

similar universes, by coalescing, to become one, which, when contracted to the size of either of its components, may retain no more matter than one of the original universes.

105. We have in these phenomena a complex series of agencies tending to overcome the dissipation of energy and the aggregation of matter. Impact develops heat, separates bodies, and diffuses gas. Radiation falls on the matter of space and heats it: this energy is taken up by the hydrogen to increase its velocity. As the hydrogen loses this new velocity it is carried to positions of higher potential. It will tend to linger in the empty parts of space, and it then becomes a trap for wandering bodies. These wandering bodies are separated from systems by the mutual interaction of three bodies.

106. Thus, in opposition to the theory of the dissipation of energy, there is seen to be the possibility of an immortal cosmos, in which we have neither evidence of a beginning nor promise of an end.

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ART. LXIV.—*On an Oversight in Croll's Mode of lengthening the Age of the Sun's Heat.*

By PROFESSOR BICKERTON.

[*Read before the Philosophical Institute of Canterbury, 3rd October, 1894.*]

DR. CROLL has suggested that the age of the sun's heat may be indefinitely lengthened if we assume the collision of two bodies with a high velocity. He says that if two bodies, each with a velocity of 478 miles a second, were to come into collision they would develop heat enough to last fifty million years. Doubtless his figures are correct; but the explanation is not sufficient. Such an impact would result in a nebula of the character I have described as producing a temporary star. When the two bodies collide the molecular heat-motion would be approximately equal to the velocity of the masses, and, disregarding "selective escape," each particle would move so fast that on its coming to the surface every one would leave on a journey never to return; and, in fact, a calculation shows that they would have a final velocity in space of over 300 miles a second. So that this method of accounting for the sun's heat contains a fallacy. In addition to this it has two essential elements of improbability—namely, the high initial velocity, and the improbability of complete impact.

Practically, then, Dr. Croll has not lengthened out the age of the sun's heat beyond that given by Sir William Thomson's calculation: his suggestion would make a temporary star, not a sun.

Still, there are many ways to account for an increase of the age of solar heat. As Proctor has pointed out, the sun may have a very dense interior: this would indefinitely lengthen out its age. And the rate of solar radiation might have been much less when the sun was larger and cooler than it is at present. It is impossible to say how far an absorbent atmosphere may retard the radiation.

I have pointed out this error because it was first stated in "Climate and Time," and after nearly a score of years it was again printed as the essential idea contained in Croll's book on stellar evolution.

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ART. LXV.—*Notes on a Visit to Macquarie Island.*

By A. HAMILTON.

[*Read before the Otago Institute, 13th November, 1894.*]

Platè L.

IN the early part of 1894 I endeavoured to make arrangements to go down to Macquarie Island, for the purpose of studying the plants and the general natural history of that remote speck in the southern ocean. I also desired, if possible, to obtain a specimen of the skeleton of the great sea-elephant for the University Museum. There is a good stuffed skin in the collection, but there is no perfect skeleton of an adult male in the museums of the Australasian Colonies. Professor Scott, who visited Macquarie Island in 1880, brought back a good skeleton of a female sea-elephant, which is now in the Medical Museum of the University of Otago. I had several interviews with Mr. Hatch, of Invercargill, the owner of the ketch which is the sole means of communicating with the island, with a view to arranging for a passage; but his demands were quite beyond my means, and I had to abandon the project on the lines I had originally intended. I then suggested that Professor Parker, the Director of the University Museum, should get up an expedition, and if the necessary funds for my passage could be found I should be very glad to volunteer my services as an extra collector. With the help of some gentlemen who kindly assisted the professor by guaranteeing the necessary funds, arrangements were made with Mr.