

the concentration of radiant heat, as in the beautiful experiments described by Dr. Tyndall in the commencement of his paper, will rise very considerably in temperature, while the vesicles enlarge under the continued influence of the heat received by radiation through the cooler enveloping ice and through the fluid medium (air and a watery film, or water) touching it all round, which is necessarily at 0° Cent. where it touches the solid.

I find I have not time to execute my intention of sending you to-day a physical explanation of the blue veins of glaciers which occurred to me last May, but I hope to be able to send it in a short time.

WILLIAM THOMSON.

Jan. 21, 1858.

II. "On the Practical Use of the Aneroid Barometer as an Orometer." By Captain W. S. MOORSOM, Member of the Institution of Civil Engineers. Communicated by P. W. BARLOW, Esq. Received January 28, 1858.

A Government Commission to Ceylon in the beginning of 1857, led the author, as Chief Engineer in charge of the Expedition, to provide (among other instruments) some aneroids, as a means of saving time in ascertaining the levels of the mountain passes of that Island. The aneroids offered by makers did not appear sufficiently graduated to admit of minute observation, and at the author's suggestion Messrs. Elliott furnished a more complete vernier, which, however, was shown to be susceptible of material improvement.

With these comparatively imperfect instruments, it was shown that an elevation of 950 feet may be taken to correspond with the fall through the first inch of the aneroid; that about 970 feet more corresponds with the fall through the second inch, and about 1000 feet corresponds with the fall through the third inch. These altitudes having been checked by levels taken with the ordinary surveyor's spirit-level, it was shown that this experience corresponds with the Tables published by M. Bellville, within 1 per cent.

The thermometer, which is usually attached to the aneroid, is not a necessary adjunct, but is frequently useful, and always interesting. The compensations introduced to provide against variations of tempe-

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ture, as affecting the results given by the instrument, were shown to be effectual without the aid of the thermometer.

The difficulties to be contended with in taking accurate observations were shown to be local variation, diurnal variation, and some irregularity in the action of the mechanical parts of the instrument itself. These difficulties were examined *seriatim*, and modes of approaching to their corrections were explained. The modes of compensation for variations of temperature affecting the instrument were shown as at present practised by the makers: the diaphragm-box being compensated by means of the introduction of a small portion of æriiform fluid, instead of being allowed to act with a perfect vacuum, and the metallic connexions between the diaphragm-box and the index being compensated by compound arms or connexions of steel and brass so adjusted as to neutralize mutually the respective contraction or expansion of each at variations extending to 100 degrees of temperature.

The mode now practised by makers of graduating the aneroid (when thus compensated) by comparison with a standard mercurial barometer, was stated, and it was suggested that improvement on this practice might be made by reference to standard elevations running up to 2000 feet at least in Great Britain. Practical examples were given of the use of the instrument in Ceylon, showing the variations of the aneroid (when properly checked) to lie between 1 foot and 6 feet, as compared with the surveyor's spirit-level: other examples were given of practice on the Great Western, South-Eastern, and North Kent Railways, varying from the true levels from 6 inches to 6 feet, over distances of between 300 and 400 miles.

The paper concluded with Tables in the Appendix, and with diagrams explanatory of the construction of the instrument; the Tables being intended to illustrate the effects of diurnal and also of local variation within the tropics (in Ceylon), and also in England.