

greatest effect observable in the differences of the earth's magnetism?

Third: Are the sun-spots caused by clouds or curtains outside, and hiding the apparent surface of the sun, or are they deep cavities through the same? STEPHEN W. ALLEN
Boston, U.S.A., March 27

Metachromism

I REFRAIN from replying to Mr. Petrie's second letter (p. 426) until after the appearance of the article to which Mr. Costerus refers (p. 427) on "Organic Colour Change."

In defence of Miller, however, I would just add that on p. 298, vol. ii. (fifth edition), occur the following words:—"The sodic dioxide, Na₂O₂, obtained by igniting sodium in oxygen is of a pure white colour." WM. ACKROYD
Royal Coll. of Chemistry, South Ken'ington, April 3

Dr. Klein on the Small-pox of Sheep

I WRITE this note in order to inform you that, my attention having been directed to some alleged fallacies in some of my observations regarding the small-pox of sheep, I am at present engaged in reinvestigating the subject. E. KLEIN
The Brown Institution, April 11

OUR ASTRONOMICAL COLUMN

OLBERS' SUPPOSED VARIABLE STAR NEAR 53 VIRGINIS.—The only comet detected in the year 1796 was found by Olbers in Virgo on the night of March 31. On the following evening, at 8h. 55m., apparent time at Bremen, it was over a star of the seventh magnitude south—following 53 Virginis, and the light of the star was remarked to be little affected by the intervention of the comet. On March 1, 1797, desiring to fix more exactly the place of this star, Olbers found in its position one of only the tenth or eleventh magnitude, whereas in April previous, according to Schreeter, who appears to have compared the comet with it early on the morning of April 2, it was the brightest star in the immediate neighbourhood of 53 Virginis, and hence in Olbers' judgment "a seventh magnitude at least." Writing to Bode in March 1797 he directs attention to this star, as perhaps a more remarkable variable star than even χ Cygni. The circumstances preclude suspicion of a similar phenomenon to that described by Piazzi when the great comet of 1811 passed over his star XX. 197.

From the positions of the supposed variable, and its neighbours given by Olbers (who also appends a diagram), it is evident that his star, which followed 53 Virginis 30' 55" in R.A., 20' 45" to the south, is No. 12,728 of Oeltzen's Argelander, a star observed 1851, April 24, and noted of the eighth magnitude. For 1876^o its place is in R.A. 13h. 7m. 32s., and N.P.D. 105° 53' 7".

Approximate mean places for 1797, March 1, of several stars with which Olbers compared the one in question were:—

	Olbers' Magnitude.	R.A.	N.P.D.
(c)	9	194 40	106 6
(a)	7	194 44	105 24
(d)	11	196 15	105 11

The star (c) is Lalande 24,421, called by him 8½; (d) is L. 24,597, noted 9; but the star (a) is not found either in Lalande or Argelander. Its position in Olbers' diagram corresponds to the place above assigned. What is its present magnitude, or is there some mistake about its position?

On April 1, 1796, the supposed variable was considerably brighter than the star (a), according to Olbers; in March 1797, much fainter than (c) and only slightly brighter than (d); he remarked no change in March, April, and May. Bode says, on April 24 and May 12 and 20 of the same year he saw it as a 9th. In March 1855 it was fully eighth magnitude or 7th.

THE APRIL METEORS.—As the moon will be absent during the nights of the 19th and 20th of the present month, a watch may be advantageously kept for meteors which are supposed to move in the path of the first comet of 1861 discovered by Mr. Thatcher, of New York, on April 4. At the descending node this comet makes a remarkably close approach to the earth's annual track, the definitive orbit calculated by Prof. Oppöizer, showing that at this point the distance between the two orbits is only 0^o00232 of the earth's mean distance from the sun, or 214,000 miles; less, therefore, than the moon's mean distance from the earth. The elements are elliptical with a revolution of 415 years, and this form of orbit we may assume with much probability to have been occasioned by a near approach of the comet to the earth at some distant epoch. The descending node is passed 22½ days before perihelion passage, and to bring the comet into closest possible proximity to our globe, it is necessary that the perihelion point should be passed on May 12. Had this been the case in 1861, the comet would have occupied the following positions on its descent towards the plane of the ecliptic:—

	R.A.	N.P.D.	Distance from earth.
March 24 ^o ...	269 ^o 2	57 ^o 4	0 ^o 700
April 1 ^o ...	270 ^o 3	57 ^o 0	0 ^o 494
" 9 ^o ...	271 ^o 3	57 ^o 1	0 ^o 281
" 17 ^o ...	285 ^o 2	59 ^o 4	0 ^o 065

The true dimensions of the orbit of this comet will be defined by the following numbers, which are in units of the earth's mean distance from the sun.

Semi-axis major	55 ^o 676
Semi-axis minor	10 ^o 083
Semi-parameter	1 ^o 826
Perihelion distance	0 ^o 921
Aphelion distance	110 ^o 430

PROF. HUXLEY'S LECTURES ON THE EVIDENCE AS TO THE ORIGIN OF EXISTING VERTEBRATE ANIMALS¹

IV.

THE crocodiles form the highest group of existing reptiles; they are higher than lizards as a steam-vessel is higher than a sailing-ship; for, while built essentially on the same lines, and exhibiting altogether the same fundamental structure, they are in some respects peculiarly modified, and that always in the direction of greater complexity.

Besides the characters of the skull mentioned in the last lecture, they are distinguished from lizards by having a four-chambered heart, one in which the separation of the ventricle into two distinct cavities is completed, so that, in the heart itself, the blood from the lungs is kept separate from that returned from the body generally. A mixture, however, takes place subsequently, through an aperture between the two aortæ, one of which springs from each ventricle.

Crocodiles are found in Central America, India, Africa, and Australia. Of the many species, the greater number are short-snouted; the fish-eating Gavial of the Ganges, on the other hand, has an extremely long and narrow snout.

All the existing crocodiles are fresh-water or estuarine animals, but, fortunately, this was not the case with the ancient forms, many of which were exclusively marine, seeming, so to say, to take the place, in the sea of their own epoch, of our porpoises and dolphins.

Besides Tertiary species, crocodiles are found in the Chalk, Oolite, Lias, and Trias often in the best possible state of preservation; they therefore extend back to the very commencement of the Mesozoic epoch.

¹ A course of six lectures to working men, delivered in the theatre of the Royal School of Mines. Lecture IV., March 20. Continued from p. 430.