Science Notes.

THE CAUSE OF GLACIAL PERIODS.

Last week some account was given in this column of the movement of glaciers, and of the evidences to be found in the British Isles and other parts of Europe, as well as in other continents, that they have been, at some remote time, covered by glaciers.

No really satisfactory theory has ever yet been offered to account for the extreme cold which must have prevailed during the glacial period over countries now temperate. Dr. Croll's theory, which supposes an alternation of glacial periods in the Northern and Southern hemispheres, has perhaps received more attention than any other, but, as has been pointed out by geologists, there is no record to be found in the earth itself which suggests that the two hemispheres were glaciated at different times. Dr. Croll's theory attributes the alternation of glacial and temperate periods in each hemisphere to the variation in the eccentricity of the earth's orbit. The earth as it travels on its annual journey round the sun is sometimes nearer and sometimes further from it; the former position is known as *perihelion*, and the latter *aphelion*. Moreover, the difference between aphelion and perihelion is sometimes greater and sometimes less. The difference between the two is now less than the maximum, and our winter (that is, winter in the Northern hemisphere) occurs at perihelion. The lower temperature we experience during winter, in spite of the comparative nearness of the sun, is, of course, due to the obliquity of the sun's rays, or to state the case in simple language, the low temperature is due to the fact that the sun does not rise so high in the sky during the winter months. Dr. Croll assumes that, in the past, the Northern hemisphere may have had its winter when the earth was in aphelion, and when, moreover, the distance of the earth from the sun at aphelion was at its maximum. These conditions would bring about a long, cold winter and a brief, somewhat cool summer for the Northern hemisphere, but, at the same time, and as a natural consequence, the Southern hemisphere would experience a long, warm summer and a brief, temperate winter. Dr. Croll's theory is very interesting, but the chief objection to it has already been stated at the outset.

According to recent researches it is believed that the line of perpetual snow in Europe and America during the glacial period was only 3,000 feet, or 4,000 feet lower than it is now, and that a general lowering of the temperature by 8° to 10° Fahr. would be sufficient to produce glaciation to the extent indicated to the geologist by the face of the earth.

It has also been suggested that the changes to which the past glaciation and the present temperate climate are due, may be meteorological rather than astronomical. We know of an eleven years' period which brings changes of climate apparently depending on the presence or absence of sun-spots; the prevalence of sun-spots appears to be accompanied by unusually warm summers. A thirty-five years' period has also been observed in variations of climate, and this may sometimes occur so as to increase the effect of the shorter period. There may be yet other periods in the amount of heat received by the earth from the sun, of which we are at present ignorant (on account of their long duration), and it is possible that the discovery of the existence of such a period (or periods) may at length solve the mystery now attaching to the great ice age. It seems as though the solution, if it be of this nature, may, however, be yet in the dim future.

Notes on Art.

THE OLD MASTERS AT BURLINGTON HOUSE.

(Continued.)

We promised, last week, having considered the Dutch School at this interesting Exhibition, to turn to the Venetian as represented at Burlington House.

The business of a painter is to paint. Mr. Ruskin says—"If he can colour, he is a painter though he can do nothing else; if he cannot colour, he is not a painter though he can do everything else—a faithful study of colour will always give power over form, though the most intense study of form will give no power over colour. The man who can see all the greys and reds and purples in a peach, will paint the peach rightly round; to colour well requires real talent and earnest study, and to colour perfectly is the rarest power an artist can possess." This power the Italians and Venetians possessed more than any other, and we realize it at once when we turn from the minute and almost painful finish of the Dutch School to the lavish golden brown of Angelo Bronzino, the reds of Van Dyck, Paris Bordone or Cima da Conegliano.

Let us take Bronzino first; he painted between the years 1502 and 1571, and is represented here by No. 108, a *Portrait of a Lady* in a richly embroidered dress of gold and brown, a thoroughly characteristic work. There is also a work by a painter of the same date, Parmigiano (1504-1540), No. 116, the *Holy Family*, but if we compare this with the exquisite work in the National Gallery by Parmigiano which represents the Virgin in a glory of gold as a background, with the infant Christ on her knees, it is difficult to believe that the work at Burlington House is by the same hand as it is so cold in colour. There is a beautiful Paris Bordone (1500-1571), No. 114, *Christ among the Doctors*. In it, Christ is seated on the highest step of a pulpit in the Temple, and around him are the doctors; it is a very interesting work and well worth examination. Do not miss the two works by Cima (1489-1508), *The Saviour*, No. 150, and the *Virgin and Child*, No. 155. For real vivid colour, however, we must turn to one of the pictures by Van Dyck (1599-1641) which occupies the post of honour at the end of Gallery No. III. It is a splendid portrait (No. 125) of Andrea Spinola, Doge of Venice, who is seated, looking at the spectator, in a gorgeous red robe and white ruff, the whole forming a really majestic work which is, perhaps, the most impressive picture in the whole Exhibition. It is flanked by two portraits, also by Van Dyck, Nos. 124 and 126. The former is Robert Rich, Earl of Warwick, who was Lord High Admiral under the Parliament, and is represented in armour. It is a very striking picture,

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