

Never has America had a more appreciative visitor than Charles Lyell, geologist and naturalist, who made a tour of the more settled parts of the country in 1841-2. Working out the geological history of Niagara particularly fascinated him, so that he included the region twice in his itinerary.

TRAVELS IN NORTH AMERICA; with Geological Observations on The United States, Canada, and Nova Scotia. By Charles Lyell. In two volumes. London: 1845.

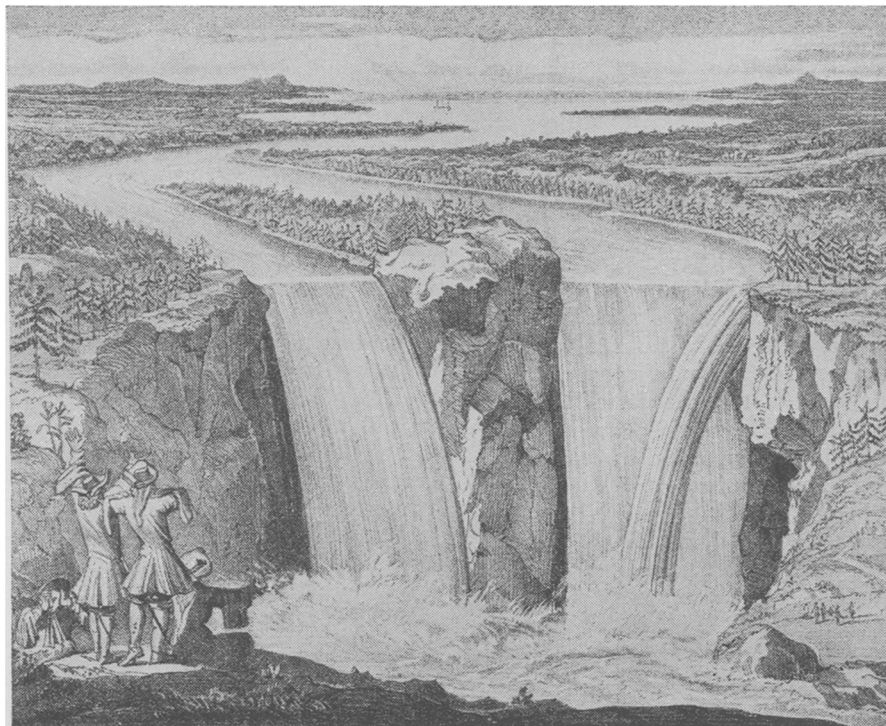
Falls of Niagara

Aug. 27.—We first came in sight of the Falls of Niagara when they were about three miles distant. The sun was shining full upon them—no building in view—nothing but the green wood, the falling water, and the white foam. At that moment they appeared to me more beautiful than I had expected, and less grand; but after several days, when I had enjoyed a nearer view of the two cataracts, had listened to their thundering sound, and gazed on them for hours from above and below, and had watched the river foaming over the rapids, then plunging headlong into the dark pool,—and when I had explored the delightful island which divides the falls, where the solitude of the ancient forest is still unbroken, I at last learned by degrees to comprehend the wonders of the scene, and to feel its full magnificence. . . .

Recent Proofs of Erosion

It has long been the popular belief, from a mere cursory inspection of this district, that the Niagara once flowed in a shallow valley across the whole platform from the present site of the Falls to the Queenston heights, where it is supposed the cataract was first situated, and that the river has been slowly eating its way backwards through the rocks for a distance of seven miles. According to this hypothesis, the Falls must have had originally nearly twice their present height, and must have been always diminishing in grandeur from age to age, as they will continue to do in future so long as the retrograde movement is prolonged. It becomes, therefore, a matter of no small curiosity and interest to inquire at what rate the work of excavation is now going on, and thus to obtain a measure for calculating how many thousands of years or centuries have been required to hollow out the chasm already excavated.

It is an ascertained fact, that the



NIAGARA FALLS IN 1678 as it appeared when discovered by Father Hennepin. (Facsimile of a view in Hennepin's original Utrecht edition, 1697, reproduced from Lyell's "Travels in North America")

Falls do not remain absolutely stationary at the same point of space, and that they have shifted their position slightly during the last half century. Every observer will also be convinced that the small portion of the great ravine, which has been eroded within the memory of man, is so precisely identical in character with the whole gorge for seven miles below, that the river supplies an adequate cause for executing the task assigned to it, provided we grant sufficient time for its completion. . . .

Discovery by Hennepin

When at Boston, my attention was called by Mr. Ingraham to a work translated from the original French of Father Hennepin, a missionary who gave a description of the grand cataract and a plate of it, as it appeared in the year 1678. It is not wonderful that coming suddenly upon the Falls, which no European traveler had ever seen before, he should have believed them to be twice their real height. "Betwixt the lakes Ontario and Erie," he says, "there is a vast and prodigious cadence of water, which falls after an astonishing manner, insomuch that the universe does

not afford its parallel. As to the waters of Italy and Swedeland, they are but sorry patterns of it, and this wonderful downfall is compounded of two great falls, with an isle in the middle, and there is another cascade less than the other two which falls from west to east. I wished a hundred times that somebody had been with us, who could have described the wonders of this frightful fall. In the mean time, accept the following draught such as it is."—From his plate it appears that this third cascade was produced by what he terms "the elbow" caused by the projection of the table rock, which must then have been more prominent than now. . . .

Ancient River-bed

In the absence of more ample historical data, we are fortunately not without geological evidence of the former existence of a channel of the Niagara at a much higher level, before the table-land was intersected by the great ravine. Long before my visit to the Niagara, I had been informed of the existence on Goat Island of beds of gravel and sand containing fluvia- (Turn to next page)

Geology of Niagara—Continued

tile shells, and some account had been given of these by Mr. Hall in his first report in 1839; I therefore proposed to him that we should examine these carefully, and see if we could trace any remnants of the same along the edges of the river-cliffs below the Falls. We began by collecting in Goat Island shells of the genera *Unio*, *Cyclas*, *Melania*, *Valvata*, *Limnea*, *Planorbis*, and *Helix*, all of recent species, in the superficial deposit. They form regular beds, and numerous individuals of the *Unio* and *Cyclas* have both their valves united. We then found the same formation exactly opposite to the Falls on the top of the cliff on the American side, where two river-terraces, one twelve and the other twenty-four feet above the Niagara, have been cut in the modern deposits. . . .

The supposed original channel, through which the waters flowed from Lake Erie to Queenston or Lewiston, was excavated chiefly, but not entirely, in the superficial drift, and the old river-banks cut in this drift are still to be seen facing each other, on both sides of the ravine, for many miles below the Falls. . . .

The observations made in 1841 induced me in the following year (June, 1842) to re-examine diligently both sides of the river from the Falls to Lewiston and Queenston, to ascertain if any other patches of the ancient river-bed had escaped destruction. Accordingly, following first the edge of the cliffs on the eastern bank, I discovered, with no small delight, at the summer-house, above the whirlpool, a bed of stratified sand and gravel, forty feet thick, containing fluviatile shells in abundance. . . . The same year I found also a remnant of the old river-bed on the opposite or Canadian side of the river, about a mile and a half above the whirlpool, or two miles and a half below the Falls. These facts appear conclusive as to the former extension of a more elevated valley, four miles, at least, below the Falls; and at this point the old-river bed must have been so high as to be capable of holding back the waters which covered all the patches of fluviatile sand and gravel, including that of Goat Island. As the table-land or limestone-platform rises gently to the north, and is highest near Queenston, there is no reason to suppose that there was a greater fall in the Niagara when it flowed at its higher level, than now between Lake Erie and the Falls;

and according to this view, the old channel might well have furnished the required barrier.

I have stated that on the left, or Canadian bank of the Niagara, below the Falls, I succeeded in detecting sand with freshwater shells at one point only, near the mouth of the Muddy River. The ledge of limestone on this side is usually laid bare, or only covered by vegetable mould until we arrive at the boulder clay which is sometimes within a few yards of the top of the precipice, and sometimes again retires eighty yards or more from it, being from twenty to fifty feet in height. I also found an old river-bed running through the drift parallel to the Niagara, its course still marked by swamps and ponds, such as we find in all alluvial plains, and only remarkable here because the river now runs at a lower level by 300 feet. This deserted channel occurs between the Muddy River and the Whirlpool, and is 100 yards broad.

There is also a notch or indentation, called the "Devil's Hole," on the right or eastern side of the Niagara, half a mile below the Whirlpool, which deserves notice, for there. I think, there are signs of the Great Cataract having been once situated. A small streamlet, called the "Bloody Run," from a battle fought there with the Indians, joins the Niagara at this place, and has hollowed out a lateral chasm. Ascending the great ravine, we here see, facing us, a projecting cliff of limestone, which stands out forty feet beyond the general range of the river cliff below, and has its flat summit bare and without soil, just as if it had once formed the eastern side of the Great Fall.

Recession of the Falls

By exploring the banks of the Niagara above the Falls, I satisfied myself that if the river should continue to cut back the ravine still farther southwards, it would leave here and there, near the verge of the precipice and on its islands, strata of sand and loam, with freshwater shells similar to those already described. I collected fossil shells, for example, on the left bank, near the Chippewa River, and learnt that others had been reached, in sinking a well, in 1818, at the southeast end of Grand Island. . . .

The patches of fluviatile strata, therefore, occurring between the old banks of drift and the precipice, and

not having been met with on other parts of the platform at a distance from the Niagara, confirm the theory, previously adopted on independent evidence, of the recession of the Falls from Queenston southwards. The narrowness of the gorge near Queenston, where it is just large enough to contain the rapid current of water, accords well with the same hypothesis, and there is no ground for suspecting that the excavation was assisted by an original rent in the rocks, because there is no fissure at present in the limestone at the Falls, where the moving waters alone have power to cut their way backwards.

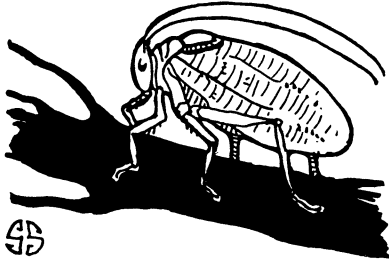
Origin of the Falls

It is almost superfluous to affirm that a consideration of the geology of the whole basin of the St. Lawrence and the Great Lakes can alone entitle us to speculate on the state of things which immediately preceded or accompanied the origin of the Great Cataract. To give even a brief sketch of the various phenomena to which our attention must be directed, in order to solve this curious problem, would require a digression of several chapters. At present the shortest and most intelligible way of explaining the results of my observations and reflections on this subject will be to describe the successive changes in the order in which I imagine them to have happened. . . .

As soon as the table-land between Lakes Erie and Ontario emerged and was laid dry, the river Niagara came into existence, the basin of Lake Ontario still continuing to form part of the sea. From that moment there was a cascade at Queenston of moderate height, which fell directly into the sea. The uppermost limestone and subjacent slate being exposed, the cataract commenced its retrograde course, while the lower beds in the escarpment were still protected from waste by remaining submerged. A second fall would in due time be caused by the continued rise of the land and the exposure of the hard beds constituting what is called the Clinton group, together with the soft and easily undermined red shale, on which they repose. Finally, a third cascade would in all likelihood be produced by the rise of another hard mass, the quartzose sandstone resting on a very destructible red shale. Three falls, one above the other, very similar in (*Turn to next page*)

NATURE RAMBLINGS

By FRANK THONE



Katy Did

Or did she? The most ancient argument in the world is being carried on in a million trees by ten million green-robed barristers, who have either had the case in court for so long that they have forgotten what it is about, or else regard Katy's alleged conduct as being of unmentionable enormity. At any rate, the prosecution shouts stridently all night long that Katy did, Katy did, she did, she did; while the defense maintains as stoutly and as repetitiously that Katy didn't. And the weary and disgusted human jury, knowing nothing about the case, drowsily curse Katy and wish that the lawyers would shut up.

But these green nocturnal grasshoppers have other business besides their eternal argument. There is the important matter of producing eggs, for instance. Nothing could be more nice and fastidious than the family arrangements that one of the southern katydid species makes. The maternal insect moves up a twig or the edge of a leaf, leaving a trail of pearly little oval eggs strung out in a curious double overlapping row. These split finally and out crawl the rising generation, very small and spectral-pale. They do not assume their robust greenness until after shedding their coats about half a dozen times.

There is another southern Katydid so large as to repay hunting with firearms. An ardent young collector, who had served in the war and knew something about night operations, fixed a small searchlight on his cap, to illuminate his prey in the tall trees. His artillery consisted of a small rifle loaded with dust-shot cartridges, to stun the giant insects and knock them off their perches.

Science News-Letter, July 13, 1929

Thomas Jefferson invented the first plow to turn over the soil as well as lift it.

Psychiatrists Not Ready for Crime Study

Psychiatry

If President Hoover's National Commission on Law Observance and Law Enforcement were to turn the whole problem of dealing with convicted criminals over to the psychiatrists, the psychiatrists would find themselves unable to offer an immediate solution to the problem.

"I, for one," said Dr. Nolan D. C. Lewis, of St. Elizabeth's Hospital, a U S. Government Hospital for the Insane, "would not wish to attempt it."

Not that Dr. Lewis believes crime outside the field of psychiatry. Quite the contrary. He says:

"Every man who commits a serious crime against either person or property is abnormal. No person who has been brought up with any knowledge of the law, and with ordinary training as to right and wrong will break into a house and rob or make a murderous attack upon another unless that person is in an abnormal state."

The principal contribution which the psychiatrist can make toward solving the problem of reduction of crime is to offer a new point of view.

"When you have studied a problem until it appears to present an impassable barrier," he said, "a fresh point of view will enable you to attack the difficulty with new weapons

and may lead in the end to the removal of the obstacle."

The psychiatrist would treat crime as a disease. He would give it the same systematic and thorough research that has been devoted to such diseases as cancer and tuberculosis. He would treat the criminal as enlightened communities treat those suffering from contagious or infectious diseases.

"Society has a perfect right to protect itself from these individuals even at the expense of the person afflicted," Dr. Lewis explained, "but imprisonment should be employed only as a matter of precaution, protection, or for the purpose of treatment; not in a spirit of revenge for wrongs done, or to satisfy the sadistic tendencies of the group.

"I do not object," he went on, "to the annihilation of the individual if he is incurably criminal and murderous, or if for any other reason the protection of society makes it desirable. I believe that we cannot emphasize too strongly the interests of society. This does not mean, however, that a life should be forfeited for every murder. Not every murderer is a permanent menace to society. The person who committed the Hall-Mills murder, for example, probably never committed another crime and probably never will. Under those circumstances it may be just as well for society that the murder should never be solved."

Niagara—Cont'd

their geological and geographical position to those actually seen on the river Genesee at Rochester, would thus be formed. The recession of the uppermost must have been gradually retarded by the thickening of the incumbent limestone, in proportion as the Falls sawed their way southwards. By this means the second cataract, which would not suffer the same retardation, might overtake it, and the two united would then be retarded by the large quantity of rock to be removed, until the lowest fall would come up to them, and then the whole would be united into one.

Sir Charles Lyell (1797-1875) was one of the greatest of the long list of Scottish geologists. He contested the idea of violent catastrophes during the earlier epochs of earth's history, and pointed out that all the observed changes could be brought about by causes now in operation if only enough time were allowed for them to act.

Science News-Letter, July 13, 1929

The psychiatrist would want to know what is being accomplished in reform institutions toward rehabilitation of the individual—toward the cure of his criminal tendencies. No physician would prescribe year after year a certain course of treatment for his patients, directing them to follow it for a definite period of time, as six months, a year, five years, or twenty years, and then dismiss them from his mind and never ascertain whether they improved or grew worse. When a new medical treatment is developed, it is tried at first with great caution. The patient is watched with the greatest of care, and if the medicine fails in its purpose, or if it produces any ill effects in the subject, it is abandoned.

Our judges, however, go on prescribing for their patients with no knowledge and perhaps no curiosity as to the result of the treatment. No one has ever demonstrated that a boy