emigration from Italy has placed it of recent years at the head of the emigrating countries (Ireland excluded).

In all the countries considered, both birth- and death-rates have fallen, and in the majority, especially those countries (as Holland, Germany, and Austria) in which the death-rate at the commencement of the period was high, the fall in the death-rate has exceeded the fall in the birth-rate, as shown by the table below; the natural rate of increase was therefore greater at the end than at the beginning of the period, in spite of the fall in the birth-rate. England is one of the exceptional countries, for the death-rate, even at the commencement of the period, was moderate, and the fall in the birth-rate has rather more than kept pace with the fall in mortality.

Country	Mean annual death-rate per 1000 ¹	Mean annual birth-rate per 1000 ¹	Decline per cent. in rates between 1871 and 1900	
	1871-1900	1871-1900	Deaths	Births
Sweden ...	17.2	28.9	10.4	11.2
Norway ...	16.8	30.7	4.1	2.3
Finland ...	21.0	34.7	11.2	13.0
Denmark ...	18.3	31.2	10.8	3.9
Holland...	21.2	34.3	24.3	11.4
Belgium...	20.8	30.5	15.0	10.2
Germany ...	24.8	37.3	18.3	7.7
West Austria...	27.6	35.4	13.3	6.5
Switzerland ...	21.1	29.0	19.1	8.7
England ...	19.6	32.6	14.9	15.5
Scotland ...	19.8	32.6	13.4	12.3
Italy ...	27.1	36.5	19.0	5.4
Spain ...	30.6	35.5	3.6	2.2
Portugal...	22.1	32.1	—	—
France ...	22.4	23.8	9.3	12.6
Ireland ...	18.2	24.3	1.1	13.2
Total ...	23.8	32.5	13.7	6.6

¹ Figures in italics are partly estimated.

The factors contributing to the fall in the birth-rate, which has recently attracted so much attention, are analysed in detail by Sir Athelstane Baines. For the most part it is clearly due to a fall in the fecundity of married women of reproductive age. The proportion of women of reproductive age to the population has in many countries (as in the United Kingdom) slightly increased, in other cases remained almost steady or fallen very little. The proportion of such women who are married, as shown by the table below,

Country	Number married per 1000 women aged 15-45 ¹		Legitimate births per 1000 married women, 15-45 ¹	
	1870	1900	1870-80	1890-1900
Sweden ...	420	411	278	268
Norway ...	436	418	302	301
Finland ...	502	471	285	292
Denmark ...	450	463	268	259
Holland...	440	446	345	321
Belgium...	409	471	338	252
Germany ...	471	504	319	285
West Austria...	448	473	295	271
Switzerland ..	419	442	288	266
England ...	496	469	292	235
Scotland ...	435	420	311	271
Italy ...	520	539	286	269
Spain ...	562	557	262	259
Portugal ...	420	452	—	259
France ...	531	552	195	150
Ireland ...	401	325	306	288
Total ...	490	500	276	249

¹ Figures in italics are partly estimated.

has fallen in all the Scandinavian countries save Denmark, but has increased in all the countries of the

central group, except England and Scotland. The births per thousand married women of fertile ages, on the other hand, have fallen in every country, with the sole exception of Finland (and perhaps one should add Norway), and most markedly in the central European group.

"The thirty years included in my survey," Sir Athelstane Baines concludes, "have been generally characterised by a moderate rate of growth of population, interrupted until towards the end of that period by considerable emigration, since reduced, except in one or two cases. People marry a little more than they did a generation ago, and, in most of the countries reviewed, they marry earlier; but the growth in the relative number of the married has been accompanied by a material decline in their output of children. Illegitimate unions, also, whether less frequent than before or not, at least contribute less to the tale of births. The community is therefore almost everywhere becoming an older one, with a gradually decreasing basis for the coming generation. Thanks to a general improvement in hygienic conditions, fewer succumb to disease, especially in early life, and the mortality having decreased more rapidly than the fertility of the population, the excess of births over deaths is relatively not below, but, on the whole, indeed, a little above that which prevailed at the beginning of the period."

PROF. HANS LANDOLT.

ON March 15, Geheimrat Prof. Landolt, the Nestor of physical chemists, passed to his rest, full of years and of honours. How few are left now of that ardent band who, in the early 'fifties, came under Bunsen's inspiration in romantic Heidelberg!

In a brief notice it is impossible to give an adequate picture either of the man or of his deeds. One is glad to think, however, that his devotion to science will be recognised in the memorial lectures by which the various societies strive to do honour to the memory of distinguished investigators.

Hans Heinrich Landolt was born in Zürich in 1831, and began the study of chemistry in the university of his native town. His *Wanderjahre* were spent in Breslau, where he graduated, in Berlin, where he studied under Rose and Mitscherlich, and, finally, in Heidelberg. His progress in the academic career was rapid. He became a Privatdozent in Breslau (1856), an extraordinarius professor in Bonn (1858), and an ordinarius professor in Bonn (1867). He then proceeded to the Technische Hochschule in Aachen. In 1880 we find him in Berlin, where he occupied the chair of chemistry in the Landwirtschaftliche Hochschule until, in 1891, he succeeded Rammelsberg as director of the second chemical institute of the university. When old age came upon him, his enthusiasm did not wane; he was active to the last.

Landolt's researches were by no means confined to one branch. In organic chemistry he studied, for example, compounds of arsenic and antimony, the action of potassium amide on various carbon compounds, and the chemical changes in the flame of coal gas. In inorganic chemistry he dealt with subjects such as phosphine, solid carbon dioxide, ammonium amalgam, thiosulphurous acid in aqueous solution, the interaction of bromine and nitric oxide. It is, however, on his pioneering experiments on molecular refraction and optical activity that his fame as an investigator will last for all time. With the exception of the contributions of Biot, very little of importance had been done on the measurement of the specific rotations of optically active substances until the field was taken up by Landolt in a series of papers which are models of exactitude. As a consequence of the experience he gained, workers in stereochemistry are indebted to him for numerous improvements in the technique of polarimetric observation.

He was engaged during the last twenty years of his life on the fundamental problem as to whether a change of mass during a chemical action can be effected by the ether possibly taking part, as it might be conceived to do by the appearance or disappearance of electrons or by the disintegration of atoms. The final result of these experiments, which demanded on the part of the manipulator the exercise of extreme patience, and involved the most exact measurement, was a confirmation of the law of the conservation of mass.

It may be added that Landolt's "Optisches Drehungsvermögen organischer Substanzen und dessen praktische Anwendungen" and his "Physikalisch-chemische Tabellen" (with Börnstein) are classical works of reference.

In a land where men of science are held in honour, it was natural that Landolt's services as a teacher and investigator should be appreciated to the full. Although he himself was the most unassuming of men, and although his work was not of the kind to bring him into the glamour of the footlights, it fell to his lot to receive an unusual number of high distinctions. He was held in esteem and affection by all who had the privilege of his acquaintance.

ALEX. MCKENZIE.

PROF. R. ABEGG.

PROF. RICHARD ABEGG, whose untimely death, in his forty-second year, was referred to in these columns on April 7, was one of the most distinguished representatives of the second generation of physical chemists. It was at the end of a ballooning expedition on April 3 that, whilst attempting to land, the balloon in which Prof. Abegg had journeyed from Breslau to Köslin caught in some bushes and tilted, with the result that he was thrown out and sustained a fracture of the skull, from which he expired in the early morning of April 4.

Abegg studied chemistry at Kiel, Tübingen, and Berlin, and devoted himself at first to organic chemistry. He took his degree, as a student of A. W. von Hofmann, in 1891, with a dissertation on amidochrysene, but the far-reaching results then recently achieved in the field of physical chemistry attracted him, and led him into post-graduate work in the laboratories of Ostwald, Arrhenius, and Nernst.

As assistant to Nernst in Göttingen from 1894 to 1899, Abegg devoted himself to most of the problems of physical chemistry. The action of kathode rays on various salts, the silver germ theory of the latent image, measurements of the depression of freezing points and the osmotic pressure of concentrated solutions, and electrochemical problems in turn claimed his attention, but his theory of electro-affinity, which was formulated along with Bodländer, marks his greatest achievement at this stage of his career. In 1899 Abegg went to Breslau University, where he was soon made an extraordinary professor. Here he continued his work, but a good deal of his time was absorbed by editorial duties. The theory of electro-affinity led to much work on complex ions, which was carried out in conjunction with pupils from all parts of the world, including England, Russia, Japan, America, and Australia, and this work in turn led to the formulation of his theory of valency.

Abegg acted as editor of the *Zeitschrift für Electrochemie*, and at the time of his death had edited about half of a "Handbuch der anorganischen Chemie." It is to be hoped that the work in connection with this Handbuch is so far advanced as to ensure its completion. In connection with analytical

chemistry, along with Prof. Herz, Abegg published his "Chemisches Praktikum," which marks an initial step in the application of the ionic theory to the early stages of qualitative analysis, a step which had been indicated by Ostwald in his "Wissenschaftliche Grundlagen der analytischen Chemie."

At the London International Congress of Applied Chemistry, Abegg was appointed on a committee to consider the annual publication of tables of physico-chemical constants, and he attended a meeting of this committee held in Paris last October. Last October Abegg was appointed director of the Physico-Chemical Institute at the new Technische Hochschule at Breslau, which is to be opened next October in the presence of the Emperor.

Finally, a word as to Abegg's genial personality. He made his students feel like colleagues, and was always available with suggestive advice. If we place Abegg in the second generation of physical chemists, he has done his duty by the third generation, and his death will be mourned as a personal loss in all parts of the world.

SIR WILLIAM BOUSFIELD.

ALL friends of education will deeply deplore the loss of Sir William Bousfield, who died on April 7, in his sixty-eighth year. Although he had received the ordinary Oxford education, Sir William Bousfield's wide culture and sound judgment enabled him to see the growing importance of practical and scientific education, and to form correct conclusions on the advice, which he eagerly sought and acted upon, of scientific men. Elected to the London School Board, of which he was a member for six years, in 1882, he took the deepest interest in all problems connected with the improvement of elementary education, and, during his membership, he was chairman of the special committee which was appointed to consider the question of manual training. That committee took evidence from a number of experts, and it was mainly owing to its recommendations that the City and Guilds of London Institute and the Drapers' Company subsequently provided funds for a great educational experiment in the provision of manual instruction in a certain number of schools under the direction of the Board, which resulted, not only in the general adoption of handicraft instruction for boys, but also of domestic teaching in all girls' schools. The success of this experiment was largely due to the efforts of Sir William Bousfield, who, when he ceased to be a member of the School Board, became vice-chairman of a joint committee, under whose direction these important experiments were successfully carried out.

Associated with the Worshipful Company of Clothworkers by family tradition, he was appointed, in the year 1887, a representative of that company on the council of the City and Guilds of London Institute. Although the Institute was exclusively concerned with the development of scientific and technical instruction, Sir William Bousfield's advice proved of the greatest possible service to the several committees of the Institute charged with the different branches of its work. It is, however, in connection with its technology committee—of which he was, for many years, first vice-chairman and subsequently chairman—that his loss will be most felt. In the solution of the many difficult problems with which the department of technology has had to deal, Sir William was able to render great assistance, and, of recent years, as chairman of the board of examinations of that department, which was charged with the preparation of schemes of instruction in every branch of technology, his help