to account for the observed phenomena in a satisfactory manner. As is required by this theory it is found that the addition of neutral acetates to a solution of acetic acid diminishes the antiseptic power of the acid, the concentration of the active component of the solution, the hydrogen ion, being under these circumstances reduced to a much smaller value.

NUMEROUS theories have been put forward at different times to account for the formation of natural paraffins, the one received with most favour being that due to Berthelot and developed by Mendeléeff in which the action of steam upon metallic carbides was regarded as the main source of the hydrocarbons. The chief stumbling block to this view was the difficulty of explaining the mode of formation of the naphthenes of the Russian oilfields. The researches of MM. Paul Sabatier and J. B. Senderens on the action of reduced nickel, iron and other metals upon hydrocarbons have now placed the "chemical" theory of petroleum formation on a firm experimental basis. By the direct hydrogenation of acetylene in the presence of nickel they have obtained liquid mixtures of hydrocarbons which can be made to correspond either with American or Caucasian petroleum by varying the conditions of the experiment. To account for the formation of petroleum it is thus sufficient to admit that there are in the depths of the earth free alkali metals and metallic carbides, which in contact with water give rise to mixtures of hydrogen and hydrocarbons. These gases encounter nickel, cobalt or iron in a finely divided state, and thus give rise to the mixtures of hydrocarbons forming natural petroleum.

THE additions to the Zoological Society's Gardens during the past week include a Bosman's Potto (*Perodicticus potto*) from West Africa, presented by Mr. Edward Straw; three American Bisons (*Bison americanus*) from North America, presented by H.G. the Duke of Bedford, K.G., P.Z.S.; three Darwin's Rheas (*Rhea darwini*) from Patagonia, a Red Ground Dove (*Geotrygon montana*) from South America, presented by Capt. John L. Marx, R.N.; two Garden's Night Herons (*Nycticorax gardeni*) from the Falkland Islands, presented by Mr. W. Grey Wilson, C.M.G.; an Algerian Tortoise (*Testudo ibera*) from North Africa, presented by Master C. Treverlyn Gill; a Silvery Gibbon (*Hylobates leuciscus*) from Java, deposited; six Ruddy Flamingoes (*Phoenicopterus ruber*) from North America, twenty Alpine Newts (*Molge alpestris*), twenty Newts (*Molge montandonii*) from Roumania, purchased; a Thar (*Hemitragus hemlaica*) born in the Gardens.

THE EQUATORIAL CURRENT ON JUPITER.

THAT differences occurred in the rate of motion of different markings on Jupiter was first discovered by Cassini in the seventeenth century. But other observers in later years appear to have neglected the systematic study of the planet. His disc was occasionally surveyed, it is true, and the positions of the belts described, but the details were not perseveringly followed. Telescopes were formerly of inordinate length and not very effective in performance, but what was accomplished by Cassini might also have been achieved by others. Jupiter's dimensions are such that comparatively small and imperfect instruments are capable of revealing the principal markings. Herschel never made a thorough investigation of the Jovian spots, though he obtained some observations in 1779 and recognised the difference in their motions. Until the last half of the nineteenth century the planet seems to have been generally surveyed in a desultory manner.

The apparition of the great red spot, however, revolutionised the existing state of things, for it was destined, not only to attract an immense amount of attention to itself, but to the whole visible phenomena presented by the surface markings of Jupiter. When this remarkable object first became perceptible it is not our purpose to inquire; it is certain, however, that as an exceptionally conspicuous feature it was widely observed during the last half of 1878.

It was long thought that the equatorial region of the planet supplied us with the most swiftly moving objects. This was, however, found to be a mistaken impression. The white and dark equatorial spots completed a rotation in about $5\frac{1}{2}$ minutes less time than the red spot, and this meant a difference of velocity amounting to about 250 miles per hour. But it was soon seen that though the equatorial current is much more rapid than the rate exhibited in certain other latitudes, it does not equal the velocity of some other occasional markings in the northern hemisphere.

It is only our intention, however, to refer briefly to the equatorial markings observed during the last quarter of a century. But it must be confessed that the observations are not nearly so continuous and complete as the importance of the subject demands. The results have been sufficiently full for all purposes during the last few years, for several observers, including Mr. A. S. Williams, Rev. T. E. R. Phillips, Captain P. B. Molesworth and others, have obtained a mass of useful materials with reference to the equatorial current. And there seems no doubt that the investigation will be adequately maintained. It is chiefly to the continuity of the observations that we must look for the satisfactory elucidation of the phenomena presented. The equatorial spots have not, it is true, been always in strong evidence. In certain years they are liable to be almost, if not entirely, absent. The breaks, therefore, which occur amongst the accumulated observations are not always to be ascribed to negligence on the part of Jovian students.

At present the equatorial spots are both numerous and conspicuous, and it is to be hoped that a large addition to our observations will be effected during this opposition. The results for preceding years are very extensive and exhibit an irregular, though on the whole a decided, increase in the rotation period, but it would be premature to undertake the collection and reduction of all the materials. The observations must be prolonged over a much more lengthy interval before they can be expected to reveal the information we require. As observed at Bristol, the equatorial spots have shown the following variations in their rotation period, but satisfactory mean results from a number of different objects were only obtained during the last four oppositions:—

	h.	m.	s.	
1880	9	50	5·8	1 very bright spot
1881	9	50	8·8	,, ,,
1882	9	50	11·4	,, ,,
1883	9	50	12·1	,, ,,
1885	9	50	14·3	,, ,,
1886	9	50	22·8	,, ,,
1895	9	50	34·3	2 black spots
1898	9	50	23·6	23 spots
1899	9	50	24·6	27 ,,
1900	9	50	24·1	18 ,,
1901	9	50	29·1	28 ,,

W. F. DENNING.

GERMAN PROGRESS IN OPTICAL WORK.[1]

I PURPOSE dealing with statistics compiled from information afforded me by two German firms and one Austrian, Messrs. Zeiss, Leitz and Reichert respectively, all of whom are well-known makers of microscopes, and the first named of many other optical instruments, including prismatic field glasses, of which, as is well known to you all, they were the originators. I must say that the figures quoted refer approximately to the end of the year 1899, since which date the average rate of increase has been more than maintained. Taking first the firm of Zeiss, in Jena, twenty years ago they employed fifty men; five years later the number had leaped up to 170, or more than three times as many; in another five years the number had practically been doubled, 327 being the precise number; yet another five years saw the number 580; while to-day (1899) they employ the astonishing number (astonishing, that is, for the class of instruments they manufacture) of 946 men, this grand total being made up as follows: theoretical staff, 22; office and dispatch, 36; mechanics, 322; opticians, 371; wood-workers, leather-

[1] Abridged report of a paper entitled "The Secret of German Progress," read before the Optical Society by Mr. Herbert F. Angus, Hon. Sec. of the Educational Committee of the Society.

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