OBITUARY NOTICES OF FELLOWS DECEASED.

In the decease of Professor William Stanley Jevons, science and philosophy, both, have suffered a great loss. Since the departure of Boole and De Morgan—names which are ever on the tongue of philosophical mathematicians—no one has taken a more prominent part in the cultivation of symbolical logic than the accomplished man whose untimely death we have now to deplore. To the general public Professor Jevons was best known, perhaps, by his researches on our coal supply, his works on political economy, and his papers on various social questions of the day. His text-books for beginners have had an extensive circulation, and have proved highly serviceable to the class for which they were intended. His essays on currency and finance, on capital and labour, and on questions affecting the social life of the people, are also well known. But his reputation as a thinker and writer may be permitted to rest on his investigations into the principles of science and his contributions to a calculus of deductive reasoning. Bringing to his studies and researches not only a well furnished mind, but also a rare faculty for experiment and a taste for mechanical contrivances, he was enabled to embody the results of his intellectual labours in forms at once original and attractive. The instrument which he invented for the mechanical performance of logical inference, an account of which is given in the Transactions of our Society, could never have been devised by a man who was only a pure mathematician, or a pure logician. It is the "fruit of the grafting of an experimental genius on a philosophical genius." This peculiarity gave to his writings a special interest and value, and secured for them a wide circle of readers.

William Stanley Jevons was born at Liverpool on the 1st of September, 1835. His father, Thomas Jevons, was an iron merchant in that city, and his mother who wrote some poems, and edited the "Sacred Offering," was the eldest daughter of William Roscoe, the author of the well-known biographies of Lorenzo de Medici and Leo X. His earlier education was received at the High School of the Mechanics' Institution, and at a private school in his native city. Afterwards he was sent to London, where for twelve months he attended the classes of University College School. At the age of sixteen he entered University College and commenced the usual course of study in arts and sciences, matriculating in 1852 in London University with honours in botany and chemistry. In 1853 he received, through Mr. Graham, of the Mint, the appointment of Assayer to the Australian

Royal Mint, at Sydney. He had just before won the gold medal in chemistry, at his College, and was working at the time, along with his cousin, Dr. Roscoe, in the Chemical Laboratory of Professor A. W. Williamson. On receiving the appointment he at once threw himself into the intricate processes of gold and silver assay, and by a diligent course of study in London, under Mr. Graham, and at Paris, under the authorities of the mint there, quickly qualified himself for the duties of an office which he filled with conspicuous ability and success for five years. His leisure at Sydney was devoted to scientific pursuits, more particularly to the study of the meteorology of the district, a subject which up to that time had been very little cultivated. The results of his observations, extending over the whole period of his residence in the colony, were embodied in a pamphlet entitled—"Some Data concerning the Climate of Australia and New Zealand." During this period he published also a paper, "On the Cirrous Forms of Cloud, with remarks on other Forms of Cloud" ("Phil. Mag.," 1857), and another "On the Geological Origin of Australia and Earthquakes in New South Wales" ("Sydney Mag.," 1858).

But his tastes and powers fitted him for higher pursuits than those which chiefly occupied his time at Sydney, and in 1858 he resolved to relinquish his post there, and to return to England that he might resume and complete his University course. It was a bold step for him to take, for it involved the surrender of a career full of promise as to material advantages: but Jevons throughout life was animated by a pure and simple-hearted love for scientific labour. Writing to his cousin in January, 1859, he says: "I feel an utter distaste for money making, but on the contrary ever become more devoted to my favourite subjects of study. Perhaps you think I am too varied and desultory in my employments, which is partly true, but you know I am yet in a transition state. I told you long since that I intended exchanging the physical for the moral and logical sciences, in which my forte will really be found to lie. I like and respect most of the physical sciences well enough, but they never really had my affections. I should be glad indeed to follow out my subject of the *Clouds* and the movements of the atmosphere, because I feel sure I could place it in a new position altogether; perhaps I may spare time for this in England, but I shall make it a secondary thing. I have almost determined to spend a year at College before looking out for any employment in England; it might be worth while to take my B.A. (If I had had this degree before coming to this colony, I should vastly have improved my position in as well as outside the Mint.) I wish especially to become a good mathematician, without which nothing, I am convinced, can be thoroughly done. Most of my theories proceed upon a kind of mathematical basis, but I exceedingly regret being unable to follow them out beyond general arguments. I daresay it is

the general opinion of my friends in England that I am inexcusably imprudent in resigning £630 per annum. . . . But I ask, is everything to be swamped with gold? Because I have a surety of an easy well-paid post here, am I to sacrifice everything that I really desire, and that will I think prove a really useful way of spending life?"

Returning to England, he went on with his studies at University College, won various distinctions in his classes, and in 1860 proceeded to the degree of B.A. at London University. Two years later he graduated as Master of Arts with the Gold Medal in the branch of Logic, Philosophy, and Political Economy. Shortly after taking his B.A. degree he began to write for Watts's Chemical Dictionary. His articles, eight in number, relate to Clouds, Gold Assay, and Instruments employed in Chemical Analysis; they occupy altogether nearly sixty closely printed pages of the work. To the National Review (1861) he contributed an article on "Light and Sunlight"; and to the London Quarterly Review (1862) an article on the "Spectrum." Meanwhile his thoughts seem to have been turning from the physical to the mental sciences, and to questions in economics.

At the Cambridge Meeting of the British Association in 1862, Mr. Jevons communicated to the Statistical Section two papers, abstracts of which were printed in the Report, one entitled "On the Study of Periodical Commercial Fluctuations," and the other, "Notice of a General Mathematical Theory of Political Economy." About the same time he prepared two charts or diagrams published by Stanford, showing—(1.) The weekly accounts of the Bank of England, the quantity of notes in circulation, and the minimum rate of discount since 1844; and (2.) The price of the funds, the price of wheat, and the rate of discount since 1731. The diagrams represent to the eye and to the mind all the useful results of tables containing no fewer than 125,000 figures, which Mr. Jevons had compiled with great care and labour. When engaged on this work he was much struck with the enormous rise of prices about the year 1853, and was in consequence led to suspect a serious depreciation of the standard of value. Grappling with the difficulties of the inquiry, he examined with care the various causes of fluctuation in prices, seeking to distinguish between the temporary and the permanent. His views on the subject were embodied in an essay entitled "A serious Fall in the Value of Gold ascertained, and its social Effects set forth." In these papers will be found the germs of ideas and methods more fully developed in some of his later writings.

In 1863 Mr. Jevons received an appointment in connexion with Owens College, Manchester. That institution was then in its infancy, but full of vigorous life, and growing rapidly in strength and stature. Increasing demands were made upon the time of the

Professors, who had to perform, in addition to their own proper duties, those which are now assigned to lecturers and assistants. It became necessary, therefore, to extend the teaching powers of the College, and it was resolved as a first step to appoint a college tutor to assist the students in their various studies. This office Mr. Jevons was prevailed upon to accept. Few men could have been found so competent to fill it, his fulness of knowledge and versatility of mind qualifying him for the work in a very remarkable degree. "The multiplicity of the London University system," writes one of his colleagues, "had at no time any terrors for him, and I have known very few men so admirably endowed as he was with the continuation of force and elasticity necessary for confronting it." For three years he served the College in this capacity with distinguished ability and success. In 1866 some changes occurred in the *personnel* of the teaching staff, and Mr. Jevons was elected to a professorship. The chairs of Logic and Political Economy being united, were intrusted to him, and in this new position he found employment entirely adapted to his gifts and tastes. Logic had become his favourite but not exclusive study. Meteorology and the physical sciences had lost much of their hold upon him; but the theory of economics and problems connected therewith still continued to engage part of his attention. The influences that mainly contributed to mould the form and direct the progress of his logical investigations may here be noticed.

While residing in Australia he had read with care Mr. Mill's great work on Logic, and the interest then awakened in his mind was revived and strengthened on his return to England by listening to the lectures and reading the works of Professor De Morgan, that prince of teachers, to whom he often and warmly acknowledged his great indebtedness, as having inspired him with a deep love for logical method, and taught him to acquire those habits of exact thought and reasoning which are a better mental possession than any amount of mere knowledge. From De Morgan, also, he probably derived his tendency to look at logic on its mathematical side. But the man whose writings more, perhaps, than any other influenced the course of his logical speculations was Professor Boole. With the "Investigations of the Laws of Thought" Jevons first became acquainted in 1860, and from that date, throughout the remainder of his life, the science of logic occupied a prominent place in his studies. The boldness, originality, and beauty of Boole's system captivated him. As a generalisation of reasoning, he regarded it as vastly superior to anything previously known; but there were some portions of it that seemed to him dark and mysterious, and these he sought to separate from what he considered clear and unassailable. The calculus of 0 and 1, which plays so important a part in Boole's method, Jevons rejected on the ground that it represents other operations than those of common thought.

He attached to the sign +, as a logical sign, a somewhat different meaning from that which it bears in the works of Boole. He dispensed altogether with the indefinite class symbol v or $\frac{0}{0}$, and he imposed such restrictions as served to make the symbolical operations always interpretable in ordinary language. Thus, in place of the logical equation $x=vy$, he employed its equivalent $x=xy$, and so on. By means of these and other minor modifications he succeeded in producing a system by which logical problems may be worked out according to the general laws developed by Boole, but in such a way as to make all intermediate as well as final results interpretable. His earliest work on the subject is entitled "Pure Logic, or the Logic of Quality apart from Quantity: with Remarks on Boole's System, and on the Relation of Logic and Mathematics" (1864). This was followed by a paper in the "Proceedings of the Literary and Philosophical Society of Manchester" (vol. v, pp. 161–5, Session 1865–66), giving a brief account of his logical Abacus—a contrivance for reducing the processes of logical inference to a mechanical form. "The purpose of this contrivance," he says, "is to show the simple truth, and the perfect generality of a new system of pure qualitative logic closely analogous to, and suggested by, the mathematical system of logic of the late Professor Boole, but strongly distinguished from the latter by the rejection of all considerations of quantity. This logical abacus leads naturally to the construction of a simple machine which shall be capable of giving with absolute certainty all possible logical conclusions from any sets of propositions or premises *read off* upon the keys of the instrument. The possibility of such a contrivance is practically ascertained; when completed, it will furnish a more signal proof of the truth of the system of logic embodied in it. Still, the more rudimentary contrivance called the *Abacus* will remain the most convenient for explaining the nature and working of formal inference, and may be usefully employed in the lecture-room for exhibiting the complete analysis of arguments and logical conditions and the exposure of fallacies."

In a little book published in 1869, entitled "The Substitution of Similars," Professor Jevons simplified and extended his theory of reasoning. When logical propositions are expressed in the form of equations, the old distinction of subject and predicate is abolished, and the *dictum de omni et nullo* of Aristotle ceases to be applicable. Jevons therefore proposed to modify the ancient *dictum* and to replace it by the following:—*Whatever is known of a term may be stated of its equal or equivalent.* Or, in other words, *whatever is true of a thing is true of its like.* He held that all reasoning can be reduced to this fundamental principle. But the novelty in his views was most strikingly exhibited in his logical analytical engine, the construction of which was completed about this time.

Boole has shown that "the ultimate laws of logic, those alone upon which it is possible to construct a science of logic, are mathematical in their form and expression, although not belonging to the mathematics of quantity." Jevons advanced a step further, and showed that the processes of logic, like those of arithmetic or algebra, are purely mechanical, and can be not only exemplified but performed by a logical engine. A full description of this curious contrivance is given in a paper read before the Royal Society, in January, 1870, and printed in the "Philosophical Transactions," vol. 160, pp. 497–518. Other papers and treatises on Logic proceeded from his pen: "On a General System of Numerically Definite Reasoning" (Manchester Memoirs, 1872). "Primer of Logic" (1876). "The Principles of Science" (first edition, 2 vols., 1874; second edition, 1 vol., 1877).

The last-named work is a comprehensive treatise on Formal Logic and Scientific Method: it contains the matured results of Professor Jevons' researches on the subject, and is distinguished by great wealth and freshness of illustration. Almost every department of science is made to contribute examples in support or elucidation of the author's views on the theory of reasoning and the nature and limits of scientific inquiry. Perhaps the most original part of the work is that which treats of the "inverse logical problem." Jevons held that deductive reasoning gives the true type of all reasoning, and that induction in an inverse process bearing to deduction much the same relation that arithmetical division bears to multiplication, or evolution to involution. The direct or deductive problem is, Given certain relations among terms or notions, to determine by the application of the fundamental laws of thought, all the possible combinations which are consistent with these relations. The indirect or inductive problem is, Given the combinations, to determine all the possible relations from which these can be logically inferred. In other words, induction is a reasoning back from conclusions to possible premises. Whatever may be thought of this as a theory of induction, there can be no doubt that the inverse problem suggested by it is highly important. The solution of that problem in all its generality appears to be impracticable on account of the number and variety of combinations involved; but Jevons succeeded in obtaining a complete solution for two and for three classes; and the late Professor Clifford made a valuable contribution to the subject by determining the number of types of compound statement involving four classes. Clifford found the knowledge of the possible groupings of subdivisions of classes which he obtained by his inquiry, of service in some of his researches on hyperelliptic functions; and Professor Cayley subsequently suggested that this line of investigation should be followed out, owing to the bearing of the theory of compound combinations upon the higher

geometry. Those combinations possess an interest for the mathematician apart altogether from their logical significance. ("Manchester Proceedings," 1877, vol. xvi, pp. 89, 113.)

In 1867 Professor Jevons married Harriet Ann, daughter of the late John Edward Taylor, the originator, proprietor, and editor of the "Manchester Guardian." Three children were the fruit of the union, a son born in 1875, and two daughters, one born in 1877, the other in 1880. His domestic happiness, and the composure of mind resulting from it, facilitated largely the execution of his intellectual work. He confessed to it himself with his usual manly simplicity, and, as one of his friends says, "it was as if his very powers as an observer had derived a fresh and lasting impulse from the new associations which had become part of his life."

The question of the extent and the resources of the British coalfields was brought under public notice by the debates in Parliament on the Commercial Treaty with France in 1859–60. Attention was called to the importance of effecting a reduction in the National Debt, while coal and iron, the main sources of British wealth, were abundant. Hence arose the inquiry to what extent we might rely on the future produce of our coalfields. Professor Hull and others made estimates of the total quantity of accessible coal in the United Kingdom, and Sir William Armstrong, in his address at the British Association in 1863, gave prominence to the subject, pointing out that the problem to be solved is not how long our coal will endure before there is absolute exhaustion, but how long those particular seams will last which yield coal of a quality and at a price to enable our country to maintain her supremacy in manufacturing industry. Jevons attacked this problem with all the advantage gained from long experience in the collection and management of statistical details. His results were embodied in a treatise, entitled "The Coal Question: an Inquiry concerning the Progress of the Nation, and the Probable Exhaustion of our Coal Mines." (First edition, 1865; second edition, 1866.) Written with clearness, tact and vigour, and presenting the matter in a new and interesting light, the work was largely read; Jevons' conclusions were keenly discussed by journalists and reviewers, and attracted the attention not only of manufacturers and men of business but of politicians and statesmen of the highest order. A Royal Commission was appointed to inquire into the whole question, and Mr. Gladstone used Professor Jevons' calculations in support of his suggestion that a certain portion of the national revenue should be set aside as a reserve fund in payment of the National Debt.

Problems in applied economics had for Jevons a peculiar attractiveness, because of their bearing on the material welfare of the community. His devotion to abstract studies did not destroy his interest

in the progress of society, or in questions touching the practical life of men. While busied with researches on abstract principles, he always kept a window open to the outer world: witness his work on Coals, his papers on Currency and Coinage, Variation of Prices, the frequent Autumnal Pressure on the Money Market, and other kindred subjects, and his articles and addresses on questions of the day, published in the "Contemporary," the "Fortnightly Review," and elsewhere. Several of these scattered papers have lately been collected and republished in a separate volume under the title of "Methods of Social Reform;" and a glance at some of the headings will suffice to show the width of Jevons' interest in whatever affects popular progress—Amusements of the People, Free Public Libraries, Museums, "Cram," Trade Societies, Industial Partnerships, Married Women in Factories, Cruelty to Animals, The United Kingdom Alliance, Experimental Legislation and the Drink Traffic, State Parcel Post, &c.

A pamphlet on the Match Tax, which he wrote in 1871, is memorable as a skilful and courageous defence of a most unpopular measure. In his view the country had reached a critical point where "one great and true policy had been nearly if not quite accomplished;" and he feared that "without any strong guiding principle like that of free trade" before it, the nation was in danger of drifting instead of carefully steering in its financial course. "If one-half of the doctrines and arguments which were brought against the Match Tax should be accepted as really true and cogent, the balance of our financial system would be in danger of complete derangement." He therefore considered it important to subject to calm and impartial investigation the various opinions uttered during the heated discussion on the proposed new impost, and his pamphlet presents an admirable specimen of the way in which the truths of economics should be applied to questions of taxation.

But in his "Theory of Political Economy" (1871, second edition enlarged 1879), Jevons dealt not with particular applications, but with the general principles of the science; he laboured at the foundations. Dissatisfied with many of the views of Ricardo and Mill, he sought to construct the science on a new basis. Observing that "as it deals with quantities it must be a mathematical science in matter if not in language," he endeavoured to express quantitatively such notices as utility, value, labour, capital, &c., and he maintained that the employment of mathematical forms is conducive to clearness and precision of expression. It is curious to remark, however, that he did not attempt to develope those forms as a working process, and when it was pointed out to him that a little manipulation of the symbols in accordance with the rules of the differential calculus would often have yielded results which he had laboriously argued out, he contented himself with replying that he did not write for mathe-

maticians, nor as a mathematician, but as an economist, wishing to convince other economists that their science can only be satisfactorily treated on an explicitly mathematical basis. One who is both a mathematician and an economist bears the following testimony, as discriminating as appreciative, to the value and importance of Jevons' work in this branch of knowledge.

"Mr. Jevons," writes Professor A. Marshall, "was an economist of the highest order. In his 'Theory of Political Economy' he explains the nature of economic quantities, and their relation to one another. Work of this kind involves no startling discovery, but its effect is much greater than appears at first sight. It makes us master of our thoughts, and founds new empires in science. A small part of his work, which was warped by his antipathy to Ricardo, will probably die away. A small part also will lose lustre when Cournot's applications of mathematics to economics are better known. For indeed Jevons was, as he frankly confessed, not a skilled mathematician. Truly mathematical as is the tone of his best work, he was not at his ease when using mathematical formulæ. But the great body of his work is unaffected by these blemishes; the lapse of time will but add to its lustre, and it will probably be found to have more truly constructive force than any, save that of Ricardo, that has been done during the last hundred years. His contributions to statistics were widely known. The pure honesty of his mind, combined with his special intellectual fitness for the work, have made them models for all time. But it is in his essays on the applications of economics to the theory of governmental action that his full greatness is best seen. There is no other work of the kind which is to be compared to them for originality, for suggestiveness, and for wisdom. Almost every one of them contains some great new practical truth which the world is beginning to recognise, though but few persons know their obligations to him."

"Money and the Mechanism of Exchange" made its appearance in 1875, forming part of the International Scientific Series. In this work Jevons expounded the nature and functions of money, the principles of circulation, the various forms of credit documents, and the elaborate mechanism by which money exchanges are facilitated, adding some important historical notes and a discussion of certain technical points connected with the subjects treated of in the main body of the volume.

Jevons' connexion with Owens College extended over a period of thirteen years, during which the Institution steadily advanced in reputation and renown. Much of its progress was due no doubt to the liberality of its friends, but more perhaps to the genius and labours of its professors, and among these Jevons held a conspicuous place. In its new buildings and with its new constitution, the College

gave a considerable share of its government to the distinguished men who constituted its teaching body, and largely increased the importance of their corporate deliberation. Almost from the first Jevons proved himself a valuable member of the Senate, and at a somewhat critical period in the history of the College, he was chosen to serve as a representative on the College Council. "There were many qualities in him," writes one of his colleagues, "which more than justified the confidence reposed in him, but there was none for which he was more conspicuous than a comprehensive large mindedness which enabled him to look on questions with a view to something more than the immediate future. . . . Towards one change now actually effected, and in the opinion of many of us, deserving to be called a progress, he at first maintained an attitude of extremely well armed neutrality. I liked to attribute his coldness towards our University project to his loyalty as a member of the University of London; but I confess to having spent a very bad half hour when I made a final private attempt to argue him into a change of front. At the same time it is an instance of the sagacity which has marked his treatment of so many public questions, that he from the first (or nearly so) declared that the adoption of a constitution, such as that now actually possessed by the Victoria University, would be the right way towards the desired end.

In 1868 Jevons was appointed an Examiner in Political Economy in the University of London; in 1870 he was President of the Economic Section at the Meeting of the British Association in Liverpool; in 1872 he was elected a Fellow of this Society; and in 1874 and 1875 he was an Examiner for the Moral Science Tripos in the University of Cambridge. In the latter year the Senatus Academicus of the University of Edinburgh conferred upon him the honorary degree of LL.D., and in the following year he was appointed Examiner of Logic and Moral Philosophy in the University of London.

In 1876 he resigned his connexion with Owens College, and in the same year, on accepting the Professorship of Political Economy in University College, London, he removed to Hampstead, hoping there to have more leisure and greater facilities for the prosecution of his researches. The duties of his new position were less onerous than those to which he had been accustomed in Manchester; but academic work had never been very congenial to him, and lecturing, even on his favourite subjects, had become of late years somewhat of an irksome task. In a letter to the writer about this time, he speaks of the duties of the class-room as a "millstone" upon his health and spirits. Sometimes he had enjoyed lecturing, especially on logic, but for years past he had "never entered the lecture-room without a feeling, probably, like that of going to the pillory." "Now that I have been able to get rid of the burden," he adds, "I shall probably

be much better. I shall never lecture, speechify, or do anything of that sort again if I can possibly help it." Apart from special reasons, too, he found that the pressure of literary work left him no spare energy whatever. Besides the logical exercises which he had just finished and given to the world in a goodly volume, entitled "Studies in Deductive Logic," he had a large treatise on practical economy in full progress, a bibliography of logic in hand, and the analysis of "Mill's Philosophy" on his mind. He was also preparing a student's edition of the "Wealth of Nations," a preface to the English translation of Cossa's "Guide to Political Economy," and a volume on "The State in Relation to Labour" for Macmillan's English Citizen Series, besides new editions of some of his earlier treatises and various minor articles for the Reviews. Much of this work he actually accomplished before the waves closed over his vanished life. But much also remained unaccomplished. The "Principles of Economics," intended as a companion volume to the "Principles of Science," he did not live to complete.

In the summer of last year (1882) he went down with his wife and family to spend five or six weeks at Bexhill, a small village on the Sussex coast. Here he wrote an article on "Reflected Rainbows," which appeared in the "Field Naturalist." This was his last printed production. He had been accustomed in former years when visiting Bexhill to bathe in the sea, and being a good swimmer and familiar with the coast, he seems not to have apprehended any danger. But this season his wife had dissuaded him from the exercise, for he was not in good bodily health. The action of his heart was weak, and the close and continued intension of his mind on absorbing studies had much reduced his physical strength. On the morning of Sunday the 13th of August, he was walking with his wife and children on the beach, not far from the cottage on the cliff where they were staying. A man of warm domestic affections, he loved to be with the little ones, watching their innocent ways and participating in their simple pleasures. At length he turned to leave them, saying nothing of his intention to bathe; perhaps he formed the intention on his way back to the cottage, or after he had reached it. Taking a towel out of the house, he descended the cliff on the other side, and entered the water. No one else was bathing at the time, or within sight of the place; and the exact circumstances of his death can only be conjectured. It is believed that the sudden shock of the cold water, overstraining a weak heart, caused syncope, and that from the first plunge he was quite powerless. Some boys passing along the beach saw the body a few yards out, floating on the sea, face downwards, and at once gave the alarm. Among the persons attracted to the spot was a labourer residing on the hill who, twenty minutes before, had seen Jevons going down to the beach. When the body

was brought to land life was extinct. Within an hour and a-half of his leaving her, Mrs. Jevons' heard of her husband's death. His clothes and the unused towel were found lying on the shore.

Jevons was a man as remarkable for modesty of character and generous appreciation of the labours of others as for unwearied industry, devotion to work of the highest and purest kind, and thorough independence and originality of thought. The bequest which he has left to the world is not represented solely by the results of his intellectual toil, widely as these are appreciated not only in England but also in America and on the Continent of Europe. A pure and lofty character is more precious than any achievements in the field of knowledge; and though its influences are not so easy to trace, it is often more powerful in the inspiration which it breathes than the literary or scientific productions of the man. "That Professor Jevons will be missed," writes the editor of the "Spectator," "as one of the profoundest thinkers of our time on the philosophy of science, no one who knows anything of his writings will doubt. Yet he had other qualities, not always found in men of science, which made his character as unique as his intellect. At once shy and genial, and full of the appreciation of the humour of human life, eager as he was in his solitary studies, he enjoyed nothing so much as to find himself drawing in the lively companionship of intimate friends. Something of a recluse in temperament, his generous and tender nature rebelled against the seclusion into which his studies and his not unfrequent dyspepsia drove him. His hearty laugh was something unique in itself, and made every one the happier who heard it. His humble estimate of himself and his doubts of his power of inspiring affection, or even strong friendship, were singularly remarkable, when contrasted with the great courage which he had of his opinions; nevertheless, his dependence on human ties for his happiness was as complete as the love he felt for his chosen friends was strong and faithful. Moreover, there was a deep religious feeling at the bottom of his nature, which made the materialistic tone of the day as alien to him as all true science, whether on material, or on intellectual, or on spiritual themes, was unaffectedly dear to him." R. H.

Friedrich Wöhler was born on July 31, 1800, in the village of Eschersheim, near Frankfort-on-the-Main, in the house of the pastor of that place, a brother-in-law of his mother. He received his first instruction in reading, writing, and arithmetic from his father; he went afterwards to the ordinary school, and later on he took private lessons in Latin and French, as well as in music.

Wöhler early showed a taste for experimenting and collecting, in which he was helped and encouraged both by his father and by his father's friend, Hofrath Wichterich, who took great interest in