Dates given in the Julian calendar must first be transformed to the Gregorian calendar before applying the above formula, and this transformation is readily effected through the relation

$$G = J + (N - 2) - \frac{N}{4}$$

where G and J are the respective dates, N is the number of the century, and the remainder is to be neglected in the division by 4.

GEO. C. COMSTOCK.

WASHBURN OBSERVATORY,
MADISON, WIS., October 31, 1898.

NORTHERN ROCKY MOUNTAIN GLACIERS.

TO THE EDITOR OF SCIENCE: For some years I have been interested in the geography of a small section of the Rocky Mountains which, until recently, was part of the Blackfeet Reservation, in northwestern Montana. This section lies, for the most part, east of the Continental Divide and between the international boundary on the north and the Great Northern Railroad on the south. The portion of it which I know best is included in the watershed of the St. Mary's River and its tributaries. In 1891 I took to the head of the St. Mary's River the first party that had ever visited it, so far as known, and in 1895 accompanied to the same point the Government Commission which afterwards purchased from the Blackfeet Indians the rough mountain land which formed the western portion of the reservation of that tribe. Before that I had made a sketch map of the region, which is the basis of all the maps of it that have been made or published.

In 1897 I made a hasty trip to the head of the river and climbed Mt. Jackson, the highest peak in that region. Last July (1898) I again went to the head of the river and climbed the Blackfoot Mountain, another lofty peak somewhat less accessible than Mt. Jackson. On both trips I was accompanied by my friend, Mr. J. B. Monroe.

These last trips have enabled me definitely to locate two points about whose relations I have never until now been quite certain. One is the Pumpelly glacier, discovered by Professor Raphael Pumpelly, who, I believe in 1883, with a small party which included the late W. A. Stiles, crossed from the Flathead country to the Plains by way of the Marias, or, as it is now called, the Cut Bank Pass. This great mass of ice, which is seen by every traveler going through the Cut Bank Pass, rises to the height of several hundred feet above the face of a lofty cliff, over which portions of the glacier are constantly falling with tremendous reports, which are heard for a long distance.

From the top of the Blackfoot Mountain the whole country leading up to the Cut Bank Pass can be seen, and immediately below it to the southeast lies the Pumpelly glacier, readily identified not only from its position with relation to the valley, but also by the peaks and rocks in its neighborhood. It thus appears that the Pumpelly glacier, as I have long supposed was the case, is part of the southern flow of the great ice cap which covers almost the whole of the Blackfoot Mountain. The Blackfoot glacier, which stretches away in a northeasterly direction from the peak of the Blackfoot Mountain, though perhaps varying in extent somewhat with the season, was estimated last July to be six or seven miles long, and in some places between three and four miles wide. From the peak of the Blackfoot Mountain the ice field flows also in a northerly direction, meeting another which runs down between Mt. Kainah and Mt. Jackson, while from Mt. Jackson a number of smaller glaciers flow down to timber line.

A little to the west of south of the Blackfoot Mountain and lying in a great bend of Mud Creek — tributary of the Flathead — which entirely cuts it off from the main range, lies Mt. James, one of the three highest peaks in this immediate section. Seen from the east, it is shaped like the square-faced, peaked end of a hay stack, and at a distance appears very difficult or impossible of ascent. Its southern and western faces may be more practicable than those on the north and east appear. From the top of the Blackfoot Mountain the level shows Mt. Jackson to be the highest of all these mountains; Mt. James the next, while Blackfoot is the third. But the differences in height are very slight.

A few miles northwest of Mt. Jackson, and

lying on the west side of the range, lies a little basin named Avalanche Basin by Mr. L. B. Sperry, of Oberlin, Ohio, and on the mountains overlooking this, Mr. Sperry tells us, are extensive snow fields and a glacier. From the summit of Blackfoot Mountain it appears that this Avalanche Basin lies nearly south of Mt. Piegan of my map, and southwest of Mt. Reynolds. I understand that Mr. Sperry, who was, of course, unaware that the mountain had been earlier named, has called Mt. Reynolds Matterhorn from the slender—as seen from the southwest—finger of rock which forms its peak. .Mt. Reynolds is in the Continental Divide, although most of the recent maps wrongly place it east of the Divide.

If the locations of the Pumpelly glacier and of Avalanche Basin with regard to definite and well-known points in the Continental Divide are thus established, the matter is one of some interest to students of this section of the northern Rocky Mountains, since hitherto, so far as I am aware, the relations of the east and west sides of the range have not been known between the head of Belly River and the Cut Bank Pass.

Lying nearly to the south of Mt. Jackson, and between it and the Blackfoot Mountain, is a deep basin which is the head of Harrison Creek, flowing down toward the Flathead Lake. This basin, which I have called Pinchot's Basin, is occupied by a large glacier, which is fed by many smaller ones flowing down the steep side of Mts. Jackson, Kainah and Blackfoot. What the extent of this glacier may be I do not know, but lying in this deep basin, and almost completely surrounded by high mountains, the area of the moving ice must be very considerable.

Geo. Bird Grinnell.

SCIENTIFIC LITERATURE.

Outlines of the Earth's History. By N. S. Shaler. D. Appleton & Co. 1898. Price, $1.75.

This 'Popular Study in Physiography' is the latest of a number of attractive publications dealing with geological and geographical themes, from the pen of the professor of geology at Harvard. As in the case of the 'Aspects of the Earth,' published in 1889, the present volume of over four hundred pages is a series of essays on some of the broader phases of the earth's history.

Popular scientific books, well written, clearly printed and attractively illustrated, are year by year becoming more and more numerous, and are taking the place of novels, especially among the more intellectual and cultivated readers. It is to this as yet small library of nature-novels that the 'Outlines of the Earth's History' belongs.

The nine essays comprising the volume and forming as many chapters are:

I. An introduction to the study of nature.
II. Ways and means of studying nature.
III. The stellar realm.
IV. The earth.
V. The atmosphere.
VI. Glaciers.
VII. The work of underground water.
VIII. The soil.
IX. The rocks and their order.

As may be seen from this outline, the volume, although embracing a wide view of nature, is not a systematic treatise, and does not fill the place of a text-book on physiography. It is a collection of graphic essays, each of which may be read separately without detracting from its value, designed to lead the reader by easy paths to a sufficiently elevated, intellectual standpoint, to command a comprehensive view of what the author terms the natural realm.

Following the first two chapters, which are of the nature of an introduction, dealing briefly with the ways in which barbarous and civilized men view their surroundings, and suggesting methods to be pursued in nature study, comes a description of the stellar realm. Most of the material in this third chapter is of necessity borrowed from astronomy, and presents, among other discussions, a clear statement of the nebular hypothesis, as formulated by Kant and Laplace. But scant, if any, attention is given, however, to the modification of this explanation of the earth's origin, presented especially by Lockyer and known as the meteoric hypothesis. A reason for this omission is perhaps to be had later in the book, where it is stated that meteors may possibly have been ejected by volcanoes of our own and other planets, a view