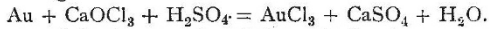


The Chlorination Process. By E. B. Wilson, E.M. Pp. iv + 125. (New York: John Wiley and Sons. London: Chapman and Hall, Ltd., 1897.)

THIS little volume bears a strong family resemblance to the book on "Cyanide Processes," by the same author, which has already been reviewed in NATURE. An engineer who has not studied chemistry so much as other subjects naturally encounters difficulties in describing a "wet" or so-called chemical process. For example, on p. 61, the equation representing the formation of gold chloride in cases where bleaching powder is used is given as follows:



It is stated further on that "the chlorination process is based upon this reaction." If such opinions are not counted, there is not much that is new in the volume.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

African Language.

IN an exceedingly interesting article in your issue of the 16th, on "Anthropology versus Etymology," I am so much struck by the clear statement of the old school mythologist dogma, that "the old name of a deity which had lost its meaning might remind a later generation of the name of some beast; hence might arise those stories of gods taking the forms of beasts," &c. That this is really the case among certain West African tribes I am quite certain, and I believe that, as far as West Africa goes, the confusion caused in white minds by the language has given rise to a good deal that has been said regarding the West African natives believing themselves descendants of animals. It is, I need hardly say, no uncommon thing to find one and the same word used for two or more distinct things. When that word is written down by a white man, who may not notice the accompanying gesture, that marks in which relation it is employed, error is liable to creep in, and you may be calling "slowness in walking" "the new leaves on trees," or *vice versa*, or "a hundred bundles of bikei" "the butt-end of a log," or, "a finger-snap" "your maternal aunt" among the Balanh. This also shows as an element of the danger of judging from words alone in the case of the name used by all the Fjort tribe, who are under the Nkissi school of fetish, for their great over-lord of gods, *Nzambi Mpungu*. In the Loango and Kacongo districts *Mpungu* means a great ape, and the word is used there also as the name for this great god, the creating god; hence it would be easy, and I hope excusable, for I did it at first myself, to think the great god and the ape had some connection. Nevertheless, they have not *Nzambi Mpungu* as a name, for the great deity was imported into the Kacongo and Loango from a region on the south bank of the Congo, with the rest of the Nkissi cult, prior to the discovery of these regions by Diego Caô; and therefore, when the word is used in a religious sense, it bears the religious meaning which it brought from its original home, namely, *something that is above, or that covers over*. Mr. R. E. Dennett tells me that *Mpungu* is used in this sense to this day in the Nlanoi dialects.

The truth is, we are now urgently in need of a Prof. Max Müller for African languages. When attempting to grasp the underlying idea of witch-doctors' methods at Okiyon (among true negroes, I found an alarming state of affairs connected with the so-called word *woka*. The only thing I can liken *woka* to is a nest of spiders, which as soon as you touch it with a stick ceases to be a manageable affair; in *woka* there are representations of at least three sets of opinions bearing on the inter-relationships of matter and spirit. I subsequently found ample reason to believe that this was the case with all secret society words; namely, that they were words the full meaning of which were only known to the initiated. The ordinary free man or woman passing through the ordinary course of secret society instruction would only learn the signification of a simple set of them. The full meaning of the strong words are only known to the few men at the head of the society. Having grasped this state of affairs I decided to stick to fishing and the

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land law, hoping that this mystery was confined to the *strong mouth*; but a few months ago, I having requested Mr. Dennett, of Loango, to send up some of the interesting stories I knew were prevalent among the Fjort tribe, among whom he has lived for seventeen years continuously, he sent me what he calls "the key to the Fjort alphabet," which shows me this strange figurative unworked-at thing lays behind the whole of that language. I have no hesitation in saying Mr. Dennett's MS. is a most appalling work, and it produces great irritation in most patient anthropologists promptly; and what we now require, as aforesaid, is that Max Müller who will give the student of the African great assistance, and then we will hope some great philosopher will come and enable us to have anthropology *cum* etymology and any other ology that will help us to know the whole truth.

M. H. KINGSLEY.
100 Addison Road, Kensington, W., September 19.

On Augury from Combat of Shell-fish.

IN your issue of May 13 (p. 30), Mr. Kumagusu Minakata quotes several examples of augury from the combat of shell-fish. In Spencer St. John's "Life in the Forests of the Far East," vol. i. p. 77, amongst various ordeals related by him as being practised by the Sea-Dyaks of Sarawak, he gives the following:—"Another is with two land shells, which are put on a plate and lime-juice squeezed upon them, and the one that moved first shows the guilt or innocence of the owner, according as they have settled previously whether motion or rest is to prove the case."

CHAS. A. SILBERRAD.
Etawah, N.W.P., India, August 21.

THE MEUDON ASTROPHYSICAL OBSERVATORY.¹

THE foundation of this national observatory may be said to date from the time of the return of the French expedition which was sent to Japan to observe the transit of Venus in the year 1874. Since that period the observatory has been content to publish many of the important results of work completed in various journals, chiefly in the *Comptes rendus*, but it is only quite recently that the first of a series of "Annals" has appeared. It is this volume which we propose now to pass under review; but we may preface our remarks by reminding the reader that many of the sections inserted are not published here for the first time, especially those relating to the photography of solar surface details.

M. Janssen opens with a most interesting historical introduction, which sums up the steps which led to the present efficient state of this national observatory, the line of work which has been actively pursued since its foundation, and the instrumental equipment which it now possesses. Neither does he forget to refer to the important rôle played by M. Cezanne, an eminent engineer and the principal originator of the French Alpine Club, in proposing and strongly advocating, before a meeting of the National Assembly, the necessity of establishing, near Paris, an observatory for the pursuit of physical astronomy. The suggestion was in due course submitted to the Academy of Sciences, and the committee appointed to inquire into it thoroughly endorsed the advisability of the scheme. It was pointed out that such an institution was not only useful, but necessary and urgent; that the part taken by France in these new studies, their importance, and the novelty of the methods on which they were founded, made them a new and distinct branch of astronomy, and called for a special establishment, where they could be freely cultivated. Strengthened by the discovery of spectrum analysis and photography, physical astronomy became a branch of astronomy of sufficient importance to be pursued with success and developed by itself.

The necessity for the establishment of the institution being thus strongly stated, it was not long before an observatory was provisionally installed at the Boulevard

¹ "Annales de l'Observatoire d'Astronomie Physique de Paris," par J. Janssen. Tome I. (Paris: Gauthier-Villars et Fils, 1896.)

d'Ornano, the place where the Japan expedition had been prepared. The question then arose as to the location of the permanent observatory, there being two available buildings belonging to the Government which could be utilised for this purpose—one at Malmaison and another at Meudon. The latter was finally settled upon, and the partial restoration of the old château in the grounds was commenced on lines suitable for the work to be undertaken.

The most satisfactory manner in which the whole of this undertaking has been completed, will have been noticed by those who have had the opportunity of visiting this charming spot. Those less fortunate may gather a good idea from an examination of the excellent series of heliogravures which form part of this volume. The old château, with its spacious grounds and rooms, has proved suitable in many ways for such a physical observatory. The large instruments have been housed in appropriate domes, while the rooms devoted to researches of several kinds have proved most convenient.

Before referring to the work accomplished, let us briefly make a survey of the instrumental equipment. The large equatorial consists of a twin-telescope with apertures of 0.83 and 0.62 metres, the latter being devoted to photography. These objectives have practically the same focal length, being 16.16 and 15.90 metres respectively. They are set up together on the same mounting, and housed under the large dome situated in the middle, but at the upper part, of the main building. The dome itself is 18.50 metres in diameter, and is rotated by means of electricity, the same motive power being also used for elevating or depressing the observing platform. Two other smaller domes of 7.50 metres diameter, situated in the grounds, contain respectively a Newtonian reflector of 1 metre aperture and a refractor of 0.30 metres aperture. The former has a focal length of 3 metres and was made by the brothers Henry, M. Gautier having undertaken the mechanical parts. This reflector is mounted somewhat after the English system, and is, as Prof. Janssen states, a "précieux instrument de voyage." The solar photographic telescope is described as being of fine optical perfection, and is due to Prazmowski. This instrument will, however, be referred to later on, so we may pass on to those parts of the building set apart for laboratory work.

In restoring the old château, as many of the smaller buildings about it were retained as were likely to prove serviceable on a future occasion. Such, for instance, was the case with the old stables, which measured nearly 100 metres in length, and could be easily extended another 40 metres if thought desirable. These have since been appropriated for a large physical laboratory, and the oak partitions have been preserved in their original positions, serving among other things as useful supports for the long tubes, which are employed in the investigation of gases under pressure. The accompanying illustration (Fig. 1) gives a good general view of this long corridor, and shows how the sides of the horse-boxes have been utilised; three of the long metal tubes can be seen resting on the partitions, and lying along the corridor a considerable distance. These tubes measure 60 metres in length, their diameters being about 0.05 metres. They are joined in sections of 6 metres, and so securely is this accomplished, that for more than six months a pressure of from 20 to 30 atmospheres has

been maintained without any sensible leakage. Among the investigations carried on here may be mentioned the determination of the densities and spectra of gases under high pressures.

Coming now to that portion dealing with solar photography, this is of special interest in that the methods and results of a long series of researches are given in a somewhat detailed form. Solar photography at Meudon has attained such a high state of perfection at the present day, that this may be looked upon as one of the chief fruits of the observatory; in fact, quite a new era in this branch of the subject has dawned.

To describe the steps which have led M. Janssen to achieve such a high state of excellence in photographing minute details would necessitate a longer account than we can here afford; we must restrict ourselves, therefore, to the main lines on which success has followed so quickly and so surely.

Investigations on the optical properties of the material to be used for the lens as regards photographic absorption, showed that the glass gave a maximum amount of light very confined in the violet region of the spectrum

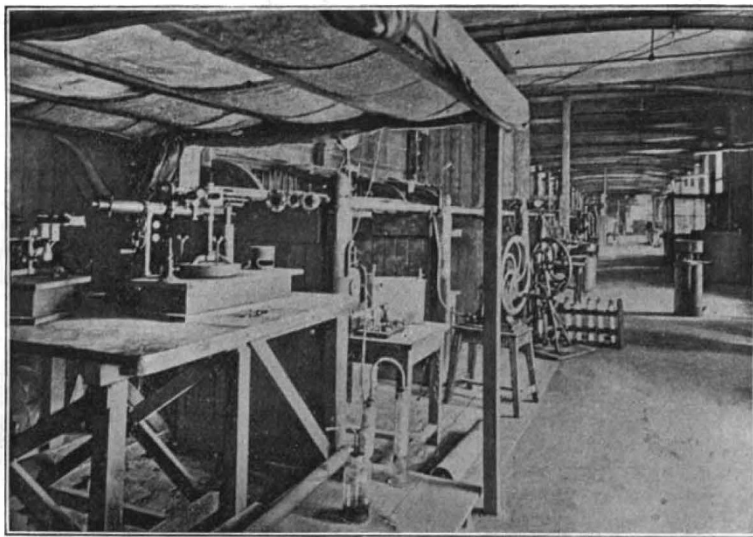


FIG. 1.—The Meudon Stables as an Astrophysical Laboratory.

near the Fraunhofer line G. A study of the sensitiveness of the photographic film was next undertaken, and a film was finally produced which was most active for those rays which M. Janssen desired to employ. The objective was then made so that the images formed at the focus were nearly exclusively composed of rays of the same refrangibility; they were also, as M. Janssen states, extraordinarily sharp. The next point was to produce as fine a grain as possible in the film, and of sufficient delicacy to reproduce all the details of the image exposed on it. The results of these experiments, giving the actual proportions which were finally adopted, are described at some length. It is interesting to note that great stress is laid on the importance of rigorously cleaning the plate in the first instance. We read "cette propreté est ici encore plus indispensable que pour les photographies artistiques les plus soignées." Other points of difficulty successfully overcome were: considerable magnification of the image to show the delicate details of the solar surface, and to diminish the effects of irradiation; complete control of the shutter, to ensure sufficient exposure and exemption from irradiation; and, lastly, means of equally exposing all parts of the image.

The photographs obtained by employing the above-mentioned instrument and method were, as a rule, of 0.30 metres diameter, but for special purposes diameters of 0.50 and 0.70 have been used. Some of these pictures have been beautifully reproduced in the volume before us, and surpass any others that have been obtained both in clearness and fineness of detail.

A minute examination of such photographs has greatly enlightened us on many points regarding the surface movement and appearance of the photosphere, and in the near future we shall have series of photographs taken very quickly one after another, which will help us to follow the motions, invisible even to the unaided eye, most closely.

Further, it has been shown that the forms, dimensions, and distribution of the granulations are not in accordance



FIG. 2.—A portion of the solar surface, showing a sunspot and a mean réseau (June 22, 1885).

with the ideas formed of these elements of the photosphere as seen through telescopes. The photographic images do not confirm the notion that the photosphere is built up of elements, the forms of which are constant, and resemble rice grains, &c. The granulations, according to M. Janssen, assume different shapes under different circumstances, and vary very much in size.

The discovery of the photospheric réseau is another outcome of the Meudon photographs. A close study of the photographs showed that the photosphere was not uniformly constituted in every part, but that it was divided into series of figures more or less separate from one another, and exhibiting a peculiar structure. The sizes of these figures were found to vary, and their contours were more or less rounded, sometimes rectilinear, and very often polygonal. These different types of réseaux are clearly seen on the photographs in the volume, and one of these, illustrating a mean type of

réseau, is given in the reproduction accompanying this article (Fig. 2).

The picture, here considerably reduced, was taken on June 22, 1885, the diameter of the disc being 0.888 metres, and gives a good idea of what is meant by a mean réseau. The photograph shows, further, a large spot, the principal nucleus of which measured nearly two minutes of arc in diameter. The faculæ and striæ of the penumbra of the spot illustrate very clearly that these parts were formed of granulations like the rest of the solar surface.

A special inquiry as to the distribution of this granulation over the entire solar surface brought out the fact that even at the poles it was quite distinguishable; it thus differs from the spots, which are limited to two narrow belts on each side of the solar equator.

The last sections of the volume are devoted to several other uses of solar photography, as, for instance, the questions of the presence of a lunar atmosphere, or of small bodies passing between the earth and the sun. Both of these have been investigated at Meudon, and in each case a negative answer was the outcome of the research.

In bringing this notice to a conclusion, we may remark that this, the first volume of the "Annals," is worthy of the institution from which it hails, besides being a valuable contribution to astronomy. It is, perhaps, the most handsome volume of any "Annals" which it has been our lot to notice, and the numerous reproductions of photographs are models of what can be accomplished in this line of work.

The French Government is to be congratulated on being the means by which such fine work in astronomical science can be accomplished, and is, we have no doubt, proud of the able director to whose energy and skill such important advances are due.

WILLIAM J. S. LOCKYER.

RECENT WORK OF THE UNITED STATES GEOLOGICAL SURVEY.

THE Fifteenth Annual Report of the United States Geological Survey opens with a few words of farewell spoken by the Director, Major Powell, on his retirement. Modestly and briefly he reviews some of the work done by himself and his colleagues, which has been expressed in not less than a thousand maps and two hundred volumes. The last Report issued by him is a worthy successor of the earlier ones in material and in illustrations; many of the latter are exceptionally fine, and show what can be done by the artistic printing on high-class paper of blocks processed from good photographs. When will English officialdom learn that the thousands of pounds spent in promoting research lose nine-tenths of their effect on account of the slovenly and imperfect presentation of the results to the public?

One of the most interesting memoirs in this volume, on the Granites of Central Maryland, is prefaced by a short but very able chapter from the pen of Prof. G. H. Williams, whose promising life has been cut off in its prime. Here we see evidence of a firm grasp of his subject, with knowledge and experience amongst the class of rocks with which he deals, and the ability not only to acquire and assimilate the work of other observers, but to show clearly that towards the end attained not only himself but a host of other workers have contributed.

Evidence from apophyses, chilled margins, contact metamorphism, and inclusions, as well as from the ultimate chemical and mineralogical constitution of the rocks, is all effectually used to demonstrate that these rocks are igneous products; the close association of a wide range of petrographic types is evidence pointing to the same conclusion. The pegmatites are studied in detail, and a conclusion arrived at that in this district