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MR. WILLIAM PETERSON, a former scholar of Corpus Christi College, Oxford, now acting as Assistant Professor of Humanity in Edinburgh University, is preparing a translation of Cicero's 'Pro Cluentio.'

Two sonnets by Mr. Lowell, written while in Spain, will be included in the January *Harper's Magazine*, together with a biographical and critical paper on the poet and his works by his neighbour at Cambridge, Mr. F. H. Underwood, illustrated with a large portrait, a smaller one of the poet at thirty-six, and views of his home, "Elmwood," and of the scenes of some of his poems.

THE memorial from 567 non-resident members of the Senate of Cambridge University, expressing their concurrence with the national and other memorials in favour of granting the B.A. degree to women, is signed, among others, by the Duke of Wellington, the Earl of Derby, Earl Spencer, Viscount Harberton, Lords Houghton, E. Fitzmaurice, and Henniker, the Bishops of Bath and Wells and of Carlisle, Drs. E. A. Abbott, Abdy, A. Barry, Cowie, and E. Thring, Sir D. Wedderburn, Messrs. Leonard Courtney, W. Forsyth, J. E. Gorst, A. Cohen, J. Heywood, J. T. Hibbert, A. W. Kinglake, G. Shaw Lefevre, A. G. Marten, H. J. Roby, J. Spedding, J. Westlake, Francis Galton, Profs. W. S. Aldis, A. T. Bentley, T. W. Bridge, A. S. Herschel, C. Niven, and A. S. Wilkins. Altogether the various memorials presented in connexion with this matter have been signed by or represent 10,000 persons (including numerous councils and societies which have presented memorials signed by their chairman). It is not often that a university or any body except a parliament has the opportunity of rejecting the prayer of so many and so influential memorialists. But this is to a large extent the effect of the Syndicate's report.

SCIENCE

The Power of Movement in Plants. By Charles Darwin, LL.D., F.R.S., assisted by Francis Darwin. (Murray.)

It is a singular fact that while this country can count comparatively few physiological botanists, those we have had have been men of unusual eminence. Germany boasts of her physiologists, and numbers them by scores; France largely exceeds us in this particular; while in most European countries provision exists for practical instruction in this department far beyond anything we have. But while this is so, England has no reason to be otherwise than proud of her representatives. Grew and Hales may be considered as almost the founders of the science. Hooke, Priestley, and Thomas Andrew Knight largely contributed to it, while in our own times Robert Brown was without a peer—the *princeps botanicorum*; moreover, his physiological work will probably be in future more highly esteemed than even his essays in mor-

phology and classification. Still more recently Mr. Darwin has stepped into the front ranks of vegetable physiologists, and by his unweary patience in experiment and observation, his laborious research and clear statement, has contributed in no ordinary degree to the progress of the science. Hitherto he has confined himself to certain specialities, and has not given us any work of a general character, but, with the experience he must have gained and the assistance he could always command, surely no one could be better fitted to produce a comprehensive treatise on the general life-history of plants.

The tendency nowadays seems to be to treat the plant too exclusively from the point of view of pure chemistry or pure physics. The result is that we get to know more what the chemist does in his laboratory, and what the physicist effects in his experiments, than what the plant itself does in its own workshops and with its own machinery. Now it is precisely in this department that Mr. Darwin's experiments have been most valuable: he has set before us the mechanism and the methods of working of flowers; he has shown how some plants, under some circumstances, feed in a special manner by means of their leaves; he has investigated the movements of climbing plants and of tendrils. He has explained how close is the relationship between plants and animals, and how attributes once considered the exclusive possession of the one are shared also by the other.

Mr. Darwin's latest volume is an extension, as it were, of his previous treatise on climbing plants. He shows us that every growing part of every plant is continually moving round—"circumnutating" as he calls it. The movements of climbing plants, the upraising and depression of leaves, the movements of certain parts towards or from the light, all are modifications of this circumnutatory tendency. The most novel portions of the treatise are those relating to the movements of seedling plants, the upper part of which is alone sensitive to light and transmits an influence to the lower part, causing it to bend. If, therefore, the upper part be shielded from the influence of light there will be no movement of the seedling, even though the lower portion be exposed to the light for hours. Here is another experiment for Dr. Siemens to make with the aid of the electric light. Still more novel and remarkable are the facts that Mr. Darwin brings forward with reference to the movements of the radicles and minute root-fibres. These, as it appears, are in constant movement, so far as the obstacles in their way will permit, and it is easy to see of what use this rotating movement is in enabling them to penetrate between some obstacles or to avoid others. The tip of the root, moreover, is sensitive to the touch and to various stimuli, and when thus excited it transmits an influence to the upper part, causing it to bend from the pressed side. On the other hand, if the tip be exposed to a current of watery vapour on one side the upper part of the radicle bends to that side.

The bulk of the book consists of the record of a series of elaborate experiments proving the existence and nature of the movements alluded to. The experiments were made

by affixing to the part to be examined, by means of shellac, a fine thread of glass tipped by a minute dot of sealing-wax. A card with a similar black dot was affixed close by, and so arranged that on beginning an observation the black dot on the glass filament and that on the card coincided in position. As the plant or part of the plant moved, while the card was fixed, the relative position of the two black dots of course varied, and the degree of variation was marked upon the horizontal or vertical glass plate through which the plant was observed by a series of marks, which, when subsequently connected by lines, represented to some extent the course of the moving object. It is probable that some more accurate and "self-recording" register will hereafter be devised; but for Mr. Darwin's present purpose, for the mere establishment of the facts in their broad outlines, this plan is sufficient. Another mode was indeed adopted by the author in cases where it was requisite to, as it were, magnify the movement. In the preparation of the work special assistance has been given by Mr. Francis Darwin, who has on more than one occasion shown a marked hereditary tendency to follow up those experimental researches in which his father has, wholly apart from his evolutionary theories, gained such well-founded repute.

Very numerous diagrams are given, but from the causes we have already mentioned, as well as from the necessary employment of a plane surface whereon to present the indications of the movements, these diagrams, as pointed out by the author, are of no value to those who desire to know the exact amount of movement or the precise course pursued, but they serve to show whether the part moved at all, and what was the general character of the movement. It is clear from this that in order more correctly to ascertain the relation between these movements to light, temperature, moisture, &c., some more accurate method of experiment must hereafter be adopted, and the apparatus by means of which the rate of growth of plants is automatically measured and recorded suggests the possibility of devising a method by which this result may be obtained.

The tendency of modern investigation has been to break down in many points the alleged distinctive marks between plants and animals. One by one the old supposed distinctions have been abandoned, so that at present the prevalent belief is that all life is essentially one, and that its manifestations are exerted through the medium of machinery fundamentally identical in character. In accordance with these views Mr. Darwin points out the resemblance between the movements of plants and many of the actions performed unconsciously by the lower animals, the most striking illustration being in the kind of imperfect reflex action which is shown to occur when a certain portion of a plant is stimulated by a touch or otherwise, the influence being transmitted from the point of contact to some other point, which, as a direct consequence of this transmitted influence, moves just as the telegraph needle moves when a current is generated in the far-off battery.

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of a specialist the reviewer can only point out the general nature of the book, and its bearing on the main subject. Criticisms on points of detail is, except to a very limited extent, out of place. As a matter of minor moment as far as the meaning intended to be conveyed is concerned, but as a point of some consequence from a literary or philological point of view, we may allude to the terms used by Mr. Darwin. For most of these he is not individually responsible, but the word "hypocystyl," to indicate that portion of the arm of the plant below the cotyledons or seed-leaves and between them and the embryo root or radicle, is a coinage of the author's own upon which we cannot complain. Written in full the word should be "hypocystylus," but as in the familiar converse of botanists the inconveniently long "diotryphous" and "monocotyledons" are frequently shortened into "diots" and "monots," so it would seem Mr. Darwin has adopted the abbreviated form "hypocystyl." Abbreviation of verbal partly will object to this on these two grounds, while botanists will repeat that neither, and as we think neither term has been adopted for what is already known as *tipilium* or *cotyled.* But this, as we have said, is a minor matter. It is far more important that a substantial addition has been made to our knowledge of the life-history of plants, and it is not altogether unpleasant to know that it has been made on this side of the German Ocean.

Jeanpierre Chemistry. By Dr. W. R. Krimmold.
(Giffin & Co.)

THE little volume is well adapted for the students in the elementary classes of the Science and Art Department, for whose use it is professedly written. There is very satisfactory agreement in all the definitions of terms, and the explanations of the physical and chemical conditions of matter are given with great facility. There are few things more difficult of any explanation than the laws of chemical combination, the atomic theory, or valence weights. Yet we find these matters rendered intelligible to the ordinary student who can devote a little thought to these subjects in a few clearly written pages of this volume. We wish we could say the same of the chapter devoted to the chemical nomenclature. But this is not the fault of the author. Our modern chemists have questioned the system of naming chemical compounds which had been long in use; they have proposed a system which is in every respect opposed to the rules regulating the construction of names in our English tongue; and the whole matter is now in an exceedingly involved condition. Notwithstanding the clearance with which Dr. Krimmold has treated his subject, inorganic chemistry, he necessarily leaves it in a very unsatisfactory state. He has opened his instructive description of chemical phenomena with simplicity, and the early student can have but little difficulty in understanding him; but he is bound very soon to be wandering into the consideration of subjects which can only be appreciated by, as the phrase is, "students of the advanced grade." This has arisen from the circumstance that the book has been written to meet the requirements of a certain system of examination. The author himself admits to examine himself by its graphic representation on the above ground, evidently feeling at the same time that these subjects require some knowledge, at least, of the highest branches of chemical philosophy, which must be far beyond

the comprehension of the junior students who are preparing only for the elementary examination. We believe the present examination system has no tendency to advance knowledge; it cultivates a dangerous tendency to "crash." Memory is taxed for a brief season; the trial being over, and the student passed, the impressions made on the mind in very transient colours rapidly fade out, and all is forgotten.

PROF. JOHN CRAIG WATSON.

WE regret to have to announce the death of Prof. John Craig Watson, who was for over twenty years Director of the Observatory of Ann Arbor, near Detroit, connected with the University of Michigan. The observatory was established at Ann Arbor in the year 1854, its foundation being due to the energy of Dr. Tappan, who raised the funds for that purpose whilst occupying the office of President of the State University. When completed, it was placed under the charge of Dr. Brinkow, and on his removal to the directorship of the Royal Observatory at Greenwich (Berlin) in 1868, he was succeeded at Ann Arbor by Prof. Watson, who had previously been assisting there and had also been a student at the University of Michigan, although a native of Canada. Whilst at Ann Arbor Prof. Watson discovered a very large number of small planets, commencing with Egeronius in 1861, and finishing with Otermonius in 1877, which earned the number of his planetary discoveries to twenty-two. One of these, named Jovra, was discovered at Pekin in 1874, whether Prof. Watson had reported an orbit of an expedition sent by the American Government to observe the transit of Venus in December of that year. He came to Europe to observe the total eclipse of the sun which took place in December, 1879, and witnessed it at Corbentini, near Catania, in Sicily. His last previous discovery of the solar eclipse which was taken in part of the United States in August, 1893, and his observations of that of July 29th, 1878, at Darwin in Wyoming Territory, and the discoveries which arose as to whether intra-Mercurial planets were seen on that occasion, will be in the recollection of all our astronomical readers. Prof. Watson

at Ann Arbor (he was succeeded by Prof. Hargraves) in July, 1879, to take charge of the new observatory at Madison, Wisconsin, erected and equipped by ex-Governor Cadwallader C. Washburn, and called the Washburn Observatory. His death took place there at the end of last month, before he had completed his forty-third year. He was born on the 24th of January, 1838, in the county of Middlesex (now Elgin), Canada West, to which place his father had removed from Pennsylvania, and from which he afterwards went to Michigan. On his subject we may notice only a short list of his publications, and we may mention that he was Professor of Astronomy at the University of Michigan in 1868, and of Physics and Mathematics in 1869. He received the gold medal of the French Academy of Sciences, in recognition of his discoveries, in 1878. As an author he is best known by his "Theoretical Astronomy" published at Philadelphia in 1868, which is a work of great merit, and is, accordingly, highly esteemed. He had also published a "Popular Treatise on Comets" in 1868.

GEOGRAPHICAL NOTES.

DR. OSCAR LEVE, it appears, is not coming direct to Europe from Saragossa. He reached St. Louis on November 23rd, and goes first to Tampa, which he will leave for Berlin in January.

We understand that Miss A. F. Yale, daughter of Col. H. R. Yale, is now engaged in investigations regarding the physical geography of some parts of China and of Turkey.

On the 27th of January Mr. Leigh Smith will read to the Geographical Society a paper on his recent voyage to Franz Josef Land. On that

afternoon the Council of the Society will, it is said, be asked to appoint an Arctic Committee, to consider the whole question of the exploration of the last few years.

At a special meeting of the Marcellin Geographical Society, held last month, medals were awarded to M. Verneux and MM. Swaid and Monnier, as the promoters and leaders of the late expedition to the sources of the Nile.

An Algerian missionary expedition is to be sent to Meana, Tarek's country, and Lake Tazguyt.

At a recent party of the same name expedition is to ascend the Congo, and settle at the great northern head of the river.

Major von Meckow, who left Malakka on the 15th of June with 215 carriers and a portable boat, has descended the valley of the Congo as far as the Quango, and having launched his boat below the rapids, he proposes to descend the latter river as far as the Congo.

The French missionaries at Shanghai have lately printed two volumes of considerable interest, one of which contains a collection of imperial edicts and the memoirs of converts and other officials in favour of Christianity, printed also the translation between France and China.

The other volume is on the subject of the famous inscription at Si-guao (discovered in 1825), and contains the text of it, accompanied by official remarks.

Dr. F. Hirth, of the Chinese Maritime Customs Service, who has some reputation as a sinologist, has in preparation some notes on the history and origin of the word "typhoon," which has been the subject of a controversy in the East for the past ten years, some deriving it from the Greek *typhos*, and others from the Chinese *ty-fing*, or great wind. Dr. Hirth, we understand, has lighted upon a passage in a Chinese work giving a detailed description of the wind, and calling it throughout "the wind fan," which he suggests might be rendered "the wind of the fan," on the ground of the prevalence of the monsoon wind in the neighbourhood of that island. Dr. Hirth is also busy with a Chinese grammar, which will deal largely with the documentary style used in official papers.

The *Geographisch Tidnings* publishes interesting information on Eastern Greenland by Lieut. G. Holm, the leader of this year's exploring expedition. There exist about fifteen Kalaallit settlements, that extend about being Kalaallit, in about 25 N. Some of these are now almost completely inhabited during winter. The native population had never seen any kind of the ruins of European buildings, but spoke of houses on many of the coasts, and of camping grounds on the Fjelds, of whose origin the present inhabitants know nothing.

M. d'Arnaud, who led two expeditions to the Upper Nile in 1840-42, is about to publish the large map (1:100,000) which resulted from his expeditions. This publication, though some what tardy, will nevertheless be looked with interest by geographers; for although the Nile has for several years been investigated by explorers, even beyond the "barriers" marked by the marvellous expedition dispatched by Mahomet Ali, it has never been carefully surveyed. M. d'Arnaud, in a paper read before the Paris Geographical Society, points out that his map gives the original nomenclature of the country, since reproduced in a large measure by Arabic designations. It also shows the former extent of Lake No, at the confluence of the Nile at Khartoum with the Nile of Gabel, or Upper Nile.

The Portuguese Government has determined upon founding agricultural colonies of Europeans in Angola, and the colonies' duties levied upon wine and spirits are to be set aside for that purpose. A loan of 1,000,000, to be repaid by the African colonies, is to be raised for the construction of roads and public works; and in order still further to show the interest which the home Government takes in the colonies, Don Carlos