

that the glacier had once not only reached them, but left evidence of its presence. Take the Rhone valley for example. From the existing Rhone glacier, traces of former ice may be seen all the way to Martigny—a distance of sixty miles. Here the old glacier was joined by another from Mont Blanc, and the two, welded into one, moved onward, leaving part of its burden of boulders at different places, and everywhere its marks on the rocks to the right and left, as far as the Lake of Geneva, whose basin it filled. Continuing its course across the country, it was finally stopped by the limestone barriers of the Jura, where it deposited, 800 feet above the Lake of Neuchâtel, many of its granite boulders, carried from Mont Blanc. Here, when the earth is removed, the scratches of the ancient glacier which carried these "foreigners" are visible still upon the limestone rock.

JEAN DE CHARPENTIER (1786-1855),

a Saxon by birth, was invited by the authorities of the Canton of Vaud to become chief engineer and director of the salt mines of Bex. He accepted the office and went to reside at Devens, beside the mines. On the little hill, Montet, separating Devens from Bex, are many "erratic blocks," some of them immensely large. These, from their number and magnitude, arrested his attention; and then an hour's walk took him to Monthey, on the opposite side of the Rhone, where there is a still greater collection. This led him to study the hints thrown out by Venetz, as to the mode of their conveyance and deposition, and finally to demonstrate the correctness of the theory in a work which has since become classic, under the title of an "Essay upon the Glaciers and Erratic Blocks of the Rhone Valley," published in 1841. So clearly and logically did he write that the greatest adversaries of the theory were compelled to become its champions and defenders. Forbes, Agassiz and others followed on the same line, and now the "glacial theory" has been universally accepted, proofs of its correctness being everywhere apparent. But these

ANCIENT GLACIERS

were not confined to Switzerland. Traces of them have been found in many parts of Europe and America, where no glaciers now exist. In the Highlands of Scotland, in Wales, in England and Ireland, their story is distinctly written for those who can decipher it. Readers of Professor Geikie's "Story of a Boulder" will remember how, seating himself on an "errant block," three miles south-west of Edinburgh, and following the example of Wordsworth's geologist:

He who with pocket hammer smites the edge
Of luckless rock or prominent stone, disguised
In weather stains, or crusted o'er by Nature
With her first growth, detaching by the stroke
A chip or splinter, to resolve his doubts,—

he starts off amongst the icebergs of the glacier age, and tells how they grated along the sea bottom, and deposited mud which geologists call "boulder clay," and so on.

A few years ago when visiting North Wales we found in the Pass of Llanberis evidence of glaciers having once filled it—grooves in all directions, polished rocks, and high above huge blocks of stone perched in positions where only melting ice could have landed them. The sides of Snowdon, too, exhibit the same effects of glacier action. I have somewhere read an interesting fact related by Dr. Hooker, who, during a visit to Palestine, found the celebrated cedars of Lebanon growing upon what had been an ancient glacier moraine.

BOULDER CLAY.

Another result of the glacial period was the formation of that mass of unstratified *debris* known as boulder clay, of which specimens can be seen on the shore of Lake Ontario, where the old Garrison Common and Toronto Exhibition grounds now are. This clay is a mixture of all kinds of rock material, including fragments of various sizes and shapes—many of them angular, polished and striated by ice action, imbedded in earth. Most geologists regard this earth as an accumulation, formed chiefly under a great sheet of ice, and similar to the *debris* underneath existing glaciers. In Britain, where this clay is extensively distributed, and where it occurs in large quantities, it is thought that it was produced by erosion, whose power was once exerted upon the whole country by a sheet of ice which entirely buried it, and ploughed up the surface of the land, grinding and mixing into

a mass of confused rubbish, the materials of which the surface was composed.

LAKES FORMED BY GLACIERS.

The occurrence of a great number of lakes in regions bearing evident marks of glacial action led geologists to suspect a connection between the two. Professor Ramsay has given great attention to this subject, and has been led, by the coincidence of the two phenomena in British North America, Britain, Switzerland, Scandinavia, etc., to ascribe both to the same cause, and to formulate a theory of the origin of a large class of lakes by the eroding power of glaciers. Making the Lake of Geneva a special study, and considering the great grinding power of a moving mass of ice 4,000 or 5,000 feet in thickness, with its imbedded sharp and angular stones, upon underlying rocks of a soft material, he was led to conclude that a great number of lakes date from the glacial age. Confirmatory of this theory, it is found that nearly all such lakes occur in the lines of old glaciers, and that in most of them the rock basin of the lake is much deeper than the outlet channel, a fact which precludes their formation by running water. It is easy to see that such a form is what might be expected from the grinding power exerted by a descending glacier; such power being greatest where the ice was thickest, and where the pressure was most nearly vertical.

BIRTH AND MATURITY OF MOUNTAINS.

The Swiss have a legend to this effect. In olden times there came a race of giants from the Himalayas, famishing and asking hospitality. They received not only what they asked, but were welcomed to a home. How did they requite that kindness? They blocked up the rivers and filled up the plains, until the cry of the herdsmen and the herds went up before God on high. The Almighty heard their cry and turned these tyrant giants into rocks and mountains which became the bulwarks of civil and religious liberty—the moral of which is that God often turns trials and troubles into a blessing. Science, however, attributes the present existing contour of dome and *aiguille*, peak and valley, gorge and chasm, to the continuous interaction of two forces, one of which upheaves, the other disintegrates; or, as Professor Geikie puts it, "stupendous earth throes, followed by prolonged gigantic denudations." The same idea is expressed in more poetic language by Professor Tyndall, when, looking from the summit of the Jungfrau toward Mont Blanc and the intervening peaks, he asks himself how this colossal work was performed. Who chiselled these mighty and picturesque masses out of mere protuberances on the earth? The answer, he says, was at hand: "Ever young, ever mighty with the vigour of a thousand worlds still within him, the real sculptor was even then climbing up the eastern sky. It was he who raised aloft the waters which cut out these ravines; it was he who planted the glacier on the mountain slope, thus giving gravity a plough to open out the valleys; and it is he who, acting through the ages, will finally lay low these mighty monuments, rolling them gradually seaward,

Sowing the seeds of continents to be,

so that the people of an older earth may see mould spread and corn wave over the hidden rocks which at his moment bear the weight of the Jungfrau."

But should not the thoughtful observer, in contemplating such scenes, look beyond the physical causes thus eloquently put forward as the creators and constructors of the Alps—beyond the "ever-young and ever-mighty sun," whose course must one day be arrested, whose fires must one day be extinguished—to that Father in heaven—the Creator of worlds and Source of all life and love? More consonant to true philosophy is the language of Coleridge in that noble hymn he composed at the foot of Mont Blanc.

Stupendous mountain! thou,
That, as I raise my head—awhile bowed low
In adoration—upward from thy base,
Slow travelling with dim eyes suffused with tears,
Solemnly seemest, like a vapoury cloud,
To rise before me—rise! oh, ever rise!
Rise like a cloud of incense from the earth!
Thou kingly spirit, throned among the hills,
Thou dread ambassador from earth to heaven,
Great hierarch! tell thou yon rising sun,
Earth with her thousand voices praises God!

Still equally true it no doubt is that:]

The hills are shadows, and they flow
From form to form, and nothing stands:
They melt like mists; the solid lands
Like clouds they shape themselves and go.

There rolls the deep where grew the tree,
O Earth, what changes hast thou seen!
There, where the long street roars, hath been
The silence of the central sea!

Châtel, Suisse, August, 1886.

T. H.

PRESBYTERIANISM SCRIPTURAL.

BY THE REV. NEIL M'NISH, B.D., LL.D., CORNWALL.

Rules that are general and elastic are found in the New Testament regarding the manner in which the Churches of Christ are to be governed: general, so that if fundamental principles are conserved and respected, minor details, which are unimportant in themselves, might be arranged on grounds of Christian expediency and propriety; elastic, so that in the progress of the Christian enlightenment of the world, and in the advancement and wider development of the social and religious life of the human race, it might be safe as well as practicable to meet every demand that may arise by a careful examination of the eternal principles of truth and order, and by a judicious application to every fresh necessity of rules and precepts which have a meaning for all time, admitting of larger developments as the ages roll along, and as the requirements of Christianity are multiplied.

To reproduce as faithfully and as fully as may be possible that method of ecclesiastical government which the apostles instituted and observed; to cling as closely as circumstances may admit to that model which the apostles have bequeathed to the Christian Church; to assign the first and most honourable place to the writings of the apostles, and to prefer these writings to the most elaborate writings of uninspired men—such is the honest and commendable manner which ought to be adopted in every thing that pertains to the government of the Christian Churches.

There is a modesty which is very sensible in itself, and which does immense honour to those who fashioned our Presbyterian polity, in the well-known and well-worn words: "Presbyterianism is founded on the Word of God, and is agreeable thereto." Modest words these, which may be construed to mean that Presbyterians are content to know and to believe that they can appeal with confidence to the Word of God for confirmation of their peculiar form of Church government, and that the other Christian Churches are to be commended for pursuing a similar course and for endeavouring, by means of logical reasoning and criticism, to establish their particular form of government. We can safely concur in these broad sentiments of one of the ablest exponents of our Presbyterian polity: "Holding, as we do, that our own Presbyterian system comes as near to the model of the Apostolic Churches as our altered state and circumstances will admit of, we are far from thinking that either this or any other system of ecclesiastical polity has been so distinctly and imperatively laid down in the Scriptures of the New Testament, as binding on all Christians, that those who adopt it are warranted to unchurch or unchristianize those by whom it is rejected; and if therefore the advocates of prelacy were content with holding their system to be allowable or expedient, or even in some circumstances necessary for the government of that particular Church in which it subsists, we should be little concerned to disturb them in their persuasion." Whoever investigates the epistles of the New Testament for himself, with the object of ascertaining what the apostles did or commanded or sanctioned for the permanent government of the Christian Church, must remember that undue importance is not to be attached to those extraordinary agents that were employed in the early days of Christianity—agents such as apostles, prophets and evangelists; agents who were endowed with miraculous power and with the gift of tongues—agents who were not to be continued, and who could not by any human means be perpetuated, in the Christian Church. All whom it concerns to know that as near an approximation as our altered circumstances will allow is made or has been made to the example of the apostles, have naturally to do with the permanent government which the apostles established, the various Churches that they founded. Bishops or presbyters and deacons, these are the orders that the apostles appointed; these are the two orders of a permanent character that are to be found in the New Testament. Bishop and presbyter, as evidence the strongest and most conclusive shows, had an identical import, and were applicable