THE PARIS OBSERVATORY.¹

THIS report opens with the address delivered by the Director, Admiral Mouchez, before the Council of the Observatory on February 24 last; the following is a brief summary of the most important points touched upon.

After referring to the successful completion of the building for the large *equatorial coude*, in which the instrument is now being erected, and to the formation of a special service for spectroscopy, over which M. Deslandres has been put in charge, he enters on the question of the formation of a branch establishment outside Paris. "The demands of modern science," he says, "the extreme smallness of the quantities on which the astronomy of position depends, and the extreme faintness of the objects that physical astronomy studies in order to penetrate more and more deeply into the knowledge of the universe, admit indeed of new processes of observation of such delicacy that they are altogether incompatible with the turmoil and disturbances of all kinds in a populous city. The instruments with large optical power lose nearly all their superiority, because they magnify the defects of an impure and disturbed atmosphere at least as rapidly as the images of the stars."

This is by no means the first time that this question of a branch establishment has been raised, but it looks very much as if it might now be taken up seriously. It seems that a proposal has been made to extend the railroad from Sceaux-Limours in the interior of Paris to Médecis and Cluny, where it would join the metropolitan; if this project was carried out, trains would run as close to the Observatory as 150 metres, thus affording the assistants at the Observatory an interesting amusement in calculating the distances of these trains by the vibrations set up in the various instruments.

A committee of inquiry, presided over by M. Chauchat, has been formed to inquire into the situation, and the unanimous opinion of all the astronomers questioned on the subject was that "the Observatory would be almost lost if this project was carried out according to the present conditions."

Of the other arguments put forward by Admiral Mouchez in favour of the branch establishment, the following may be mentioned. The lighting of the surrounding streets by means of the electric light. This, as he says, would obliterate all stars above the 12th magnitude, and perhaps even above the 11½th, to say nothing of the minor planets, nebulae, and some comets. And with regard to photographing the heavens with moderate exposures, it would become nearly impossible owing to the fogging of the plates before the images are formed, the gas from the street lamps even now producing this effect on the sensitized plates. Referring to the opening and enlarging of the Rue Cassini, he points out, that at no remote date, houses will be constructed from 20 metres to 25 metres in height at a distance of 100 metres, and just in the direction of the meridian line of the instruments; these, besides completely blotting out from view many of the circumpolar stars at their lower culmination, will render the observation of those that remain difficult on account of the smoke from the chimneys.

Following Admiral Mouchez's address are the reports, from each of the heads of the various departments, of the work done during the past year. With the meridian circle no less than 14,374 stars have been observed, exclusive of the 432 observations of the planets made with the same instrument. Observations which were commenced in the month of April with the *equatorial coude*, have been regularly pursued, and at present the results have been highly satisfactory. Not only "do we believe that we have settled in every detail the most precise rules for the application of the new method, but also we have obtained the constant of aberration with an exactness which surpasses all researches made up to the present time."

The three equatorials have been used by M. Bigourdan, Mdlle. Klumpke, and M. Boinot respectively, and with them observations have been made of comets, double stars, nebulae, eclipses of Jupiter's satellites, occultations, planets, and double stars.

M. Paul Henry, who is chief of the photographic department, has been busily engaged among other things in making large *clichés* of different regions of the sky, several of which were prepared at the request of foreign astronomers.

The most important addition to the Observatory for the year

¹ "Rapport Annuel sur l'État de l'Observatoire de Paris pour l'Année 1890." Présenté au Conseil par M. le Contre-Amiral Mouchez. (Paris: Gauthier-Villars et Fils, 1891.)

was the special service for stellar spectroscopy, which, as we have mentioned before, is superintended by M. Deslandres. This branch, when in full working order, should be of the utmost value to science, and the results obtained will be looked forward to with interest. With regard to this branch Admiral Mouchez has given an extract from M. Deslandres' report on the installation of the apparatus and the results obtained.

After a short description of the meteorological work carried on, together with the various other reports usually inserted in this pamphlet, Admiral Mouchez concludes with a brief reference to the Observatory School at Montsouris, of which also he is Director. This school was organized under the patronage of the Bureau of Longitudes, in order to supply a want long felt in France of a school for practical astronomy, where "marine officers, explorers, professors of science, and others could come and accustom themselves to make observations." Since the year 1877 the Observatory has been freely opened to anyone, the only conditions being that those who go should have sufficient scientific knowledge to understand what is taught, and that their work should be regular. To give an idea of the range of the subjects that form the syllabus of instruction we cannot do better than condense the methods of organization as given in the report.

With regard to astronomy, both theoretical and practical lectures are given twice or three times a week. M. Boitel delivers a course on electricity and magnetism which extends over four months, during which time he conducts the officers over all the large electrical manufactories in Paris. Lectures on meteorology are delivered by M. Moureaux, who concludes them with practical instructions for the determination of the magnetic elements. M. Thoulet treats of ocean geography in a course that is of interest and use to sailors. The regulation of the compass, so important to-day on account of our iron ships, forms the subject of a number of lectures by M. Caspari, while photography is studied for two months under the superintendence of M. Guenaire.

From this syllabus it will be seen that a good, practical, and sound course is open to all those who wish to take advantage of it, and in the list of explorers who have figured in the principal missions during the last fifteen years the majority will be found to have served at any rate a short period at the Observatory School.

In concluding his remarks, Admiral Mouchez, after referring to the school that was started in 1879, and which was suppressed some years after for reasons of economy, points out the necessity of giving every encouragement to the one that is doing such good work at Montsouris.

W. J. L.

NOTE ON THE PHYSIOLOGICAL ACTION OF CARBON-MONOXIDE OF NICKEL $\text{Ni}(\text{CO})_4$.¹

BY the kindness of Mr. Ludwig Mond, we have had the opportunity of examining the physiological action of carbon-monoxide of nickel, a substance of unique chemical composition, represented by the formula $\text{Ni}(\text{CO})_4$. The general results of our investigation are as follows:—

(1) $\text{Ni}(\text{CO})_4$ is a powerful poison when injected subcutaneously into a rabbit weighing 1·5 kilo. even with a dose of 1/30th c.cm.

(2) The vapour of $\text{Ni}(\text{CO})_4$ in air, even to the extent of 0·5 per cent., is dangerous.

(3) The symptoms are those of a respiratory poison, and are similar to those caused by carbonic oxide.

(4) The spectrum of the blood of an animal poisoned by $\text{Ni}(\text{CO})_4$ is that of carbonic-oxide-haemoglobin, and it is not reduced by sulphide of ammonium.

(5) When the substance is injected subcutaneously it is probably in part dissociated in the tissues, as there is evidence of the existence of nickel in those tissues, but the nickel also finds its way into the blood, and is found there.

(6) The substance produces a remarkably prolonged fall of temperature even when given in small quantities. In several instances, with lethal doses, the fall was from 2° to 12° C. This may be accounted for by the haemoglobin being prevented to a large extent from supplying the tissues with oxygen. Nico, as we may, for convenience, call this substance, makes it possible to give graduated doses of carbonic oxide, and thus reduce temperature

¹ By John G. McKendrick, M.D., F.R.S., and William Snodgrass, M.A. M.B., Physiological Laboratory, University of Glasgow.

by directly interfering with the respiratory exchanges occurring in the tissues. The objections to its use as an antipyretic are that, owing to its poisonous properties, it is difficult to inject it subcutaneously in sufficiently small doses, while it is not easy to obtain a solution in any menstruum in which decomposition will not take place. If a convenient method of dissolving it could be devised, $\text{Ni}(\text{CO})_4$ might become a valuable antipyretic, the *modus operandi* of which is intelligible.¹

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, April 2.—Mr. W. Crookes, F.R.S., Vice-President, in the chair.—The following papers were read:—Citraconfluorescein, by J. T. Hewitt. Lange and Burckhardt have shown that maleic anhydride is capable of yielding a fluorescein; the author has obtained the corresponding fluorescein from citraconic anhydride, by the action of resorcinol in the presence of sulphuric acid. Citraconfluorescein is easily soluble in alcohol and glacial acetic acid, fairly soluble in water; the aqueous solution is yellowish-brown and shows a green fluorescence.—Ethylic thiocetate, by Dr. C. T. Sprague. Hübner obtained ethylic thiocetate by the action of sulphur monochloride, S_2Cl_2 , on ethylic acetate. It has since been obtained by Delisle by the action of sulphur dichloride, SCl_2 , on ethylic acetate; by Schönbrodt by the action of sulphur on the copper derivative of ethylic acetate; and by Michaelis and Phillips from thionyl chloride and ethylic acetate. Buchka proposed the formula $\text{S}(\text{CH}_3\text{Ac.CO}_2\text{Et})_2$, but an alternative formula, $\text{S}(\text{O.C}:\text{CH.CO}_2\text{Et})_2$, was suggested by Delisle. The author describes the preparation of the substance and the products of its interaction with hydrazines; and shows that it behaves towards phenylhydrazine in the same manner as ethylic acetate. The results are in accordance with the formula proposed by Buchka.—The function of chlorine in acid chlorides as exemplified by sulphuryl chloride, by H. E. Armstrong. A number of experiments carried out during recent years in the author's laboratory show that sulphuryl chloride, SO_2Cl_2 , acts on benzenoid compounds simply as a chlorinating agent. Sulphuryl chloride is easily formed by the direct union of sulphur dioxide and chlorine in the presence of a catalyst, such as camphor, charcoal, or acetic acid; it is a highly mobile liquid of low boiling-point, and is acted on with extreme slowness by water and alkaline solutions. It is an inert substance possessed of properties by no means such as are usually regarded as characteristic of acid chlorides. The chlorine is apparently but loosely held, and is easily withdrawn by a compound having an affinity for chlorine, such as naphthalene. On warming a mixture of this hydrocarbon and sulphuryl chloride, SO_2 is evolved and naphthalene tetrachloride is produced. The author doubts whether the chlorine in acid chlorides is possessed of special activity, and is inclined to the view that the activity of acid chlorides is conditioned by the oxygen rather than the chlorine; this view being supported by the observations of Wagner and Saytzeff, and the later ones of Pawlow (*Annalen*, clxxxviii. 104). The author also discusses the action of SO_2HCl , and the analogous compound SO_2EtCl , and points out that pyrosulphuryl chloride, $\text{S}_2\text{O}_5\text{Cl}_2$, behaves much as if it consisted of SO_3 and SO_2Cl_2 .—The action of nitric acid on the ligno-celluloses, by C. F. Cross and E. J. Bevan. Dilute nitric acid attacks the ligno-celluloses when heated with them at 60° , with the formation of a bright yellow derivative of lignone and nitrous acid. On further interaction, large quantities of nitrous oxide, N_2O , are evolved, together with carbonic anhydride and a small proportion of nitric oxide. A sensible quantity of hydrogen cyanide is also produced, the proportion being increased by increase of temperature. The observations point to the entrance of the NOH residue into the lignone molecule; its interaction with nitrous acid being finally the displacement of H_2 by O. The reaction is probably general for compounds containing the NOH residue, and the authors suggest that attention be paid to the gaseous products of the interaction of nitric acid and carbon compounds, as calculated to elucidate their mechanism.—The Chairman, Mr. Crookes, gave a short verbal account of observations on the volatilization of metals *in vacuo* under the influence of an electric discharge.

¹ This investigation was carried on during last winter. It appears that M. Hanriot made a communication of the subject to the Société Chimique on February 27. He found the substance to be more poisonous than CO, and that the blood gave the spectrum of carbon-monoxide-hæmoglobin.

April 16.—Prof. A. Crum Brown, F.R.S., President, in the chair.—The following papers were read:—Studies on the formation of substitution derivatives, by H. Gordon. The following experiments were undertaken with the object of throwing further light on the laws which govern substitution in the case of benzenoid compounds. *The action of bromine on diorthonitrophenol.*—When bromine is added to an acetic acid solution of diorthonitrophenol at ordinary temperatures, the normal product, namely parabromdiorthonitrophenol, is obtained. However, if the mixture be heated at 100° for a short time, a mixture is obtained consisting of parabromdiorthonitrophenol and orthobromorthoparadinitrophenol. And if the heating be prolonged, and small quantities of bromine added, the mixed product is converted into orthobromorthoparadinitrophenol. Parabromdiorthonitrophenol is therefore completely converted by the action of heat, and bromine into the isomeric orthobromorthoparadinitrophenol. The same isomeric change takes place under the influence of nitric acid. An acetic acid solution of parabromdiorthonitrophenol, when heated with a few drops of nitric acid at 100° , is completely converted into the isomeric orthobromorthoparadinitrophenol. Experiments were then undertaken with the corresponding chloro-compounds. It was found that chlorine had no action on diorthonitrophenol when dissolved in acetic acid at 100° , even in the presence of iodine. Chlorination, however, takes place when chlorine is passed into a solution of diorthonitrophenol in antimony pentachloride at 105° , and only the normal product parachlorodinitrophenol is formed. *Action of bromine on parachlorodinitrophenol.*—Experiments to ascertain whether isomeric change could be effected by the action of bromine on parachlorodinitrophenol only gave negative results, the normal product, parachlororthobromorthonitrophenol, being obtained in every case. The author considers that in the case of the chlorine compound isomeric change does not take place, because the chlorine is more firmly held than bromine. *Action of sulphuric acid on orthoparadichlorophenol-orthosulphonic acid.*—The combined action of heat and sulphuric acid on orthoparadichlorophenolsulphonic acid gave no indication of any isomeric change taking place, although the reaction was investigated under a great variety of conditions of temperature, &c. The corresponding dibromophenol also gave negative results, but as several secondary reactions set in, such as the formation of tribromophenol, this reaction was not further investigated. *The chlorination and bromination of phenol.*—Phenol when chlorinated in the ordinary manner yields a mixture of para- and ortho-chlorophenol. The author finds that a similar mixture is obtained when SO_2Cl_2 is employed as the chlorinating agent. He has also investigated the action of bromine on phenol under the conditions described by Hübner and Brenken (*Ber.* vi. 170), and finds that the product is practically pure parabromophenol. *The sulphonation of the nitrophenols.*—Orthonitrophenol and paranitrophenol are, according to Armstrong, both readily acted upon by SO_2HCl ; the former yields the well-known sulpho-acid; the latter yields a product which is decomposed by water, and was supposed by Armstrong to be the sulphate, and this the author finds to be the case. The author considers that the initial action in both cases is the same; but that the sulphate formed from orthonitrophenol at once undergoes isomeric change, whereas the sulphate from paranitrophenol is more stable. The author did not succeed in obtaining any sulpho-acid by heating the sulphate from the paranitrophenol at 100° . But he obtained a fair yield of sulpho-acid by heating the nitrophenol with two molecular proportions of SO_2HCl at 100° . Hence, there is little doubt that the paranitrophenol-sulphonic acid is formed by the sulphonation of the sulphate. Metanitrophenol resembles the para-compound in being converted into sulphate, but not into the sulpho-acid even by the action of heat.—Compounds of dextrose with the oxides of nickel, chromium, and iron, by A. C. Chapman. The nickel compound is obtained by adding a solution of nickel hydrate in ammonia to a solution of dextrose in 90 per cent. alcohol. It is a green amorphous substance, insoluble in water and alcohol, of the composition $\text{C}_6\text{H}_{12}\text{O}_6 \cdot 2\text{NiO} + 3\text{H}_2\text{O}$. The chromium compound, which appears to have the composition represented by the formula $\text{C}_6\text{H}_{12}\text{O}_6 \cdot \text{Cr}_2\text{O}_3 + 4\text{H}_2\text{O}$, is prepared by dissolving an excess of dextrose in an aqueous solution of chromic chloride, and pouring this solution into cold strong ammonia. The precipitated hydrate partly dissolves on standing, and on pouring the purple solution so obtained into 90 per cent. alcohol, the chromium dextrosate is obtained as a lilac-coloured precipitate. The iron compound, $2\text{C}_6\text{H}_{12}\text{O}_6 \cdot 3\text{Fe}_2\text{O}_3$