

*Handy Atlas of Modern Geography.* (London: Edward Stanford, 1892.)

It would be difficult to obtain a small atlas more complete than this. Every place of any importance appears to be represented on one or more of the thirty coloured maps. The degrees of latitude and longitude are subdivided into parts of five minutes each, so that the positions of places, the names of which are not engraved, can be easily and accurately located by reference to the alphabetical list at the end. This list is a comprehensive one. It gives the latitude and longitude of the principal mountains, rivers, capes, bays, islands, towns, and villages, and forms an excellent supplement to a very good atlas.

#### LETTERS TO THE EDITOR.

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##### Aurora.

A VERY brilliant display of aurora was seen here last night, the 25th inst. At about 9.25 p.m. a number of red streamers proceeded from a length of some  $110^\circ$  in azimuth along the northern horizon, and extended upwards for (on an average)  $30^\circ$ . The length of the streamers varied quickly, sometimes shooting upwards for  $70^\circ$  from the horizon. In the course of five minutes the red streamers gave way to white or yellowish white ones, narrower and more sharply defined than the red ones. At 9.40 p.m. there was a decrease in the brilliancy of the phenomenon, but at 9.45 p.m. long red streamers again appeared for a few minutes, which again shortly gave way to a brightness of the horizon only. Close to the horizon the colour was white, or nearly so, the whole time. The apparent point of convergence of the streamers was far south of the zenith, say  $30^\circ$ .

GEO. M. SEABROKE.

Temple Observatory, Rugby, April 26.

PROBABLY many of your readers witnessed the brilliant display of the northern lights between nine and twelve o'clock last night, the 25th, but it may be as well to call attention to it, as being the finest display seen here for many years. Appearing soon after nine o'clock, the luminous arc and the radiating beams, sometimes rose and orange coloured, presented a varied and beautiful spectacle until close upon midnight, when they faded away.

The most noteworthy features of this display were the vividness and height of the arc, which reached an angle of about  $13^\circ$  above the horizon, whilst the beams were visible up to  $51^\circ$ . The whole expanse of the arc from east to west was about  $93^\circ$ , and the duration of the phenomenon a little under three hours.

ARTHUR MARSHALL.

Cauldon Place, Long Row, Nottingham.

A FAIRLY distinct aurora was visible here on the northern horizon last night. I first observed it at 9.15, when the streamers appeared somewhat less bright than the Milky Way. Ten minutes later one streamer, about  $15^\circ$  west of north, brightened considerably, and appeared of a pale reddish-yellow tint. It fluctuated in intensity, and soon became less bright. The streamers, which inclined slightly to the west of the vertical, extended to about  $30^\circ$  to  $40^\circ$  above the horizon.

I watched them till 9.50, when they seemed fading in intensity, and when I looked again at 10.30 they had disappeared entirely.

ARTHUR E. BROWN.

Thought Cot, Brentwood, April 26.

##### Pigments of Lepidoptera.

THE appearance of Mr. F. Gowland Hopkins's letter on this subject in the last issue of NATURE (p. 581) demands a brief explanation from me—although it is not easy to reply satisfactorily within narrow limits—and the more so since Mr. Hopkins appears to have somewhat misunderstood my standpoint.

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Let me first acknowledge the courteous tone of Mr. Hopkins's letter, and express my sense of the value to myself of criticism from his pen, and the more so since I have been labouring under the disadvantage of being practically entirely uncriticized so far—a disadvantage that I have not failed to appreciate.

Now, Mr. Hopkins remarks: "Mr. Coste's experiments are very useful as forming a method of classifying these pigments; but . . . they are of far too empirical a nature for any considerations as to the constitution of the bodies to be based upon them."

Here it is that Mr. Hopkins appears to have missed the point of my work. If he will do me the favour to refer to the detailed account of my experiments in the *Entomologist*, *passim*, I think that he will find it tolerably clearly emphasized that my interest in this work, so far, has been almost entirely *biological*. I stated expressly in my opening article that my object had been to discover, if possible, the genealogies of the colours, and to obtain evidence (so far as coloric characters could afford it) of the phylogenetic relations of allied species: and I may perhaps add that the results obtained have enabled me to predict several varieties of whose occurrence in the natural state I have since been informed. So that Mr. Hopkins is mildly reproaching me because my work does not tend in a direction at which it was not originally aimed, while he is at the same time good enough to admit that it is of some use for the end at which it was aimed.

However, it was only to be anticipated that one could not go very far without becoming involved in the further question as to the constitution of the pigments; but here I was met by three considerations. In the first place, I was anxious to obtain first of all as much as possible of what Mr. Hopkins designates "empirical" evidence as to the reactions and classification of the pigments before making any researches at all into their constitution; secondly, the amount of material at my command was far too scanty for any even approximate analysis; and in the third place, shortly after my experiments had been commenced, my attention was drawn to an abstract of a paper by Mr. Hopkins on the constitution of the yellow pigments. Finding that he was already in possession of the field here, I felt almost bound to leave this part of the subject alone, at least for the present; and I think that I may say that I have on the whole taken exaggerated care not to extend my experiments into that quarter where Mr. Hopkins was engaged, or to avail myself of the discoveries that he had already made, in order to trespass on his investigations. Putting aside my provisional suggestions as to the nature of the "reversion effect," it has only been at a comparatively recent stage of my work, and in consequence of experiments that have not yet been published, that I have at all turned my attention to the constitution of the pigments; these results being such as would have compelled me to consider the question even had I heard nothing of Mr. Hopkins's work. I hope that this explanation will put me right in Mr. Hopkins's eyes, and will satisfy him that he has considerably misunderstood the spirit of "some remarks [perhaps clumsily expressed by me] made at the close of the last article"; and that it will also satisfy him as to the question of priority. I had no thought of questioning Mr. Hopkins's priority in his own work, and the less so since I have throughout been under the impression that we were working mainly on different—though sometimes adjacent—lines.

I must not so far trespass upon your space as to criticize Mr. Hopkins's criticisms upon the "reversion effect"; but I will ask him kindly to examine the detailed accounts of the "reversion" experiments which I gave in the *Entomologist*, since his remarks appear to me somewhat to ignore the evidence there brought forward: and at the same time I may remark that his statements as to the constitution of the *yellow* pigments appear to me hardly to invalidate, but rather indirectly to confirm, the suggestions made by me as to the reversion reaction with *red* pigments. The new information that Mr. Hopkins promises in his closing paragraph I shall look forward to with great interest.

April 22.

F. H. PERRY COSTE.

I WAS about to pen some remarks on Mr. Perry Coste's recent articles on this subject, when a letter from Mr. Gowland Hopkins in the last number of NATURE (p. 581) expressed substantially the same views as those which I had arrived at. I write now rather to support Mr. Hopkins in his strictures than to offer any fresh criticisms of my own. The articles on "Insect Colours" published in these columns are, as the author