disease, as the air penetrates more freely into the earth, and the moisture passes off more freely. No one seems to know exactly where the disease came from when it so suddenly appeared in the Isle of Wight in 1844, all we know is that it there appeared and that it spread very rapidly.

It may be that the *P. infestans* is a descendant of a fossil species *Peronosporites antiquarius* found amongst the vascular bundles of a Lepidodendron from the coal measures, figured and described in Science Gossip, Vol. XIII., p. 270. It appears that the ovarian sacs visible in that fossil plant contain zoospores as well defined as any to be obtained on living plants, the septate mycelium being equally distinct. The only difference appears to be that the host was not a potato plant; the genus *Peronospora* is not however confined to solanacious plants. The eighteen at present known species of Peronospora attack parsnips, peas, onions, spinach, lettuce, clover, nettles, anemones, poppies, roses, docks, etc., but apparently not in such a destructive manner as *P. infestans* does with potatoes.

THE OCCULTATION OF JUPITER.

By A. B. Biggs.

Read 16*th April*, 1886.

As the visibility of an occultation, like that of a solar eclipse, depends upon the position of the observer, the chance of such an event being visible in any particular locality is rather scanty. On looking down the list of southern occultations of Jupiter for the current year, I saw there were three that came temptingly near us. On working these out, I found that one, that of 16th of April, was in a most favourable position for observation, being near the meridian; but, to my disappointment, that those for March 20th, and May 13th, would be just missed by us; the former being over just before the moon would rise, and the latter commencing just after setting. On 20th March, I had both bodies in the same field of the telescope at rising, the moon having passed the planet.

With regard to the occultation of 16th April, I regret much that, through my not having taken the precaution of obtaining assistance to record notes, and being flurried by the clatter caused by a boisterous wind upon my iron roof, I was not able

to obtain more than half the result I had hoped for. A few thin clouds, moreover, interfered materially with the observations.

The satellites were disposed two on each side the planet. I missed all the contacts of the satellites, except those of the third (in order), which I got, both at immersion and emersion. I also missed the first contact of the planet.

I timed the observations by the sidereal clock, afterwards reducing to local mean time. I may here explain that my clock is with my smaller telescope in the adjoining grounds (Mr. Pullen's garden). I get the time from it to the large telescope by an electric line communicating motion each minute to the hands of a dial, and the clock beats (seconds) I get by telephone. This is just where the trouble came in; the clatter of the wind interfering with my keeping correct count. The times recorded, however, I obtained with certainty, and fair accuracy, as follows:—

	hrs.	min.	sec.
1st Contact of planet (missed)			
2nd Contact (or total disappearance)...	9	25	27·8
3rd Satellite disappeared at	9	33	37·6
At re-appearance—			
The planet just peeped out at	10	2	49·8
And emerged entirely at	10	6	23·2
Third satellite re-appeared	10	14	14

As seen in the 8½in. reflector (power 200, full aperture), the phenomenon furnished a most interesting exhibition. To watch the beautiful markings of the planet gradually disappearing behind the dark limb of the moon, and the extinction of the satellites one by one, and still more, the re-appearance in the same order, was almost enough to distract the attention from the sterner details of minutes and seconds.

Whilst in close proximity, and especially at re-appearance, I carefully studied the relative luminosity of the moon and planet, especially with reference to the question of the planet's being in any degree *self-luminous*. I here became aware of my mistake in having omitted to provide some means of photometry. However, as an eye estimate, I was struck with the apparent *smallness of the difference* in the luminosity of the two bodies, as compared with their vastdifferenceof distance from the sun. Considering that the sun's disc, from the distance of Jupiter, compared with the same as viewed from the moon (or earth), would appear only as about 1 to 25 in surface, I could not but feel impressed with the fact, that the brightness of the planet was out of all proportion to the relative amount of light received by him from the sun. As compared with the lunar surface, it appeared as if the shadow of a thin cloud were cast upon the planet. Still, as against the theory of the planet's being self-luminous by his own glowing heat (as has

been suggested), stands the fact, that the luminosity of the satellites compare about equally with that of the planet. We can hardly imagine these comparatively small bodies to retain any sensible amount of their supposed original incandescence. They may, however, receive a considerable amount of light from the planet itself. This question is one of great interest, and should be investigated, as it probably will be, on a more accurate and scientific basis.

"IS JUPITER SELF-LUMINOUS?"

By A. B. Biggs.

It is with some diffidence that I submit the following paper, partly because I am doubtful of its being a subject of general interest, and partly from a consciousness that the experiments in the course of my investigation of the subject did not attain the degree of accuracy which I had hoped for. Perhaps, however, the fact that the question which I set myself to solve is intimately connected with that of the physical condition of Jupiter, and inferentially also of all the giant planets may lend an interest to the subject.

In the concluding part of my paper on the occultation of Jupiter in April last (read 8th June), I referred to the question of Jupiter's intrinsic brilliancy, and expressed the hope that the question would be scientifically investigated. In order to clear the way, I will first state the case. Jupiter is, roughly speaking, about five times the earth's distance from the sun. It is impossible, therefore, that he can receive from that luminary more than $\frac{1}{25}$ (one twenty-fifth) part of the intensity of illumination which reaches the earth; that is, in inverse proportion to the squares of the distances. Now, from the time of my first telescopic acquaintance with Jupiter, I was struck with the impression that his brightness far exceeds what, by the above rule, it ought to be. The question naturally arises, how is this want of accordance with the laws of radiation to be accounted for, presuming it to exist? Some modern astronomical works just refer to this question, but as a rule they pass it over lightly.

Chamber's Astromony devotes but one short paragraph to the question, from which I quote as follows:—"Bond computed that Jupiter actually emits more light than it receives (!); but whether we accept this problematical result, or the more trustworthy one obtained by Zölner, strong indications of inherent luminosity in Jupiter seem to exist; and this points to the conclusion that this planet is itself a *miniature Sun.*" Professor Newcomb says:—"A still more remarkable resemblance to the sun has sometimes been