SCIENCE

NEW YORK, JANUARY 12, 1894.

SOME NEW JERSEY ESKERS.

BY G. E. CULVER, MADISON, WIS.

THE eskers here noted are found in the northeastern part of the State a little east of the valley of the Ramapo. The district embraced is about four miles wide and eight miles long. The series of deposits lies in a gentle depression extending from the point where the Ramapo enters the State, south to the neighborhood of Ramsey's, where it broadens somewhat and connects with other similar valleys, after which all turn southwestward and are noted as far as Wyckoff and Camp Gaw on the Susquehanna Railroad.

Besides the eskers proper there are here gravel sheets and bodies of various shapes, all more or less directly connected with the eskers.

The disposition of all these deposits is to keep well down on the sides or in the bottom of the valleys. Nevertheless, their elevation is not constant, and the eskers cross, at different points, small valleys and low ridges to some extent.

Of the eskers proper the three best are the Ramsey's, the Allendale and an esker beginning about a mile west of Ramsey's and running parallel with the Ramsey's esker.

These, with their branches, constitute a group not unlike a river system.

The Ramsey's esker is the central one of the group. It is also the longest and the best type of an esker. It begins north of the State line in the vicinity of Suffern, N. Y., and extends south to the neighborhood of Mahwah, where it is interrupted, and in its course are several flat-topped, delta-like deposits of precisely similar material, *i. e.*, loose textured sand and gravel. These deposits extend south of Mahwah about a mile and a half, at which point they cease, and the esker again becomes distinct and prominent. It crosses the Erie Railroad in the northern edge of the village of Ramsey's, then runs southwest for about a mile and a half, where it is again interrupted and is probably represented by various shorter branches or pieces of eskers extending nearly to Wyckoff.

This esker has its best development about a half mile southwest of Ramsey's, where it crosses about half a mile of low ground. It stands up clean and clear as a sharp ridge of gravel about twenty-five feet high and one to two rods wide on top. Its sides are as steep as gravel and sand will lie. Its course is sinuous, like that of a stream.

Besides the wide gaps which occur in nearly all of these eskers there are several narrow gaps, through some of which small streams now flow. In the case of the wide gaps the esker usually thins perceptibly, if not greatly, before disappearance, but where the narrow gaps are found the esker terminates abruptly on one side of the valley and begins as abruptly on the other. The resemblance to a railroad embankment where a stream is to be crossed by a high bridge is marked.

Present appearances indicate not that the stream has cut the gap in such cases, but rather that the gap was either never filled or else the material was removed while the ice was still near.

None of the eskers nor the associated deposits seem to have suffered much, if any, post-glacial erosion.

About a mile and a half southwest of Ramsey's a deposit is found which seems to have been made by the union of three small eskers which come in here.[1] It is an oval, rather flat-topped body of sand and gravel, covering, perhaps, an acre to the depth of twelve or fifteen feet. Two branches, apparently from the Ramsey's esker, come in from the north, another comes in or goes out from the southwest, while a fourth leads out to the south. The three first mentioned come from higher ground to the junction. The one going south descends from the junction, following the course of a small stream for about a mile, where it enters another and larger junction deposit, through which it connects with the Allendale esker. This second junction deposit is about a quarter of a mile long by half as wide, and rises forty feet above the eskers connecting with it.

It is steep-faced on the sides facing the lower ground, but seems to lap onto the higher ground on the northwest smoothly as though it were wedge-shaped. The thick end of the wedge lies toward the low ground, and the surface is quite level.

In all particulars save one this deposit is like the bodies of sand and gravel lying in the course of the Ramsey's esker south of Mahwah. Some of those are fifty feet deep, flat-toppod, steep-faced on the lower side and shade into the higher ground gradually. But they are not directly connected with an esker. The analogy, therefore, is not complete.

In the esker west of the Ramsey's esker occurs a feature which is perhaps suggestive in this connection.

This esker, after running as a sharp, well-defined ridge for more than a mile, in which distance it climbs about forty feet, turns sharply to the right, descends about thirty feet in less than half a mile, makes a broader turn into its former course and then gradually expands to fifteen or twenty times its former width, with a corresponding increase in the quantity of material deposited. It then narrows slightly and terminates abruptly, or rather is interrupted by one of the narrow gaps previously mentioned.

Beyond this gap it first widens and then narrows to to its original width—about a rod on top.

Here are three closely analogous types of deposits intimately associated with eskers. In topographic features they are practically the same, in material

[1] So far as I know this feature has not been before noted in connection with eskers, and hence no name to designate it has been suggested. In the absence of a distinctive name I have simply called them junction deposits.

and texture precisely so. All lie in the path of eskers. But they are differently connected with the eskers. The deposits south of Mahwah simply lie in the course of the Ramsey's esker, but are separated completely from it.

The junction deposits are connected directly with the eskers, but show decided differences of level as compared with the associated eskers. The Allendale junction deposit stands forty feet higher than either of the two main esker branches which unite in it.

In the third type we have the esker itself gradually widening out into a broad thick mass without marked change of level. In this case we have also the subsequent narrowing of the deposit to its original esker proportions.

If the first or Mahwah type alone were considered, perhaps the most natural inference regarding its genesis would be that a rapid stream had here debouched into the still water and there built the delta-like deposits.

Yet even in this group, which includes some half dozen of these gravel bodies, are several that can hardly be so accounted for, and in each of the other types it is clear that the material was brought to its present position by ice-walled streams.

In the case of the junction deposits it seems to this writer that a satisfactory explanation of their origin may be found by supposing that these deposits mark the points at which one or more crevasses in the ice intersected eskers. The radiating gravel ridges now mark the position of the intersecting crevasses.

That all these gravel deposits were made near the ice front is probable from the fact that a little farther south all the gravel is spread out in sheets. It is therefore reasonable to suppose that there were openings in the ice-front, bay-like in character, and that there were other openings within the ice border less directly connected with the open water along the ice border.[2]

The suggestion is offered, therefore, that these variously disposed bodies of esker material mark the places where openings of greater or less size had been formed by various agencies not far from the ice front and in the path of the ice rivers.

The streams would pour their contents into these openings. The water would escape, but the sand and gravel would accumulate in the openings until it either filled them completely or until new avenues were opened for its onward movement.

On the final melting of the ice the deposits of sand and gravel would be left resting on the till beneath, whether the streams which brought the material were subglacial or englacial.

COLORATION OF THE RUFFED GROUSE.

BY J. H. BOWLES, PONKAPOG, MASS.

ALTHOUGH much has been written upon the two plumages in which our screech owl (*Megascops asio*) has been found, comparatively little has been *printed* concerning the variety of colors worn by the ruffed grouse (*Bonasa umbellus*), which seems surprising, as it is a favorite game bird. My experience has been with the birds of eastern New England (from Massachusetts northward), but I am inclined to think that the conditions are the same in other portions, for like the screech owl there is a red and a gray plumage.

Perhaps I can best explain my meaning by selecting three birds from a bag taken in this vicinity, as they show to perfection the three different phases seen in this species, viz.: gray, brown or red, and intermediate.

The breast feathers show comparatively little difference, but when the backs of the birds are compared the contrast is at once apparent. Taking the one in the gray plumage, which is the type found most commonly in Maine and the other northern parts, the fan of long tail feathers is of a decided grayish cast, the back, upper and lower tail coverts being of the same shade. (The tail coverts and back vary in intensity to a greater or less extent in individuals.) The ruffs are black throughout, with a strong tinge of iridescent green.

The next to be considered is the bird in the brown or red plumage, which is, from what I can learn, the phase more commonly found in the southern portions. Its fan is of a decided rufous tint, appearing in no way like that of the northern bird except for proportions and the transverse black bands. (These bands are almost always black, having a decided tinge of rufous in but *very* few cases.) The tail coverts and upper parts are also of a reddish tint, the ruffs being a strong brownish-red, tipped with dark brown, and tinged with iridescent brown. All things considered, the northern and the southern bird, when laid side by side, would hardly be taken for the same species.

Upon consideration, I am convinced that it would be impossible to show satisfactorily the third phase in one specimen. The upper portions of what I should consider the typical intermediate bird are what might be termed "pepper and salt," for the fan (always excepting the transverse black bands) is of a mixed red and gray color, the tail coverts and back being a medley of gray, dark brown and red. The ruffs may be either black or brown, for I have seen about an equal number of each. However, there is a wonderful variation, for I have taken birds having brown ruffs, back and tail coverts, yet with an almost entirely gray tail. This phase, like the preceding, is more commonly found southward.

The intermediate stage may, I think, be due to the inter-breeding of northern and southern birds, which meet at about the latitude of Boston, for they are found commonly on or near that line. As the ruffed grouse is greatly given to migrating, this theory seems possible. Another curious fact has become more apparent to me year by year, namely, that in the vicinity of Boston the birds in the red or intermediate phase are taking the place of those in the gray, until this season I have taken an average of three red or intermediate birds to one gray one, whereas in former seasons it was exactly the reverse.

In regard to nidification, I have not been fortunate enough to approach sufficiently near the birds on more than three nests to distinguish the color of their ruffs. Much to my satisfaction, however, one of these was red with brown ruffs, the other two being gray with black ruffs. Curiously enough, in both sets of the black-ruffed birds the eggs were light colored with very faint markings, while those of the red bird were larger with a darker ground color, most of them being thickly sprinkled with large, well-defined spots of reddish-brown. Of course this may have been purely accidental.

In conclusion I will deviate from the subject by giving my opinion that if the bounties were removed from owls and hawks, and put upon skunks, foxes and other vermin, our supply of game and song birds would be greatly increased; nor do I think that the farmer would suffer, in the aggregate, by such a proceeding. My reason for so thinking is the number of nests (including those of the ruffed grouse and oven bird) of eggs and young which I have found destroyed by these pests, not to speak of the number of birds killed after reaching maturity, which is comparatively small.

[2] It is not meant here to assert that still water of any depth was to be found along the ice front at the time mentioned, although such might have been the case.