were extruded before the deposition of the 'mactrakalk' is certain; but, from the fact that the exact age of the tertiary deposits in the southern part of the Troad has not been definitely determined, the time of the extrusion of the great mass of the liparites cannot be stated. However, it occurred most likely at the beginning or in the early part of the pliocene, when the land was raised above the sea, and the islands converted into a peninsula.

The andesites embrace typical mica-andesites and hornblende-andesites, as well as a great variety in which mica and hornblende occur in nearly equal proportion. These, with augite-andesite, occupy a great area between the Menderè and the southern coast; and, unlike the liparites, they seem to have reached the surface, at least in some cases, through volcanic vents. Not unfrequently they occur in dikes also, and have evidently overflowed a large area of late tertiary deposits.

Their extrusion along the western coast began before the deposition of the 'mactrakalk,' and along the southern coast during the formation of the fresh-water deposits of that region. Pyroxene is generally a prominent constituent of the andesites, and frequently both rhombic and monoclinic pyroxenes occur together. The former is generally the most abundant, and has in one case been proved to be hypersthene. It occurs not only in the mica-andesite at Assos and Smyrna, but also in the hornblende-andesite north-west of Qozlou-dagh, and the augite-andesite west of Sivriji-bournou. Among the great variety of andesites may be mentioned the oldest which flowed from the crater at Assos. It is a mica-andesite, in the groundmass of which is a large proportion of apparently primary mica and hematite.

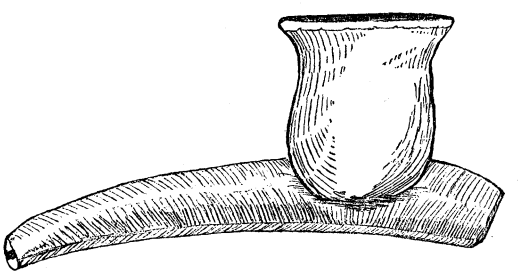
The basalts occur in dikes, and, although widely distributed, do not occupy large areas. Along the southern coast of the Troad it is of an andesitic type, and the olivine is occasionally altered to distinctly cleavable pleochroitic serpentine.

The same phenomenon is better developed in the typical nepheline-basalt which forms the prominent hill called Qaràlyly or Qapandjà-tepe, near the centre of the Troadic peninsula. The basalts and nepheline-basalt are evidently younger than the tertiary deposits with which they are associated; but the time of their extrusion with reference to that of the other eruptive rocks of the Troad cannot be definitely determined. J. S. Diller.

Greason, Cumberland County, Penn.,
June 4, 1883.

OCCURRENCE OF MOUND-BUILDERS' PIPES IN NEW JERSEY.

Until recently the one form of stone implement which is characteristic of the mounds of Ohio and westward, and that has not been duplicated in surface finds in New Jersey and elsewhere on our northern Atlantic sea-board, is the so-called mound-builders' pipes, such as were discovered in great numbers, and described in detail by Squier and Davis in the 'Ancient monuments of the Mississippi Valley,' and more recently by several authors. These pipes may be characterized as having a small bowl, usually in the shape of a bird, mammal, or human head, placed upon a short, flat, and slightly curved base, so perforated that it was used as the stem of the pipe. In other words, it was a complete smoking implement, and therefore unlike the ordinary pipes or pipe-bowls found in New Jersey and the New-England states, which, as a rule, required the addition of a stem of reed or hollow bone, to be used as the mouthpiece.



Within a few weeks, a pipe of the pattern I have described, assumed to be peculiar to the mound-builders, has been found in New Jersey. While the bowl is perfectly plain, except a slight scalloping of the rim, it will be seen at a glance, that the specimen is essentially of the same pattern as the 'animal pipes' found in Ohio, and recently also in Iowa.

Previous to 1882, I had been unable to find any pipes of this pattern, or traces of native copper implements of any kind; but since then copper spears, such as are found in Wisconsin, have been found in New Jersey, and now the pipe that I have described, and of which an illustration is given. Recently, also, specimens of flint arrow-heads have been collected, which in size, and delicacy of finish, are equal to the best examples from Oregon.

These specimens are now briefly referred to, as indicative of the fact, that in skill in working flint, and in the range of handiwork, whether in stone, bone, or clay, the difference

between those people that erected the extensive earth-works of the Ohio valley and elsewhere, and the 'wild tribes' of the Atlantic seaboard, is practically nothing. I still hope to find unmistakable artificial mounds in New Jersey; basing my expectation upon the fact, that natural hillocks or knolls were frequently used as places of burial, and were chosen as desirable sites for the erection of wigwams.

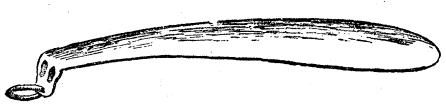
CHARLES C. ABBOTT, M.D.

THE IGLOO OF THE INNUIT.[1] — III.

THE only instrument used in the construction of the igloo is the snow-knife. Where the Innuits have intercourse with white men, they bar-

MODERN SNOW-KNIFE.

ter for cheese-knives or long-bladed butcher-knives, remove the double handle from the tang, and put on a single one about three times as long, which can be readily grasped by both hands. The old knives were made of reindeer-horn or from the shin-bone of the reindeer.



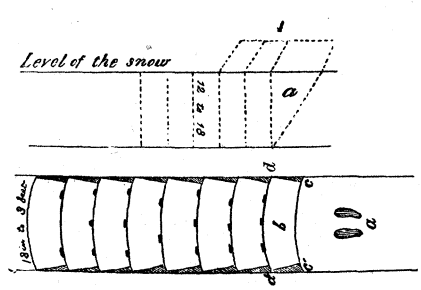
SNOW-KNIFE OF BONE.

Among the Esquimaux in and around King William's Land I found snow-knives made of copper stripped from Sir John Franklin's ships, the imprints of the queen's broad arrow still showing on many, the blades double-edged or dagger-shape, and the handles of musk-ox and reindeer horn rudely attached by sinew lashings.

The snow-knife of iron, while more convenient in many ways, is far more liable to break in the intense cold of the winter weather, such accidents with them being very common. I have seen igloos built when the thermometer registered $-70°$ F. At such temperatures the snow becomes almost stone-like in its compactness. The snow-knife is often used as a substitute for the snow-tester whenever that instrument is broken or left behind, for the Esquimaux are a very careless and absent-minded people.

Before starting to cut the snow-blocks, the builder gets from the sledge a pair of gauntlets used for this purpose, only being of finer and softer reindeer-fur, so as to give the hands the most complete freedom of motion. These gloves extend half way up the fore-arm, and have a puckering-string around the top, which the builder's wife pulls tight, and ties so as to completely exclude the snow while he is at work in it.

The igloo is built on the sloping drift of snow, the entrance being at the lowest point. The first trench from which the snow-blocks are cut is so disposed as to have its axis coincident with the diameter of the igloo, which runs directly up and down hill, or which makes the greatest angle with the horizontal. These snow-blocks are from a foot to a foot and a half wide, from a foot and a half to two or three feet long, and eight or ten inches thick. The first block cut from the trench is a thick triangular one, which is thrown away (see *a*, which is a vertical section through the axis of the trench). A ground plan of the blocks would show that they are partially curved, but in no manner to such an extent as would be needed to conform to the curvature of the igloo. This curvature is the result of their manner of cutting by a swinging motion of the whole body, held almost rigid, and rotating about the foot steps, *a*, in the figure. This motion of the whole body gives them considerable power; and the resulting curved blocks, if large, are in the best shape for the first part of the structure. In cutting the block *b*, first the right-hand edge, *c d*, is cut by three or four powerful downward strokes of the knife, and then the opposite edge, *c′d′*. The knife, with its blade held horizontally, is passed under the block in front of the toes of the builder's feet. About three or four inches in depth of the line *d′d* is cut; and,



with the knife in the right hand, two or three deep vertical thrusts are made along this line, which generally separate the snow-block from its bed, and it is caught with the left hand as it falls forward. I have tried to represent these gashes in the figure. They are plainly visible on the snow-block inside and out, and a good artist would represent them in his pictures of the huts. The blocks are carefully lifted out and placed beside the trench, as, under some circum-

[1] Continued from No. 29.