We might expect, if there really is a behaviour of sun-spots depending upon the position of Venus, and of the nature herein stated, that the average area of a spot as it passes the central longitude of the disc ought to be greatest when Venus is 180° from the earth, and least when Venus and the earth are together, and the same ought to hold for Mercury and for Jupiter, if these planets have any influence. Taking the mean of the four central

TABLE V

Longitude.	Venus (whole series).	Venus (Carrington's series).	Venus (Kew series).	Mercury (whole series).
°	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)
—49	+40+48—18—118	+ 8+30—10—160	+117+58—27—46	+28+45—50—12
—35	+21+46—20— 82	+ 9+24— 5— 95	+ 47+58—39—59	+21+ 6— 6—26
—21	— 3+39—13— 43	+ 1+24+10— 37	— 16+45—38—52	— 6—12+36—34
— 7	—31+17+15— 3	—12+16+36+ 16	— 74+13— 9—36	—33—16+60—28
+ 7	—50—14+49+ 29	—23+ 2+53+ 58	—113—29+45—20	—40—18+63— 9
+21	—46—40+60+ 53	—15—20+46+ 82	—119—57+77+ 4	—28—20+43+19
+35	—25—50+34+ 76	+ 4—45+13+100	— 91—56+59+36	— 1—28+ 7+36
+49	+ 7—50—22+105	+14—50—40+118	— 9—44+ 1+82	+19—27—27+32

areas as giving the best value of the araea of a spot its passes the centre, we have for Venus the following results :—

Mean of 4 central areas,

(A)	(B)	(C)	(D)
44741	57426	46068	33095

and the number of groups for these are as follows :—

229	265	150	181

hence the mean area of one group will be,—

195	217	307	183

from which we get (A)=195 ; mean of (B) and (D)=200 ; (C) = 307 ; that is to say, A is least, and C is greatest.

Doing the same in the case of Mercury, we get

(A) = 204 ; mean of (B) and (D) = 217 ; (C) = 246 ;

and finally, doing the same in the case of Jupiter, we get

(A) = 185 ; mean of (B) and (D) = 207 ; (C) = 282 ;

it thus appears that in all these cases the same order is preserved.

13. We leave it to others to remark upon the nature and strength of the evidence now deduced as to a connection of some sort between the behaviour of sun-spots and the positions of the planets Venus and Mercury. We think, however, it must be allowed, that the investigation is one of interest and importance, and we trust that arrangements may be made for the systematic continuance of solar observations in such localities as will ensure to us a daily picture of the sun's disc.

The influence of blank days in diminishing the value of a series of sun-observations is very manifest. We have been able to record the behaviour across the sun's disc of 421 groups of Carrington's series for a total number of 885 groups, and we have been able to record the same behaviour for 373 out of 544 groups observed at Kew. Thus, out of a total of 1,429 groups, we have only been able to record the behaviour of 794. Nor are the records which we have obtained so perfect as we could wish, on account of blank days, which make interpolations necessary. It is therefore of much importance for the future of such researches as the present that there should be several observing-stations so placed that we may reckon on having at least a daily picture of the sun's disc.

It will be easily seen that such observations are very different from experiments which may be multiplied *ad libitum* ; for in this case Nature gives us in a year or in ten years a certain amount of information, and no more ; while it depends upon ourselves to make a good use of the information which she affords.

It is already universally acknowledged that we ought to make the best possible use of the few precious moments of a total eclipse ; but such observations must necessarily be incomplete unless they are followed up by the equally important if more laborious task of recording the sun's surface from day to day.

RHINOCEROSES

THE few species of Rhinoceros which now exist on the world's surface are divisible into two distinct groups, one of which inhabits Africa, the other certain portions of Asia. The Asiatic rhinoceroses are readily distinguishable from their Æthiopian brethren by the presence of incisor teeth throughout life, and by the remarkable folds of the skin. In the African rhinoceroses the incisor teeth are absent, or rather never cut the gums, and the skin is smooth, or, at all events presents scarcely any appearance of the peculiar folds which distinguish the Asiatic species.

Commencing with the Asiatic group, the great Indian rhinoceros (*Rhinoceros unicornis*) is the largest, oldest, and best known species. Of this animal the Zoological Society's Collection contains two adult specimens—a female, purchased in 1850, and a male, presented by Mr Grote in 1864. But long before the arrival of these animals the large Indian rhinoceros was represented in the Society's Collection by a specimen which died in 1849, and which formed one of the subjects of Prof. Owen's elaborate memoir upon the anatomy of this animal, published in the Society's "Transactions," vol. iv., p. 31.

The habitat of the large Indian rhinoceros is the wooded district called the Terai, which lies along the foot of the Himalayas from Nepaul to Bhotan, and thence extends into Assam.

The Sondaic rhinoceros (*Rhinoceros sondaicus*) appears to be very like its larger brother in general conformation, having but one horn on its nose, and the same complicated folds of the skin. It is, however, much smaller in size, and, according to the best authorities, presents certain well-marked cranial characters, which render it easily distinguishable. This rhinoceros was, until recently, supposed to be confined to Java, Sumatra, and Borneo, in which latter island, however, its existence in the present epoch is somewhat problematical.*

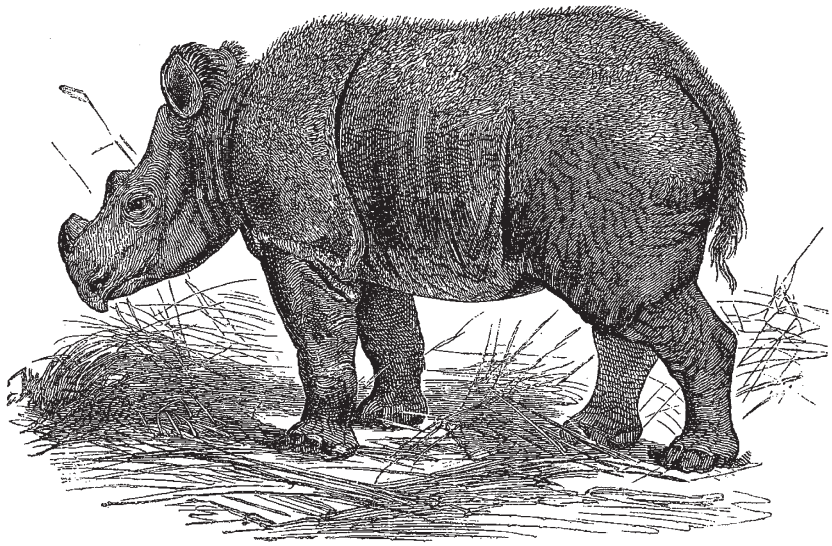
Mr. Blyth, however, has recently shown that the one-horned rhinoceros of the Malay peninsula is in all probability referable to this species, and that the rhinoceros which occurs in the Sunderbunds of Bengal is most likely the same animal.

Of the Sondaic rhinoceros, the Zoological Society has

* See Busk in Proc. Zool. Soc. 1869, p. 429, and Fraser, *ibid.*, p. 29.

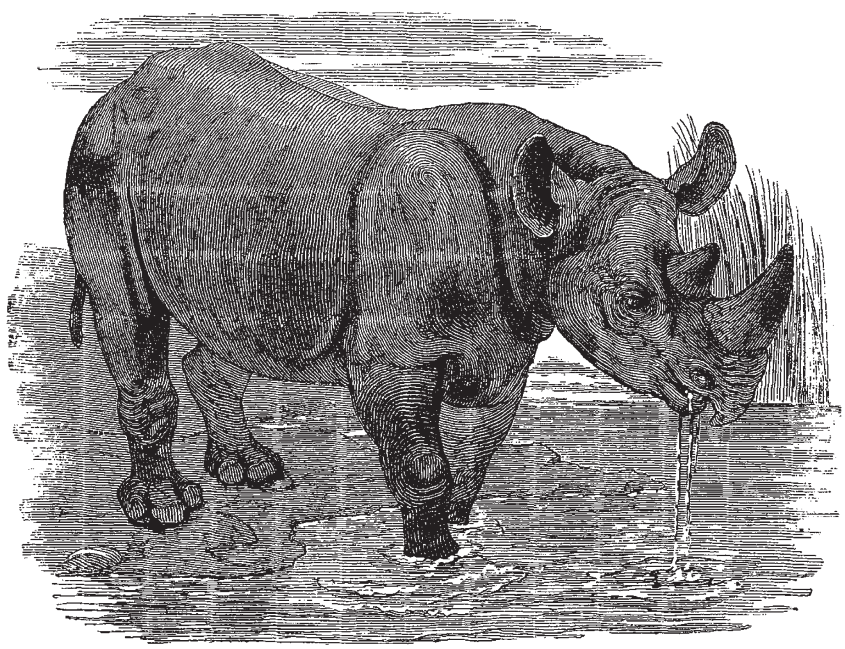
not yet succeeded in obtaining a specimen, and I am not aware that the animal has ever been brought alive to Europe. It would be of great interest to place a living example of this species by the side of its larger ally in the Regent's Park.

The third Asiatic species of rhinoceros is a very different looking animal from the two previously mentioned, having two horns on its forehead, the smaller of which is situated just above the eye, and the other still farther forward. Its body is, moreover, covered with bristly



SUMATRAN RHINOCEROS

hairs, and there is only one strong, well-marked cutaneous fold of skin on the back, which renders it very unlike its mailed brethren. This animal was until lately supposed to be only found in the Island of Sumatra. Cuvier called it *Rhinoceros sumatrensis* from this circumstance; and our countryman, Sir Stamford Raffles, who obtained it in that island about the same period, likewise proposed to name it after the country to which he believed it to be



AFRICAN BLACK RHINOCEROS

confined. It has, however, been recently discovered that the Sumatran rhinoceros extends northwards along the whole range of the Malay peninsula, at least as far as Chittagong. The fine female specimen of this rhinoceros now in the Gardens of the Zoological Society of London was captured a little way south of Chittagong about four years ago. At the time of its capture, it is said to have been quite young, perhaps two years old. Now, however, it is about four and a half feet high, and has probably nearly attained its adult stature; this species being the

smallest of existing rhinoceroses. Singularly enough, at the time this animal was on its way to England, a second specimen of the same species was received by the Zoological Society of Hamburg, and is now living in their gardens in that city. The Hamburg animal is likewise a female, and is said by those who have examined both individuals, to agree in nearly every particular with that belonging to the Zoological Society of London, but to be about one-third smaller.

It must be observed, that although the Sumatran rhinoceros has two horns, it is by no means nearly related to the African two-horned rhinoceros, but has the incisor teeth and other cranial characters of the Indian division of the group.

Of the African rhinoceroses, which constitute the second division of the genus as explained above, many nominal species have been made by naturalists who delight in conferring names upon fragments of horns, and imperfect skulls; but we have not as yet certain evidence of the existence of more than two species, commonly known as the Black rhinoceros and the White rhinoceros.

The Black rhinoceros (*Rhinoceros bicornis* of Linnæus) has its upper lip long and prehensile. This organ, in fact, forms almost a short proboscis, well fitted for grasping the small branches of trees, upon which it principally subsists. The two horns are not very different in size and length, although the front one is usually longest. The Black rhinoceros is found in Eastern Africa, as well as in the interior of the Cape Colony. In his well-known work on the Nile tributaries of Abyssinia, Sir Samuel Baker describes it as being not unfrequently met with in Upper Nubia. The young male example of this animal obtained by the Zoological Society in September 1868, was captured in this district by the Hamram Arabs, of whose prowess Sir Samuel Baker tells us such wonderful stories. A living example of the African Black rhinoceros has been since added to the collection of the Zoological Society of Berlin; but these two specimens are, we believe, the only individuals of this species that have been brought to Europe, since the days when rhinoceroses were exhibited and slain in the Roman amphitheatres.

The White African rhinoceros is immediately distinguishable from its black brother, apart from the difference in the colour of its skin, by its short upper lip, whence Dr. Burchell, the first scientific traveller who met with it, proposed to call it *Rhinoceros simus*. It is a grazing animal, feeding chiefly upon grass, and inhabits more open districts than *R. bicornis*. But the most noticeable distinction of the White rhinoceros is the enormous length of the front horn, which in old individuals reaches to three and a half, or even four feet in length, and, after sloping forwards, curves gently backwards towards the summit. The hinder horn, on the contrary, always remains small, and slightly developed. The range of the White rhinoceros in Africa is not very perfectly known. From the inner parts of the Cape Colony it extends probably on to the Zambesi and its affluents. How much farther northwards it may go is uncertain; but, according to Sir Samuel Baker, it is not known in Upper Nubia, where the Black rhinoceros is the only species met with.

No specimen of the African White rhinoceros has yet been brought to Europe, and few additions could be made to the collection of the Zoological Society of London, which would be more acceptable than a young male of this rare and curious animal. P. L. S.

SCIENCE IN THE NAVY

IT is with great satisfaction that we learn, from a speech made by Mr. Goschen in the House of Commons last week, that the Government proposes a vote of 2,000*l.* to Mr. Archibald Smith, Q.C., for great services rendered by him to the Admiralty, not in his professional capacity, but as a man of science whose researches into matters connected with magnetism had been of great service to the Navy and the country. This grant was not proposed as a compensation for Mr. Smith's very laborious services, but as a small mark of the high appreciation the Government had of his eminent scientific services. There was another increase proposed also in aid of the expedition about to be organised under the auspices of the Royal Society to make researches into the depth, temperature, composition, circulation, and distribution of animal life in the Atlantic, Indian, and Pacific Oceans. The total cost to the country, supposing the inquiry to extend over two and a half years, would be about 25,000*l.*, a sum which would not be grudgingly paid in order to secure a vast amount of important scientific knowledge.

The following announcement, with respect to the education of naval officers, will be welcomed with great satisfaction by the scientific public generally:—

"It was proposed that cadets should first go for two years to a Naval College, to master some of the rudiments of their profession, cruisers being attached, so that they might begin to go to sea. At the expiration of or within twelve months they would go out in a seagoing man-of-war, with naval instructors, when they would have for three years a much better education than they now obtain, the same amount of sailoring experience being retained. It would then be desirable that they should have six months' teaching preliminary to their examination, when many young officers would ascertain which way their bent lay, and whether they should apply themselves to higher courses of study, for which arrangements could be made, but which would not be entered upon till they had passed the lieutenant's examination. . . The question that the Government had before them in reference to this subject was how to unite in one establishment all the various branches of naval study which were at present taught in the Royal Naval College at Portsmouth, and in the Naval School of Architecture at South Kensington. At present the Royal Naval College conducted their examinations themselves—that is to say, they first taught and then examined, which was not at all a desirable state of things. It was now proposed to combine the scheme which he had described as regarded the education of the young officers with one for the education of the commissioned officer, and also to make better arrangements for the education of the Engineer and Marine officers. In order to carry out these objects it was proposed to found a Royal Naval College at Greenwich, where all branches of a general naval education would be taught, and to do so upon a scale which would be calculated greatly to raise the tone of our naval officers. In the first place there would be received in the College sub-lieutenants, who would be kept there for six months before their passing their general examination, and also naval officers. It was proposed that after the sub-lieutenants had passed their examinations and had been a short time at sea, those who chose to avail themselves of it should have an opportunity accorded to them of pursuing a higher course of study, of which half-pay officers might also avail themselves, and the establishment being so near London they should be able to offer a better course of study, under more able professors, than would be possible to give at Portsmouth. But, in addition to thus offering an education of this description to the young and to the commissioned officers who now went to Portsmouth, they trusted to be able to make arrangements with regard to the education of Engineer officers. At present these latter officers were all brought up in our own yards, which they entered at about fifteen or sixteen years of age, and in which they remained for four or six years as Engineering apprentices, and at the end of the fourth year three were selected to go to the School of Naval