erected in Greyfriars Church to an officer who died only in 1863 is no longer legible. At least $\frac{1}{8}$th of an inch of surface has here been removed from a portion of the slab in sixteen years, or at the rate of about $\frac{3}{4}$ inch in a century.

In the second place, where a sandstone is marked by distinct laminæ of stratification, it is nearly certain to split up along these lines under the action of the weather if the surface of the bedding planes is directly exposed. This is well known to builders, who are quite aware of the importance of "laying a stone on its bed." Examples may be observed in our churchyards, where sandstones of this character have been used for pilasters and ornamental work, and where the stone set on its edge has peeled off in successive layers. In flagstones, which are merely thinly-bedded sandstones, this minuter lamination is fatal to durability. These stones, from the large size in which slabs of them can be obtained and from the ease with which they can be worked, form a tempting material for monumental inscriptions. The melancholy result of trusting to their permanence is strikingly shown by a tombstone at the end of the South Burying Ground in Greyfriars Churchyard. The date inscribed on it is 1841, and the lettering that remains is as sharp as if cut only recently. The stone weathers very little by surface disintegration. It is a laminated flagstone set on edge, and large portions have scaled off, leaving a rough, raw surface where the inscription once ran. In this instance a thickness of about $\frac{1}{3}$ inch has been removed in forty years.

In the third place, where a sandstone contains concretionary masses of different composition or texture from the main portion of the stone, these are apt to weather at a different rate. Sometimes they resist destruction better than the surrounding sandstone, so as to be left as prominent excrescences. More commonly they present less resistance, and are therefore hollowed out into irregular and often exceedingly fantastic shapes. Examples of this kind of weathering abound in our neighbourhood. Perhaps the most curious to which a date can be assigned are to be found in the two sandstone pillars which until recently flanked the tomb of Principal Carstares in Greyfriars Churchyard. They were erected some time after the year 1715. Each of them is formed of a single block of stone about 8 feet long. Exposure to the air for about 150 years has allowed the original differences of texture or composition to make their influence apparent. Each is hollowed out for almost its entire length on the exposed side into a trough 4 to 6 inches deep and 6 to 8 inches broad. As they lean against the wall beneath the new pillars which have supplanted them, they suggest some rude form of canoe rather than portions of a sepulchral monument.

Where concretions are of a pyritous kind, their decomposition gives rise to sulphuric acid, some of which combines with the iron and gives rise to dark stains upon the corroded surface of the stone. Some of the sandstones of this district, full of such impurities, ought never to be employed for architectural purposes. Every block of stone in which they occur should be unhesitatingly condemned. Want of attention to this obvious rule has led to the unsightly disfigurement of public buildings.

III. GRANITES.—In Prof. Pfaff's experiments, to which I have already referred, he employed plates of syenite and granite, both rough and polished. He found that they had all lost slightly in weight at the end of a year. The annual rate of loss was estimated by him as equal to 0·0076 mm. from the unpolished and 0·0085 from the polished granite. That a polished surface of granite should weather more rapidly than a rough one is perhaps hardly what might have been expected. The same observer remarks that though the polished surface of syenite was still bright at the end of not more than three years, it was less so than at first, and in particular that some figures indicating the date which he had written on it with a diamond had become entirely effaced. Granite has been employed for too short a time as a monumental stone in our cemeteries to afford any ready means of measuring even approximately its rate of weathering. Traces of decay in some of its felspar crystals may be detected, yet in no case that I have seen is the decay of a polished granite surface sensibly apparent after exposure for fifteen or twenty years. That the polish will disappear, and the surface will gradually roughen as the individual component crystals are more or less easily attacked by the weather, is of course sufficiently evident. Even the most durable granite will probably be far surpassed in permanence by the best of our siliceous sandstones. But as yet the data do not exist for making any satisfactory comparison between them.

GERHARD JOHANNES MULDER

IN the death of Prof. G. J. Mulder, to which we briefly alluded in our last number, Holland has been called upon to mourn the loss of her leading chemist. Gerhard Johannes Mulder was born at Utrecht, December 27, 1802. His studies were completed at the university of his native city, and embraced especially mathematics, the natural sciences, and medicine. In 1825 he established himself as physician at Amsterdam. His inclination towards a more purely scientific career caused him however in the year following to accept a position as teacher of physics at Rotterdam under the auspices of the Batavian Society. This proved but the stepping-stone to the Professorship of Botany and Chemistry at the Rotterdam Medical School, to which he was appointed in 1827. In 1841 he accepted a call to the Chair of Chemistry at Utrecht, and returned to the place of his birth, to add to its fame by making it the scene of a long-continued series of valuable chemical researches.

Mulder's tastes lay almost entirely in the department of organic chemistry, and more especially in those branches connected with the phenomena of vegetable and animal life. In mineral chemistry his researches were confined to careful studies on the chemical composition of white lead and red lead (1839)—two of the important technical products of Holland—and to the establishment of the atomic weight of tin (1849) by means of numerous analyses. He also modified or perfected a number of analytical methods, such as those for the determination of silver, phosphorus, carbonic acid, &c., and contributed a large variety of analytical data on various technical and scientific compounds. In 1864 he made an elaborate investigation on the phenomena of solution of salts in water, establishing several of the now generally accepted laws with regard to the solubility of mixtures of salts, among others the interesting fact that in saturated solutions of mixtures the relations between the respective quantities of the salts is expressed in multipla of their molecular weights. The varied experimental data resulting from his own researches were grouped, together with the contributions of other chemists on this subject, in the form of a monograph of over 300 pages, which forms the most important work extant on solubility.

In physiological chemistry Mulder has conducted a large variety of investigations. The most important are those connected with the study of the albuminoids, which were commenced in 1838 and extended over a period of twenty years. In the course of these investigations he exposed albumin, fibrine, caseïne, &c., to the action of a variety of chemical agents, obtaining the products of oxidation, chlorination, nitrification, &c. At an early date he obtained, by the action of alkaline solutions on the albuminoids, the so-called *proteïn*, which he regarded as the primary albuminoid matter, the various members of the group consisting of this radical in union with small quantities of sulphur, phosphorus, and oxygen. This

ingenious hypothesis, while being a fruitful cause of research, was ultimately found to be untenable. It involved the author in a somewhat bitter discussion with Liebig and his school, who finally proved proteïn to be by no means a homogeneous body, and to contain a notable quantity of sulphur, in opposition to Mulder's opinion. While failing to solve the problem of the constitution of this group of compounds, a problem which, even despite Schützenberger's remarkable experiments during the past few years, is but half-way toward solution, Mulder vastly increased our knowledge of the proteïds by numerous analytical results and thorough studies of the chemical properties of the different members of the group and of their derivatives. As especially interesting papers in this connection should be mentioned his research on the nature of the albuminoid forming the crystalline lens of the eye (1839), and that on the natural and artificial formation of peptone from the albuminoids (1858). Closely allied to this subject were the important researches on chondrine and other gelatinous bodies carried out in 1839. From this same year dates also his extended investigation of the chemical properties of hematin, the colouring matter of the blood. The examination of blood enlisted his attention at various intervals, and led to numerous analytical tests, to one of which we owe the proof of the presence of carbonic acid as a normal constituent of the blood. In addition to the topics alluded to, Mulder has contributed to physiological chemistry a large variety of minor isolated observations and numerous analyses of various products of the animal economy.

In the chemistry of vegetable physiology he developed a scarcely less noteworthy activity and diversity. In 1839 and 1840 were published important papers on inulin and starch, and on pectin and pectic acid. At the same time appeared his analytical investigations on the composition of silk, of gum arabic and other gums, of the poison of the upas, of various sorts of tea and coffee, of tannic acid, of numerous ethereal oils, of the resinous matter in turf, of salicin and phlorizin, and of the compounds rufin and rutilene, derived from them, and of gluten. In 1839 he published an extensive research on cassia-oil and cinnamon-oil, and on benzone, in which numerous derivatives of these bodies are described. In the year following he completed an elaborate investigation on the ulmic bodies, which forms the chief basis of our knowledge in this still comparatively obscure field. This was followed by interesting researches on yeast (1844), on chlorophyll, on the presence of waxy constituents in many ordinary plants (1844), on the action of acids on woody fibre (1846), on chrysamonic acid and other derivatives from aloes. In 1865 he published a very complete and valuable study on drying oils and their chemical properties, based on a wide range of experimental observation. Mulder made two important contributions to the special chemistry of the aromatic compounds by his discovery in 1839 of meta-nitro-benzoic acid—one of the earliest representatives of the nitro acids—and by his study in 1858 on the formation of picric acid from indigo, in which he advanced the now generally accepted opinion of a transition, by means of isatin and nitro-salicylic acid, from one compound to the other. Organic chemistry is likewise indebted to him for several improvements in analytical methods, and he was one of the first to devise gas furnaces for use in organic combustions.

As an author and editor Prof. Mulder was scarcely less active than as an investigator. His principal works, which are better known in their German translations, are:—"Proeve eener allgemeene physiologische Scheikunde" (1843), translated into German by Prof. Kolbe, under the title of "Versuch einer allgemeinen physiologischen Chemie;" "Die Ernährung in ihrem Zusammenhang mit dem Volksgeist" (1847); "Die Chemie des Weins" (1856); "Die Chemie des Biers" (1858); "Die Silberprobirmethode" (1859); "Die Chemie der Ackerkrume," 3 vols. (1864); "Beiträge zur Geschichte des chemisch gebundenen Wassers" (1864); "Die Chemie der austrockenden Oele" (1867). As an editor he published, in connection with Van Hall and Vrolik, the "Bijdragen tot de natuurkundige wetenschappen" from 1826 to 1832. During the six years following he edited the "Natuur- en scheikundige Archief." After uniting for several years with Miquel and Wenckeback in the editorship of the "Bulletin des Sciences physiques et naturelles en Néerlande," he has issued since 1842 the "Scheikundige Verhandelingen en Onderzockingen" (Rotterdam), the only chemical journal of Holland.

Prof. Mulder was frequently intrusted by his Government with important commissions, and has contributed greatly by his pen and speech to the cultivation of chemistry in Holland. In 1860 he was elected an honorary member of the London Chemical Society. T. H. N.

NOTES

A CONSIDERABLE number of the Fellows of the Royal Society have decided to add a portrait of Sir Joseph Hooker to the valuable collection of historical portraits belonging to the Society, and they invite others to join in the subscription. Cheques crossed "Barclay and Co., for the Sir J. Hooker Portrait Fund," to be paid to Messrs. Barclay and Co., 54, Lombard Street, E.C.

AT the last meeting of the Chemical Society it was announced that the Longstaff Medal had been awarded to Prof. Thorpe, of the Yorkshire College, Leeds. Prof. Thorpe is the first recipient of the medal.

ON Sunday, May 23, M. Dumas was presented by the Société d'Encouragement with a civic crown, in acknowledgment of the services rendered to science and to France during more than half a century.

THE Emperor of Germany has appointed Prof. Baron von Nordenskjöld a foreign Knight of the Ordre pour le Mérite for Arts and Sciences.

THE Visitation of the Royal Observatory takes place on Saturday.

THE funds for the erection of a monument in memory of the great philosopher, Leibnitz, at Leipzig, have now reached the sum considered necessary, and Prof. Hänel of Dresden is about to execute the monument. It will be erected on the southern side of the St. Thomas Churchyard. The statue of Leibnitz will be of bronze, and will measure 3½ metres in height. The pedestal will have the same height, and will be adorned by four bas reliefs.

WE have to record the death of Mr. Alfred Swaine Taylor, F.R.S., the physician and toxicologist. He was born at Northfleet, Kent, in December, 1806. He was a pupil of Sir Astley Cooper and Mr. J. H. Green at Guy's Hospital, and afterwards studied in the leading medical schools of France, Germany, and Italy. In 1830 he entered the Royal College of Surgeons, was admitted a Licentiate of the Royal College of Physicians in 1848, and was elected a Fellow of the same five years later. In 1845 he was chosen a Fellow of the Royal Society. He was the first holder of the chair of Medical Jurisprudence in Guy's Hospital, and was for many years joint-Professor, and subsequently sole Professor, of Chemistry. Dr. Swaine Taylor was the author of several professional treatises, more especially on the subjects of poisons and poisonings, chemistry, and medical jurisprudence; and he had received the honorary degree of M.D. from the University of St. Andrew's.

ON May 15 the Congress of Bohemian Naturalists was opened at Prague. Dr. Albert, of Innsbruck University, was elected