University of the State of New York

# BULLETIN

OF THE

# New York State Museum

VOL. 4 No. 16

OCTOBER 1897

# ABORIGINAL CHIPPED STONE IMPLEMENTS OF NEW YORK

PREPARED BY

WILLIAM M. BEAUCHAMP, S. T. D.

ALBANY

UNIVERSITY OF THE STATE OF NEW YORK

1897

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OCTOBER 1897

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## INTRODUCTION

In 1896, the legislature appropriated $5000 to be used by the regents of the University for increasing the state collection illustrating New York aboriginal life, and for preserving such facts as might seem to them of most value. Most of this appropriation has been judiciously used by A. G. Richmond, esq., honorary curator of this department of the state museum, in securing several collections of great value. It was also thought advisable to issue some bulletins of a popular nature, illustrating the antiquities of New York, especially the implements and ornaments of the aborigines. In furtherance of this plan the Rev. W: M. Beauchamp, S. T. D., of Baldwinsville, N. Y., was consulted and his aid secured. He had been engaged for a quarter of a century in this study, and had accumulated a vast amount of available material. His suggestion was that such work might be distributed under suitable heads, each subject complete in itself, but forming a series if desired. The first would be that of the chipped stone implements of New York, and a paper on this is subjoined. A second would be on those polished articles of stone, in which New York is so rich; the paper on this is nearly completed, and will be an important contribution to science. Others might treat on the articles of clay, bone, horn, shell and metal, so abundantly found in the state.

It was thought that, in this way, not only would clearer information be afforded, but that the state museum would be the gainer, by valuable contributions of many things altogether uncared for now. Such has been the result elsewhere, and the local pride of our citizens may confidently be relied upon to make the state collection one unsurpassed. The illustrations are selections from the thousands of drawings which Dr Beauchamp has made, and show both rare and common forms.

For this valuable bulletin the state is indebted solely to Dr Beauchamp to whom its publication has been wholly entrusted. For the admirable work done in increasing the archeological collection, the state is indebted to our honorary curator, A. G. Richmond, president of the Canajoharie national bank, who has for years given his

active and extremely valuable expert service to the increasing of our collections without a dollar of compensation from the state. It is a pleasure to recognize in this public way a service so satisfactory in its result and so unusual in being rendered to the state without salary.

It is hoped that Dr Beauchamp may from the results of his work for the past 25 years give us a series of bulletins which will make his stores of special knowledge available to every student of the subject.

MELVIL DEWEY
*Secretary of the University*

# ABORIGINAL CHIPPED STONE IMPLEMENTS OF NEW YORK

## ARCHEOLOGICAL WORK IN NEW YORK

While much has been done by the state of New York in the preservation and dissemination of documents relating to early days, little until now has been accomplished in collecting and arranging those still earlier records, found so largely in stone, which reveal much unwritten history. All early writers describe a condition of things evidently not representative of periods which were then already days of old. Implements and ornaments had changed, arts and history had been forgotten, a new race had displaced the old, as we have taken its place in turn. We can only know what that history and those arts were, by seeking their surviving memorials in the soil.

The state, however, has done valuable service in embodying so much relating to what is called indian history, in many of its publications. Crude as was Mr Schoolcraft's *Report on the Iroquois,* made in 1845, it was a boon to the public, and preserved or suggested much valuable matter. This was notably the case with the several Iroquois dialects, afterwards much enlarged by him. The *Documentary history* and the *New York colonial documents* made other interesting matter accessible. The *Report on the indian problem,* in 1889, wisely placed the Iroquois treaties before the public, although it was great misfortune that the signatures to these were not submitted to an expert in indian names. It would have saved a host of needless errors.

The work of the regents in the same direction has been good as far as it has gone. The annual reports which contain the papers of L. H. Morgan on recent Iroquois implements and ornaments, are yet among the most popular and best preserved. Part of these were afterwards embodied in his valuable *League of the Iroquois,* and were first produced nearly half a century since. The publication of Father Bruyas' Mohawk lexicon, written two centuries ago, was one of the earliest attempts to bring a New York indian language before the public, when systematically arranged. It has since been fully translated. The publication of the explorations and plans of Messrs Hough and Cheney, in the northern and western parts of New York gave prominence to the interesting earthworks in both sections, with occasional notes from others.

In connection with Mr Morgan's literary work he made an interesting collection of modern Iroquois articles for the state museum, and this has been partially supplemented by that made for the World's fair at Chicago, by the Rev. J. A. Sanborn. These might be enlarged. Occasional stone and other relics have come into the state collection by donation, but no systematic or sustained work has been done until that now begun. Individuals have not been idle in making up their own cabinets, sometimes soon dispersed, sometimes remaining, but often far surpassing anything belonging to the state. Notable among these are the collections of O. M. Bigelow, in Baldwinsville, illustrating Onondaga and neighboring counties; that of J. S. Twining, Copenhagen, pertaining to Jefferson county, now in the possession of the state; and those of S. L. Frey, Palatine Bridge, and A. G. Richmond, Canajoharie, so rich in the relics of Montgomery county and vicinity. Many smaller collections of interest might be mentioned.

The early Dutch writers are now available in many ways, and the various historical societies have added much to our knowledge of the aborigines. The Pennsylvania archives and colonial records contain much relating to those of this state, and other valuable material will be found outside of our limits. The recently discovered journal of Arent Van Curler (Corlaer) is a treasure indeed. The *Jesuit relations* have been diligently culled and annotated, and large portions relating to New York are now within easy reach. Valuable notes on local antiquities may be found in such works as Bolton's *History of Westchester,* Hough's *Histories of Jefferson and St Lawrence counties,* Doty's *History of Livingston county,* Young's *History of Chautauqua,* the *Onondaga centennial,* Clark's *Onondaga,* and many other local histories. Some are carefully prepared, forming a good working foundation.

The work done by Mr Squier as yet stands alone as a general account of the antiquities of New York now accessible to the public. Dr Frederick Larkin published a little work in 1880, entitled *Ancient man in America,* which is a careful treatise on the antiquities of the western part of the state. The Rev. W. M. Beauchamp prepared a map for the U. S. Bureau of ethnology, some years since, with de-

scriptive notes of the Iroquois portion of the state, much of it from personal field work. This has since been enriched, and now contains all the reported indian sites of New York, large and small. It is very suggestive in many ways. The Bureau of ethnology has done much here, although its larger fields in the west compel it to leave many things to local efforts.

Philology has had its students. The issuing of Father Bruyas' valuable Mohawk lexicon marked an era in this respect, and Mr J. G. Shea has made valuable contributions from early French publications since that time. Messrs L. H. Morgan and O. H. Marshall did excellent work on the indian names in the western and some other parts of the state. Mr W. W. Tooker in the eastern, and the Rev. Dr Beauchamp in the central part of New York have done much in the same line. Prof. Horsford published Zeisberger's *Onondaga and Delaware dictionary* in 1887, but his journal of his residence at Onondaga still sleeps in the old manuscript at Bethlehem. The late Horatio Hale's *Iroquois book of rites* is an invaluable contribution to our knowledge of Iroquois songs and ceremonies. Prof. Lyman, of Syracuse, has recently taken down a large collection of indian songs, with the accompanying music, and the Bureau of ethnology is steadily at work on the Iroquois dialects. Others might be mentioned.

Colden preserved much in his history of the Five Nations, and the quaint and marvelous history written by David Cusick, the Tuscarora, has passed through many editions. It has recently been republished, with ample notes. Morgan's *League of the Iroquois* is a standard work, but has little to do with prehistoric, or even early historic times.

## ABORIGINAL OCCUPATION

The aboriginal occupation of New York was of a varied character and for a long time after it was first visited by man, almost its whole extent was but a temporary resort for hunters and fishermen. Rivers were the first places to attract men, and rifts on these were the favorite spots for camps. Good fishing and fording were important considerations and determined the routes of travelers and the location of many hamlets. The mere abundance of fish and game drew roving

men to some places, and the small supply of the former was a sufficient reason why the Mohawk valley was so little visited until a recent day. For a similar reason deep lakes were little frequented here, unless at the shallow waters near their outlets. The aborigines of New York seldom used the hook and line until after European contact, and the harpoon, arrow, stone fish weir and net were useful only where the water was of no great depth. Large lakes, too, were often perilous places for canoes, while on most rivers they could be employed at any time. Accordingly early relics and camps are most frequent near large streams and small lakes. Where a river was as large as the Hudson in its lower course, camps would be expected only near the mouths of its tributaries, or in sheltered spots; near the sea they would also occur on shallow bays. In the one case the burnt earth and frequent relics, in the other the great shell heaps attest the presence of early man.

Many of the finest articles, however, have been discovered near the old trails, or in low grounds. If lost on a village site in peaceful times, they would have been sought and found with comparative ease. On the road, time could not always be allowed for this, and weeds, brambles and mire might have rendered all search useless.

These visitors came from many directions, and with differing habits, as relics plainly show; but having once been here, there were soon favorite places of resort. In process of time small hamlets were formed, often but the renewal of fishing camps from year to year. The old lodges would be repaired or rebuilt on the same spots, used in the summer and abandoned in the winter. This was the Iroquois practice in the seventeenth century, and in Canada the wandering tribes had a succession of camping places, to which they periodically resorted. Some northern tribes were thus winter visitors in New York. Nearer the sea, many indian tribes as steadily vibrated between the shore and the interior as some of our people do now. The new is ever the old.

When the Iroquois came into New York they brought a change. They hunted and fished, but they were also growers of corn, pumpkins and beans. Although they camped on the rivers, their towns and forts were almost always at some distance from them. It might

be but a few rods, but often it was many miles. They wished not only strong positions, but situations where canoes could not reach them. This was always the case in warlike times, and the position of the town will often show confidence or fear. Their permanent homes also depended to some extent upon the soil, being a corn raising people; and in fact nearly all camps of others as well were placed on a light, and not a heavy soil. Very rarely indeed did other considerations outweigh this. Iroquois villages are thus not to be expected in regions characterized by primitive rocks; a glance at a map showing the indian sites of New York and Canada, will make apparent how much their location was affected by geological conditions.

The Algonquin tribes built palisaded forts in the eastern part of New York, somewhat like those of the Iroquois, and their long houses are reported to have been even longer than those of the latter. Earthworks here, however, were nearly all defenses of the Iroquoian family, and yield abundant earthenware. Some of these are quite recent, and in these are observed suggestions of a knowledge of European articles, soon followed by the articles themselves. These later sites, usually simple stockades, have often done a work similar to that of the Rosetta stone, but in another way. Knowing their age, and finding aboriginal relics on them of peculiar kinds, we are able to give the approximate age of similar articles elsewhere. In this will be found one great advantage of studying some New York sites, an advantage not confined in its results to our own borders.

One important question relates to the Eskimo. It will appear that some articles now used only by them are frequent in the northern part of New York, along with others which suggest their occasional presence. It is well known, also, that they once lived much farther south than now, and it may yet appear that they were sometimes visitors here. Rash conclusions are to be avoided, but so much is known as to call for further light.

It is to be deplored that such quantities of our finest relics are forever lost to the state, but this is a lament in which every part of our land shares. Enough remains to give us some idea of the arts — perhaps of the habits and history — of our predecessors. Although so

many forts and sites have also been obliterated, quite a goodly number have been located and described, and with a moderate farther research it is possible to tell a great deal of the occupation of New York in historic and prehistoric times.

The articles left by the aborigines here have a wide range in nature and origin. In a broad way they may be classed as flaked or chipped forms of stone, those of clay, those of shell, horn or bone, those of metal, glass and wood; and most interesting of all, those of picked or polished stone. This is a simple matter of convenience, for many things in all these have other relations. Fine and beautifully wrought articles may precede those which are rude, or they may have coexisted in the same camp or town. Horn and bone were often used with stone. Metallic articles were of a remote date, as well as recent. Wood was used in every period.

While many rude implements closely resemble those called paleolithic, these are usually surface finds here, pointing to no remote antiquity. In fact quite deep burial often proves no test of age, owing to some well known customs as well as natural agencies. Some implements made of argillite, and much changed by weathering or contact with the soil, although surface finds, are precisely like those occurring in the higher deposits at Trenton, N. J. Thus far none of the ruder articles have been reported at any great depth here, though this is but negative testimony, which farther research may change. Up to the present time polished stone implements have been reported here deepest of all. How reliable the reports are it is difficult to say.

Caches of flint are frequent, commonly composed of broadly chipped stones, rather more triangular than leaf-shaped in form, and nearly alike in size, although this is not always the case. In general they are supposed to be those from which others were to be made, having been deposited either for security or to preserve the temper of the flint. Although not strictly correct, this word will be used for a common material. Many of these simple articles were not farther elaborated, but at once came into use. Others may have been changed into other forms, but this is little more than theory. Their uniformity in size, and their burial in quantities give plausi-

bility to it, and it may well be allowed that they were brought from a distance for purposes of trade, or further development. Quantities of material came here in a still ruder form, which have not been found in caches, and among these were some of the choicer kinds. There are abundant flint flakes in places where they could only have come through the agency of man, and these indicate the arrow maker's temporary home.

The aborigines made but moderate use of the local hornstone, so plentiful in the corniferous limestone of New York, though it is often recognizable in the ruder articles to which it is adapted. At Black Rock in Buffalo, and across the river in Canada, one can easily see where blocks of hornstone were detached and used. Occasionally something of the kind will be seen elsewhere, but most of the material for the finer arrows, knives and spears came from without the state. Among these implements occur jaspers of every hue, white quartz, chalcedony, argillite, schist and sandstone, as well as the finer flints of bluish or brownish grey; yellow jasper was a favorite material, specially for large implements, and it is comparatively frequent in caches. It was probably derived from a neighboring state.

In a very broad way it is well known that the prevailing materials used in any region have a somewhat local character. Through Ohio and much of New York, the grey or drab cherts from the limestone are prevalent, with a projection of this material far southward. In the southern Atlantic states a brownish quartzite or coarse sandstone appears, with finer materials in the mountains. Along the Hudson and in New England white quartz was largely used; and in the northern states of the Mississippi valley an opaque white or pinkish flint was the rule. A characteristic dark hornstone also appears there in immense caches in some places. The beautiful arrows and other small implements of the Rocky mountains and the Pacific slope are also well known, and in other quarters yellow jasper is common. An experienced archeologist may thus often feel sure of the general origin of an article, without knowing precisely where it was found. That is a question of trade or migration.

Material is often a better guide in determining ultimate origin than form. The drills and scrapers of the east are often matched by

those of the west. A few New York arrows rival those of Oregon in size, though not in delicacy. When the stone used is considered the difference is more obvious. Form and material may both aid in determining what people visited New York in early days. In a representative and ample collection from this state, where the locality of the specimen is clearly and correctly recorded, as it always should be, later critical study of this kind may establish facts now unknown, regarding early migration and trade.

Celts, gouges and pestles were often made of local pebbles, but those of basalt and striped slate may show a different origin. Gorgets, tubes, ceremonial stones and amulets often do the same. Native copper implements of course come from afar, and sheets of mica do not naturally occur here. Steatite, as fragments of vessels, is also found abundantly, hundreds of miles from any quarry, and other like things will appear in due time.

All flint implements are not arrows or spears, however much they may resemble them at first sight, and thus a lack of observation and distinction has led to errors. It is not long since Sir John Lubbock said that there were no scrapers here, whereas many forms are abundant in New York alone, some of them precisely like those used by the Eskimo now. They simply had not been observed or reported. A very large proportion of implements termed arrows or spears are really knives. They never could have been shot or thrown with precision, they are so bent or one-sided. Many drills have also been called arrows; and in fact articles often grade into each other, or unite characteristic features. Drill, knife and scraper may appear in one implement, and a writer in early days said of western arrow points, 'if no knife is at hand, they use them also to skin the animals they have killed.' They would answer well.

While there are many gradations, or variations of form, in the flint implements found in New York, few typical examples have been found or described which are without representatives here, unless it be in some massive forms. Farther observation may supply these, and perhaps even others. On the other hand, some notable types appear here as yet undescribed. These should have due prominence.

In chipped or flaked implements the simplest form was that of the knife, which might sometimes be used for a spear, but not often for an arrow-head, unless of unusual symmetry. Many simple flakes were employed for this, the edge being sharply and neatly chipped. Some of these inconspicuous flakes show better workmanship in these edges than large and symmetrical implements, but they seem to have served only a temporary purpose. A knife was wanted; a flake was picked up, to which in a few moments an edge was given; it was used and thrown away. So that it was sharp, little more was required for mere use, but in many cases knives were both large and beautiful. As has been said, in an emergency almost any article might serve as a knife, but there are many special forms. When the surface was bent, as was often the case, knives were probably used also as scrapers, without having the distinct scraper edge. Some agree with Loskiel's description, who says, 'their knives were made in a long triangular shape, the long sides being sharpened.'

### ARROW MAKING

In an excellent article on the stone art of the Mississippi valley, (13th *Annual report of the bureau of ethnology*, p. 139-42) Mr Gerard Fowke gives an extended account of arrow making, as practised in different places. Without going into full detail, it may be well to say here that chipping was usually done by pressure or percussion. In almost all cases, a piece of horn or bone, slightly notched, was used as a flaker. The process has been observed by many, for it is not an extinct art, although steel is now often substituted for horn or bone, and glass for stone. Any stone which will admit of a conchoidal fracture, and some which will not, may be used; for large implements, and even for small, a siliceous limestone or even sandstone was often employed. Quartz was used, but some varieties were not adapted for delicate work, while for large implements it was a showy material.

Usually the stone is held in one hand, or placed on wood, buckskin, a blanket, or other yielding substance. More rarely it is held against a stone anvil, and chipped with a stone hammer. Simple pressure suffices in most cases, the bone flaker being set against the

proper points, and small pieces being chipped off by pressing it in different directions. Some hold the stone in the hand, setting the tool at different points and angles, while an assistant gently strikes it. Pincers are sometimes used, and the Klamath indians hold the wooden handle of the flaker under the arm, pressing the stone against the point. A long flat tool, found in Great Britain, was thought a flaking implement by Mr Evans, but the same stone article is here either a scraper or knife.

The time required in arrow making differs according to the size or delicacy of the article to be made. In his account of the indians of Virginia, in 1607, Capt. John Smith said, 'His arrow-head he maketh quickly, with a little bone, of any splinter of stone or glass.' Evans said that the Mexicans could turn out a hundred obsidian knives in an hour, but these were probably only long and sharp flakes, often made at a single stroke. Crook, however, states that the indians of the plains will make from fifty to a hundred arrows in an hour, with a knife for a flaker. These must be rude, however serviceable. A Klamath indian made a complete arrow-head in five minutes, and a Shasta indian took an hour for this. On articles of extraordinary delicacy and size, many days might be employed.

Mr Frank H. Cushing, in his address upon the arrow, at the Springfield meeting of the American association for the advancement of science in 1895, gave an interesting account of his own experience in arrow making. In a boyish experiment he stumbled upon the use of the bone flaker, by which he at once chipped the flint 'in long, continuously narrow surface flakes wherever the edge was caught in the bone at a certain angle.' His experience proved to him 'that paleolithic man, of the French caves at least — that man who is said to have known no other art of working stone than by rudely breaking it into shape by blows of other stones — could not have existed in such primary status of art for more than a few seasons at most.' (See *Proc. A. A. A. S.* 1895. p. 205)

Before he went to the Smithsonian institution or to Zuni, he had elaborated 'some seven or eight totally distinct methods of working flint-like substances with stone age apparatus.' His whole account is worthy of careful study, and to him we are indebted for the know-

ledge of one purpose of caches. From one pebble he had made 'seven finished knife and arrow blades in exactly 38 minutes;' and, 'from obsidian or glass a very small and delicate arrow-point — the most easily made, by the way — in less than two minutes.'

### ARROW-HEADS

There are local varieties in arrows, as in other implements, and on some sites one type may prevail to the exclusion of almost all others, but the distribution of all leading types is very general. There are few forms of the smaller chipped implements, from the Atlantic to the Rocky mountains, which may not be matched in form in New York, whether it be arrow, spear, drill, scraper, or knife, the early visitors bringing them from every part. In most cases the finer ones come from a distance, while for the smaller, more common and less valuable, the hornstone of the Helderberg group often sufficed.

Some small forms have been classed as boys' arrows, but there is little reason for this, for they are much too common, and were serviceable in hunting. Many are found in New York less than half an inch in length, and they occur in quantities not over an inch long. Primitive children's arrows were used with a blow-gun.

Arrow making was a necessity to every hunter, but all were not equally skilful, and some would acquire a high reputation, finding their work in demand. A division of labor was inevitable, even in savage life, and Roger Williams described this in 1643: 'They have some who follow onely making of bowes, some arrows, some dishes, (and the women make all the earthen vessels) some follow fishing, some hunting; most on the seaside make money, and store up shells in summer, whereof they make their money.' Some of the finest stone work here, also, was that of an early day, the Iroquois having no fondness for working in stone, and restricting themselves mostly to axes, small arrows and knives. The finest material, also, is not of recent date, but of that period when men were here as hunters and fishers, rather than as residents. This is true of ornamental stone work as well, except in the very recent introduction of red pipestone, and the fine stone pipes of the later Iroquois, made with metallic tools. The stone masks also belong to the historic period.

It is impossible to draw an exact line between arrows, spears and knives, although most of them may be easily distinguished; and it is almost as difficult to classify satisfactorily the varieties of either of these implements. Dr Rau arranged arrow-heads as leaf-shape; convex sided, with truncate base; triangular; triangular, but with indented base; notched at the sides, with convex, straight, or indented base; stemmed, but with various bases; barbed and stemmed. Others have suggested additional groups, but nothing exactly covering all has yet been proposed.

The common form of cached articles in New York is a straight base, straight or slightly concave edges gradually expanding to the full width of the stone, whence longer curved edges contract to the point. These coarsely flaked implements are commonly from four to five inches in length, and sometimes scores occur in one cache. Although usually of the drab, grey or dark hornstone, this is not invariable, nor is the size always the same. They may be found near streams navigable by canoes, but not always close to them. In some cases they are comparatively distant from prominent routes or resorts, but in places favorable for hunting or fishing. They are frequent in New York, and fig. 1 is typical of a large class often used without change. It is one out of a cache of 29 of the same form, and is four inches long, but among the rest were some larger.

Those which Dr Rau called leaf-shaped arrows, seem to be knives as a rule; at least they might have been used as such, and it may be best to refer them to that class. In most cases his convex sided arrows, with truncate bases, seem knives also. The triangular forms, with either the straight or indented base, are true arrow-heads, and these were favorites with the Iroquois, who seldom used others. Their use was not confined to them. Triangular arrows with straight bases are somewhat rare, but the other form is common, and sometimes very slender and beautiful; true arrow-heads, though suggestive of drills. They vary from one to two and one-half inches in length, and on some sites no others will be found. When the Iroquois had brass to use, they retained their favorite form, and the metallic point was simply sheet brass, cut in a long triangle, perforated or not.

To Dr Rau's classification may be added two kinds of bunts, which are divisions of the stemmed arrows, sometimes with expanded

bases; pentagonal and straight sided, double notched, and what is locally known as the shark's tooth form. These might be placed in his classes, although he gives no examples of these forms. Some of them are somewhat local, and beveled arrows may prove to be scrapers.

The various forms of triangular arrows are often called war arrows, and Catlin makes a distinction between war and hunting arrows of a little different nature. (See *North American indians*, 33). He says that the quiver 'generally contains two varieties. The one to be drawn upon an enemy, generally poisoned, and with long flukes or barbs, which are designed to hang the blade in the wound after the shaft is withdrawn, in which they are but slightly glued; the other to be used for their game, with the blade firmly fastened to the shaft, the flukes inverted, that it may be easily drawn from the wound, and used on a future occasion.' If the barbs are the essential distinction, many other forms besides the triangular would be called war arrows.

The wonderful rapidity with which indians send their arrows has been remarked by both early and recent writers, and this argues a corresponding facility in making them. They were not confined to war and hunting, but were largely employed in shooting fish. Father Rasles mentioned this when he was among the Illinois in 1693. When they wanted fish, 'they embark in a canoe with their bows and arrows, standing upright, for the purpose of more easily seeing the fish; as soon as they perceive it they pierce it with an arrow.' This method was noticed farther east, and in Johnson's *History of New England*, 1654, it is said, 'Their Boyes will ordinarily shoot fish with their Arrowes as they swim in the shallow Rivers, they draw the Arrow halfe way, putting the point of it into the water, they let flye and strike the fish through.' Loskiel mentioned the same thing in Pennsylvania, in the last century, 'Little boys are even seen frequently wading in shallow brooks, shooting small fishes with bows and arrows.' Lawson (1714) observed the same thing in the Carolinas, and other early writers refer to it elsewhere. This is one reason for the abundance of arrows along rivers and streams, and this would allow of much larger heads than the usual 'regulation size.'

Triangular arrows with concave bases are widely distributed, and in New York their chief distinction is in material and breadth. In

Europe they seem rare. Sometimes they are almost equilateral; at others nearly as slender as many perforators. They are usually neatly chipped and thin. Fig. 2 is a small example, about as broad as long, being an inch in extent. It has a concave base, and is of common flint, slightly mottled. This comes from the Seneca river, where it is a frequent form. It is sometimes much smaller. Fig. 3 is of brown flint from the same stream. In this, however, while the base is more deeply concave, the lateral lines are slightly convex instead of straight, and the width exceeds the length, being one and three-eighths inches. Fig. 4*a*, a still broader form, seems a true arrow, and yet there are reasons for thinking it a knife. It is of common dark flint, and is one and one quarter inches wide. Fig. 4*b* is an extreme form of this, from Cross lake. It is of an obscurely banded drab flint, and the width is one and eleven sixteenths inches, more than double the length, if we call it an arrow, but its proper place seems with the knives. Fig. 4*c* shows the other extreme of this somewhat rare form. In this all the angles are a little rounded.

Three early forts, near Baldwinsville, have afforded some of the finest examples of the straight sided, slender triangular arrows, varying from one and one quarter to two and one half inches long. From one of these, a stockade on the north side of Seneca river, come both broad and extremely slender forms, with all intermediate grades. Fig. 5 is one of these, one and one quarter inches long, and of dark flint, proportionally quite as broad as those so frequent elsewhere. Fig. 6 is of light drab flint, and is two and one half inches long, the utmost limit technically allowed for arrow-heads. It will be seen that an inch more would add little to its weight, or resistance to the air. Fig. 7 is of the same material, and from the same place. It is two inches long, and another almost as long is very much narrower.

An Onondaga stockade, occupied about A. D. 1600, has this smaller and broader form, but with few examples. It occurs a little later in time, in common flint, in a stockade a mile south of Delphi, but is not as neatly chipped. An Onondaga stockade south of Pompey Center, apparently occupied about 1640, has the same form and material. Fig. 8 is an example, one and one eighth inches long. Some are smaller than this. Most of these later specimens are small,

and have a deeply indented base. They occur on Indian hill in Pompey, the site of the Onondaga town which Father Le Moyne first visited in 1654. Fig. 9 is a beautifully mottled one from Watervale, in the same town. It is two inches long, and is exceptional in material, as most of these are of common flint.

In the early Mohawk towns the same favorite Iroquois arrow appears, but in a ruder form. Fig. 10 is a curious example from the earthwork in Minden, near Fort Plain. This work seems to have been one of the earliest triad of Mohawk forts, occupied respectively by the three clans of Turtle, Bear and Wolf, and having suggestions at least of European contact. Squier's statement that European articles have been found there, seems premature. This arrow point is of grey flint, one and one quarter inches long, and may be unfinished, as it is flat on one side, and much ridged on the other. Fig. 11 represents another of the same material, and much like the last, except in having a lower ridge and deeper base. This comes from a Mohawk town east of Wagner's Hollow, which has afforded some of the most remarkable relics of the early historic period. Although usually of common flint, fig. 12 shows a very pretty white one from Baldwinsville, which is not only a good example, but is very finely serrated.

There are distinct varieties of the triangular arrows, and fig. 13 represents one of the rarest of these from the double walled earthwork, three miles southeast of Baldwinsville. It is of a beautifully variegated and lustrous flint, with a distinct groove in the center of each surface, tapering from base to point. The base is much indented, though not as deeply as in some, and the length is two and one eighth inches, with convex edges. The locality is of importance, as showing this to be an Iroquoian form. Fig. 14 shows another of these from Cross lake, two and one half inches long, which is very fine, and of a light bluish grey flint. Other fine examples might be given, for though somewhat rare, it is widely distributed.

Another variety, in which the edge presents a double curve, is locally called the shark's tooth form. Jones, in his *Antiquities of Georgia*, calls most triangular arrows the shark's tooth form, but in New York it is restricted to a peculiarly curved outline. Fig. 15 is

an extreme form of this, made of common flint, one and three quarters inches long. It is remarkable for its obtuse barbs. This was found on Onondaga lake. Fig. 16 represents the typical form, with gentler curves and sharper angles. It is a large specimen from Ithaca, of dark flint, and two and one quarter inches long. Many differ hardly at all from this except in size. Fig. 17 is a slender form from Brewerton, of common flint, two inches long. They are rarely as slender as this, but many intermediate varieties occur, none of which have slender barbs. Good examples seem almost peculiar to New York.

Notchless pentagonal arrows are moderately distributed, and occur in several materials. Fig. 18 is one of common flint, from the town of Van Buren, and has angles somewhat rounded. It is quite flat, and one and three quarters inches long. They are usually quite as broad as this, though slender forms occur. A ruder and more massive one, of the same size and outline, comes from Baldwinsville. It is made of a piece of common hornstone, which unites the light clay color and the dark drab tint. They may be either arrows or knives.

The name of bunt has been adopted for a class of stemmed stone arrow-heads, with broadly rounded or obtusely pointed ends. The term was first used in Missouri, and while Mr A. E. Douglass, of New York city, has 753 Missouri specimens in his collection, he reports none from this state. They are frequent farther south and southwest, and seem here most abundant on the Seneca river. In outline they often have the scraper forms, and are sometimes confounded with them, but the class will hold good. To this day the Onondagas use blunt headed arrows made entirely of wood, as they probably always did. Sometimes those of stone seem to have been merely broken arrows, long ago recut for use, as in fig. 19, from Seneca river. Of course this might have been used for digging purposes, like longer ones of this form, but it seems too short for this. In this specimen there is no perceptible difference in the flaking, as though it had a secondary use. It is one and one half inches long. Fig. 20 shows a longer and straighter form, made of light grey flint. This is quite thick, and about one and three quarters inches long. Fig. 21 is a typical form, of which there are many examples. It is

of common flint, and is one and one half inches long. Most of these are from Onondaga county. The same form often appears in scrapers. Fig. 22 can hardly be assigned any other place, although too long and heavy to be strictly called an arrow, being two and three quarters inches long, and very coarsely chipped. It is of common flint, and occurs on the Seneca river in smaller sizes. As an arrow it might have been used to stun fish.

Fig. 23 is a fine arrow of the bunt form, quite flat, and with a finely rounded edge. It is one and three eighths inches long, and is made of a fine brown flinty sandstone. In this the stem expands at the base. Fig. 24 is even finer, and is of dark blue flint, about one and one quarter inches long. It differs from the last in having distinct barbs. Fig. 25 has a simple rounded stem, and is a beautiful specimen, made of light grey and lustrous jasper. It is from Cross lake, and is nearly one and seven eighths inches long. This is more properly a scraper, for though it is neatly chipped all over both sides, yet one side is much the flatter, and the edge is cut at the usual angle. It may be considered an intermediate form. A large proportion of the bunts on Seneca river have the rounded end, but some are angular. They are quite variable.

Among the stemmed but notchless forms are many having a suggestion of barbs, and of the kind which Catlin called hunting arrows. This projection, when not carried below a horizontal line, is now called a shoulder, and is a frequent feature. The edges may be straight or curved, and they are so common as scarcely to require illustration. Fig. 26 is a good typical specimen, made of light grey flint, and one and seven eighths inches long. This is from Cross lake. An infinite variety will be found in this simple form, produced by variations in length, breadth, and proportion of parts. Fig. 27 is a very odd example, of yellow jasper, suggesting both the pentagonal and bunt arrows, and having deep notches. A little central point also suggests the drill. It comes from Tonawanda and is but little over an inch long. Fig. 28 is still more curious here, being more like extreme western forms than those of New York. It is very small, too, though others here, of a different outline, are less than half the length of this. It might be described as a narrow and a

broad triangle, united by their bases. It is of flint, one and one quarter inches long, and is said to have been found on Grand island, in the Niagara river. Fig. 30 is a very small and pretty arrow of yellow jasper, three quarters of an inch long, and comes from Amboy, west of Syracuse. Yellow jasper is a common material for small arrow heads.

Fig. 31 represents a very common form. This is of white flint, two and one eighth inches long, and comes from Brewerton. It is neatly chipped, and has a slightly expanding base. There are many small and often good specimens of this form, usually quite slender, and made of the nearest hornstone, but fine examples occur on most indian sites, except those of the Iroquois. Beveled arrows are commonly of this form.

Among the notched or shouldered arrows, of every variety, more or less occur which are of a spiral or twisted form, but whether this came from design may be a question. The indians were aware of the advantages of a rotary motion, and learned to rifle smooth bore guns very neatly for themselves. Loskiel said, 'Many of the Delawares and Iroquois have learned to make very good rifle barrels of common fowling pieces, and keep them likewise in good repair.' On the other hand, the triangular Iroquois arrow-heads, whether of metal or stone, were made as flat as possible. Obviously, a rotary motion was not always desirable in the woods, and to this day the Onondagas do not feather their own arrows, though they will do it for others. Accordingly, as the spiral twist is the exception rather than the rule with stone arrow-heads, and is quite as frequent in knives and spears, this feature is to be ascribed to the first flaking of the material, rather than to design. It may be observed that in the picture of the battle on Lake Champlain in 1609, the indians on both sides have feathered arrows, as is the case in the picture of a Susquehanna warrior made about the same time, and this might be thought the idea of the European artist, rather than the fact, were we not told elsewhere how the southern indians affixed the feather. When required, the Onondagas feather their shafts very simply and neatly. The shaft of the feather is split, one side only being used. The anterior part of this is stripped and bound on the arrow shaft,

pointing toward the notch. Then the feathered part is reversed, given a slight twist, and bound firmly at the end. As this spiral twist is said to be purely American, some have claimed that thence came the idea of rifling gun barrels. This feature, however, appeared in Europe as early as 1520; even earlier as regards the mere groove.

Another arrow form is not distinctly notched in the usual way, but has an angular indentation on each side. Fig. 32 is a good illustration of this. It is of common flint, one and one half inches long, and was found on the Seneca river. Such arrows are quite flat, and might easily have served for knives. Fig. 33 is of the same form, but a little larger, being one and three quarters inches long. It is of brown flint, and was found on Oneida lake. These are typical of many others, but some are proportionally very long. Fig. 34 is an intermediate form, with curving instead of straight outlines, and this also is typical of a large class, many of which are not more than half this length. It was found on the Seneca river, and is one and five eighths inches long. The material is that whitish flint, so commonly used in some parts of Illinois, and which is frequently seen in arrow forms in New York.

Some parallel sided angular arrow-heads are both remarkable and rare. Two of the best specimens of these were found on the Seneca river, more than ten miles apart, and no one can doubt they were made by the same hand. Both were picked up by the writer, one being at first thought a broken arrow, as it lay on the ground. Fortunately something about it arrested attention, and a slight examination revealed its great value. For comparison, as well as on account of their unique character, both are represented in figs. 35 and 36. They are quite thin, one and one eighth inches long, angular and straight sided, and are of drab flint. The notch on each side distinguishes them from some other forms. One much like these was found at Newark Valley, of the same material, but slightly larger. It differed in having a distinctly concave base. Fig. 37 has a resemblance to these also, but is much larger and ruder, although thin. It is of a grey flinty limestone, and was found on the east side of Skaneateles lake. The length is two inches, and the width but very little less. Fig. 38 shows one from Herkimer county, of common flint, and

one and one half inches long. It is not as symmetrical as the parallel sided ones mentioned, and it has a notch in the center of the base, besides those in the sides. There are other examples which are much less striking than these.

Fig. 39 is of yellow jasper, with curving edges, and somewhat thin. It is an inch long, and has long barbs, a feature not common here. It has the needle-like point, found in many arrow-heads, but usually more distinct than in this. This feature is shown in a broad way, though by no means typical, in fig. 40, which is of black flint, one and five eighths inches long, and from the Oswego river. This has long barbs, though shorter than in some imperfect specimens, such slender projections being peculiarly liable to fracture. Its general character is more like articles from Ohio than New York. Fig. 41 is the most remarkable for material, being a shark's tooth, perhaps a fossil, one and one half inches long. It has been deeply and narrowly notched, but is otherwise unchanged. It may be a memorial of the Iroquois wars with the Catawbas and other southern indians, or it may be of an older day, for, although found near an historic Cayuga site, its age is uncertain. It was found in a grave near Union Springs, on the east side of Cayuga lake, by Mr S. L. Frey of Palatine Bridge, whose account may be quoted. 'The burials at this place were very numerous, and judging from the state of the bones, older than the coming of the whites, unless a single glass bead which I found there, would seem to indicate white trade. At this place, associated with many small shell beads, or rather shells used for beads, was the arrow referred to. It is perfect, and just as it was in its original state, except the two slits which have been cut for fastening it to the shaft. The enamel is as hard, glassy and perfect as ever, and it is really a unique specimen, as far as my explorations go. I think similar ones were used by the southern indians.' The locality is one where there were early and recent cemeteries and villages, but on the whole the grave was probably comparatively recent. Perforated fossil shark's teeth were used as ornaments in Georgia.

A few double notched arrows appear, but this feature is more frequent in the spears, where the advantage would be greater. In

fact these are so large that they might well be called a small form of spears. Fig. 42 is one of grey flint, and comes from Brewerton, where spears of the same kind are found, and it differs from them only in size. It is two and one half inches long, one corner of the base being broken off, so that but one notch remains on that side. The notches are neatly made. Fig. 43 is a curious one from Onondaga lake, of the same length, and of common flint. It is much thicker than the last, and has a narrower base and broader notches. A similar base appears in one from Seneca lake, though somewhat wider. The latter may have a more definite claim to the title of arrow, being one and seven eighths inches long. It has a rounded point, and the notches are neatly cut. This is the smallest of these thus far reported.

The ordinary notched or shouldered arrows, the most abundant of all, occur in several varieties. Those with widely expanded bases are frequent in central New York, and are usually quite thick, although not invariably. Fig. 44 shows one of blue flint, from Nine Mile creek, in Onondaga county. This has a base one and one half inches wide, making the three sides nearly equal. So broad is the point of the next that it might be classed as a bunt. This is shown in fig. 45, which is of common hornstone, one and one quarter inches wide, and with a concave base differing a little from the last. In both of these the broad wings of the base are notable features, well brought out by the deep notches of the lateral edges. Fig. 46 represents another frequent form, which may be thin or thick, long or short. This one is of a variegated drab flint, one and one half inches long, which is a very frequent size. It comes from the Seneca river, and differs from the last in being longer, having shallower notches, and a straight base. There are many beautiful examples of this form, and it was well adapted for preservation, specially when thick. It may be observed that many such arrows are thickest toward the point, thus allowing the thinner part to be inserted in the shaft.

Fig. 47 is a more slender form, also somewhat common, though not usually as fine as this. It will be seen that most of these are simply notched triangular arrows, many of them quite as thin as in that characteristic form. This specimen is of drab flint,

one and three quarters inches long, and was found at Baldwinsville. One a little broader, but only one and three eighths inches long, was found at the same time and place. Some smaller and thicker forms are less deeply notched. They are among our most beautiful arrows.

It may be remarked that some eccentric forms were probably personal, or at least tribal, used to show ownership or nationality. It has been pointed out that two arrow points already figured, were made by the same man, so rare is the form, and so close the correspondence. If stolen or lost for a time he would have no difficulty in identifying his property. This extended into a national feeling. As we have seen, in recent times the Iroquois used the triangular arrow almost exclusively. If other forms were then as characteristic of other nations, the form of the arrow used would indicate the actors in any sudden raid, and these often had a pride in making themselves known. There are several instances in early history, where tomahawks or war clubs were used for this purpose. Thus, a Canadian indian, on a scout on Lake George in 1690, saw the English and Iroquois making canoes. Failing to make a prisoner he 'suspended three tomahawks within sight of their cabins, indicating to them that they were discovered, and that he defied them to come to Montreal. These tomahawks are a species of club on which they carve figures, and in that way manifest their wishes.' In speaking of some depredations committed in 1695, near Montreal, the French said, 'These blows were struck by some Mohawks and Oneidas, as we discovered by their tomahawks, which they left sticking in the ground, according to their custom.' It will be readily seen that a warrior who wished to be renowned might adopt a distinct form of arrow as his own, and be allowed a certain informal copyright. His arrow would prove his deed, whether in hunting or war. This, of course, could not be carried out to any great extent, and yet will account for some exceptional forms. Personal taste may well be allowed a place, but in a few instances a higher purpose may have been connected with it, and there is no doubt at all that little peculiarities clearly distinguished the implements and arms of various nations. Among the remaining Iroquois the snow snakes of the Onondagas and Senecas might seem precisely alike to the casual observer, and yet they have perma-

nent distinctions. The same considerations have their application to very many other things. Closely related as they were, each Iroquois nation had its own fashions.

Fig. 48 is not common, and the work is somewhat coarse. The basal line is also convex, a rare feature in this form, unless there is a central notch or double curve, as in some of the following. The lateral notches are also deep, and the implement is beveled. It is of brown flint, one and three quarters inches long, and was found on the Seneca river. Fig. 49, from the same place, is by no means rare, though quite variable. This is of brown flint, one and one half inches long, and with a basal width of one and three sixteenths inches. The notches are quite deep, and the cutting edges convex. The base is hardly as concave as in most of this form, which is of wide distribution, extending far to the south and west. Fig. 50 is of the same general form, but has a hollower base and straighter edge. This is of brownish white flint, and comes from Brewerton, at the foot of Oneida lake, for ages a favorite resort of the aborigines. It is one and five eighths inches long. Fig. 51 is of dark brown flint, one and seven eighths inches long, the base being one and one quarter inches wide. This is also concave, and the implement is thick. It comes from Onondaga lake. Fig. 52 is another, made of common hornstone, with a fine concave base. The full length is two and one quarter inches, and the base is one and three eighths inches wide. It was found at Baldwinsville, and the form is rather frequent in that vicinity. A much smaller one, with some peculiarities, comes from the same place. It is but little over an inch long, and the base is much deeper and more indented. This form even occurs in quartz, but with less elaboration.

Some of the smaller arrow-heads have peculiar features, and slender ones, with one sided bases, occur occasionally. Fig. 53 is a good illustration of these. It is of drab flint, one and five sixteenths inches long, and quite inequilateral in every way, so much so as to make it a question whether it should not be called a very small knife. They are hardly common, and those figured here are from the Seneca river. Fig. 54 is another of these, of the same material, but proportionally much wider than the last. It is but little over an inch long,

and browner than the one preceding it. Fig. 55 is of the same brownish hornstone, but perhaps more like limestone, and less neatly chipped than the others. It is also more symmetrical. It is one and five sixteenths inches long. The first may be considered extreme forms of these.

Fig. 56 has a double curved base, angular in the center, and is of an obscurely banded dark blue flint, rather thick, and two inches long. It comes from Seneca river, where there are many modifications of the form. Fig. 57 is from Wood creek, east of Oneida lake, an early thoroughfare in historic times, but less so at an earlier day. It is of common flint, two inches long, and has the double curved base more deeply notched than the last. It has also a much narrower and more rounded base, this being less wide than the main part of the arrow. They are sometimes distinctly barbed, rather than shouldered. A beautiful one of variegated brown flint, two inches long, comes from near the Seneca river.

Fig. 58 is from the same vicinity, and is of a light brown flint, with two black bands appearing on one surface. It is quite thin, and is one and one quarter inches long, the base being seven eighths of an inch wide, this being the broadest part. The form is quite odd in several respects, being somewhat angular, and with straight converging sides. Fig. 59 is another broad and peculiar form, less prominently notched than the last, but almost as nearly triangular. It is of drab flint, and quite thick. The length is two and one half inches, and the breadth one and five eighths inches. It comes from the Seneca river, and might be called either arrow or knife. It would be rather heavy for the former, unless used at close quarters or in shooting fish. It must be remembered that much of the primitive forest archery was at short range.

Fig. 60 is much like the last in outline, though with a deeper base, like some preceding forms. It is small for so neatly made an implement, being considerably less than an inch in length. This is of light colored flint, and is also from the Seneca river. The surface is even, and the outline very symmetrical. Fig. 61 resembles the last, but is a ruder specimen, being quite thick and ridged through the center. It is of dark flint, one inch long. This form is quite abundant

along the Seneca river, and varying examples will be given later. Although small, they are quite large enough for effective use.

Fig. 62 is a very rare and beautiful arrow-head, made of light bluish flint. The point has been slightly broken, and was acute, making the original length one and one half inches. It is straight but not parallel sided, the base is deep, and the notches so much enlarged within as to give both base and sides the appearance of approaching barbs. Its most striking feature is that of expanding above the notches, until half way between these and the point. The surface is flattened. This unique specimen came from the Seneca river, which was a favorite early resort, both for its own advantages, and as being the outlet of so many lakes. At every rift are found camps and hamlets of varying age and character, and these rifts are quite frequent in its long course, which was easily navigable by the indian's light canoe, as it has since been traversed by the larger vessels of the white man.

Fig. 63 is a small, but prominently shouldered arrow-head of opaque white flint, found opposite Three River Point, where the Oneida and Seneca rivers unite to form the Oswego. The junction of two such important streams made this a natural stopping place, and many arrows and spear-heads of similar material have been found there. This is but one and one eighth inches long, and several have been collected of similar form, but usually smaller. In this all the outlines are concave, except the lowest of all. Fig. 64 is another of these, from the Oswego river, and but one inch long. It is of dark blue flint, and every way more slender than the last. The base is wider, and it was distinctly barbed, but one of the barbs has been broken. Fig. 65 is of drab flint, and was found at Baldwinsville. It is but seven eighths of an inch long, and has a deep and expanded base, but has a strong general resemblance to the preceding. On comparing these with articles from other places, this may be regarded as a rare form. Neither Rau, Abbott, nor Fowke give any figures closely resembling it.

Fig. 66 has been referred to before, among those arrow-heads which have concave bases. It is a fine example, with a deeper and more angular base than usual, while it is also quite small. It is of

drab flint, one inch long, and quite thick. It was found on Seneca river.

Fig. 67 is a beveled arrow of drab flint, two inches long, and from the same locality. Besides the bevel on each lateral edge, the basal edge has also its bevel, which is not a common feature, and it is more slender than is usual with implements of this type and size. These are rarer here than farther west, and suggest scrapers. Those which are large enough to be classed as spears are sometimes quite slender. While the elaborate work distinguishes them from the broad flaking of the under side of the common scraper, it is difficult to assign any other use to the characteristic edge. At the same time, this edge is sharp enough for many cutting purposes, the bevel resembling that of a chisel.

Fig. 68 is a rare form from Wood creek, east of Oneida lake. It is of common flint, one and seven eighths inches long, indented but not notched, and presenting curved lines in every part. Except in the expanded base, it is much like one of the finest forms of knives, and might have been used either for knife or arrow.

Fig. 69 is a fair example of those arrows which end in a needle point, though this point is scarcely as slender as in some others. This is of drab flint, one and three quarters inches long, and was found at the mouth of Chittenango creek, where it enters Oneida lake. Such specimens are rarely perfect, but they often preserve the slender point, even when broken elsewhere. This curious feature suggests a union of the knife and drill. It has scarcely attracted attention elsewhere, nor are good examples frequent in New York. The points are too neatly worked to have been accidental, and they are too delicate for any rough usage, thus leaving their purpose to be conjectured.

Fig. 70 is quite another type, having convex edges and a slender base. It is of drab flint, two and one quarter inches long, and may have been either arrow or knife. It was found not far south of the Seneca river. The point is rounded, which is its main distinction from the next. Fig. 71 is not quite two inches long, and is of black flint, with sharp and thin edges all around. It is found in the same vicinity, and the same remarks apply to its use. This is straight and

symmetrical, but in some examples the surface is so distinctly curved as to leave no doubt of their being knives. This is true of other forms.

Fig. 72 is an unusual form of the triangular arrow or knife, having a truncate base and convex sides. It is of common flint, one and one quarter inches long and very thin. This comes from Owego, on the Susquehanna, and is quite rare in this state, and probably elsewhere. Neither the truncate base, nor the convex edges are features of our triangular arrows. Usually the base is indented, and the sides straight, but in larger implements both features may appear, and often do, separately or together.

Fig. 73 is a broad, notched, and finely serrated arrow-head of dark flint, from Seneca river and one and seven eighths inches long. Distinctly serrated flints are quite rare in New York, but frequent farther west and south. Those most distinctly serrated, and preserving the knife or arrow form, have been considered saws, and might well have been used as such. This was Evans' view of those found in Great Britain, but it has met with but moderate endorsement here. This feature, however, is so conspicuous in some that they will hereafter be referred to as saws in this paper, simply as a possible use.

Fig. 74 is a thick stemmed arrow-head of dark flint, two and one half inches long, and found on Seneca river. It is distinctly shouldered, and has a convex base and edges. The form is quite common. Fig. 75 is of quite a different character, resembling some before figured, but with a narrower base, the lateral edges also presenting two nearly straight lines. This is two and one eighth inches long, rather thin and of dark common hornstone, from the same vicinity. Fig. 76 is quite curious in form, although one of the stemmed arrows with expanding bases. It is quite thick, while at the same time slender in outline, and is of dark flint, two inches long. The work is rather coarse.

Fig. 77 is almost unique, while having the leading features of some preceding forms. It is one and one half inches wide, and but one and one quarter long, broadly shouldered, and with a concave expanding base. The straight edges meet at an obtuse angle. It is of light colored flint, rather thick, and like the last, comes from the

Seneca river. The base has a double curve. It is a fine example of a rare form.

Fig. 78 shows a frequent form which is often rude. This, however, is neatly made, and is ridged on both sides. It is of brown flint, two and one quarter inches long, has a long stem, and is from the same place. Such forms are often flattened on one side, and ridged on the other. Fig. 79 is a small arrow of drab flint, rather flat and a little curved. It is but seven eighths of an inch long, stemmed and broad. This is also from the Seneca river. Triangular arrows are found there even shorter than this.

Fig. 80 represents one of the commonest forms, and one very variable in size, material and finish. They are usually coarsely made, and probably were rapidly finished and little valued. This one is of black flint, and is one and one half inches long. They are often much smaller, and on many sites scarcely any thing else occurs. In assigning these small points to boys, the fact has been overlooked that the efficiency of an arrow-head was not in proportion to its size. Its office was simply to open the way for the shaft which propelled it, and for this purpose it needed only to be sharp and slightly larger than the shaft itself. Thus Verrazano, in 1524, found the Long Island indians using arrows tipped with fish bones, while farther east many had them tipped with stones. In an account of New England indians, written in 1620, it is said, 'For their weapons they have bowes and arrowes, some of them headed with bone, and some with brasse.' Capt. John Smith said that the indians of Virginia had many arrows headed with bone. Others used sharp stones, turkey spurs, or birds' bills. The Sasquehanocks whom he met in 1608, had arrows a yard and a quarter long, 'headed with flints or splinters of stones, in forme like a heart, an inch broade, and an inch and a halfe or more long.'

It will be observed that the writer differs from some on the true distinctions of arrow-heads, while following the usual classification as a matter of convenience. The small points were not made merely for children, but were useful to men. Length is a less essential feature than breadth, and some long and slender forms may have been used as arrows, where shorter and broader forms were not.

Obviously, half an inch added to the width, or a doubling in thickness, would have produced more resistance in the air than a much greater increase in length. At the same time, for certain purposes and where the range was short, as in the shooting of bears or fish, neither an increase in weight or breadth would have been a disadvantage. In a general way, more than one form would be found in the quiver, even while a special object was kept in view. Sir John Franklin unexpectedly met a party of Eskimo in 1825. These at once changed their hunting arrows for those of war, showing that they were well supplied with both. This distinction of kinds probably went much farther. The hunting arrows themselves were adapted for different kinds of game.

Fig. 81 is another of these small arrow-heads, made of dark flint, and one and one quarter inches long. Fig. 82 is a little smaller, being one and one eighth inches in length. Fig. 83 is a fine arrow of white quartz, two inches long. All these are from the Seneca river, and others of these simple stemmed forms present many variations.

Fig. 84 is a large and broad arrow-head of drab flint, from Onondaga lake. It is quite thin, and is two and one quarter inches long. This would have served quite as well for a knife, and is notched and well worked. Fig. 85 is from the same vicinity, and is more distinctly notched, and also much narrower. It is of blue flint, and is two and one eighth inches long. The base is slightly wider than the blade. This form is quite frequent in larger sizes. Fig. 86 is a very neat notched arrow-head, from the same place. It is made of common hornstone, and is one and three quarters inches in length, being both thin and symmetrical. Fig. 87 is quite curious, and comes from Oak Orchard, on the Oneida river. It is made of olive slate, of uniform thickness, and the edges alone are worked, much like a scraper. Arrows made of stratified material are hardly rare, but slates like this are seldom seen adapted to such uses.

Fig. 88 is a large barbed arrow, nearly two and one quarter inches in length, and made of a bluish drab flint, variegated with white quartz. It was found, with others of similar material, near Three River Point. The barbs are well preserved, and the work is good. Fig. 89 is a small notched arrow of brown flint, one inch long, and

comes from Seneca river, where many of this form have been collected. Fig. 90 is another neat little arrow-head from Onondaga lake. It is of light brownish drab flint, one and one eighth inches long. It has a wide base, and is almost barbed. Fig. 91 is a rare and beautiful form of the angular arrow-heads with parallel lateral edges. It is quite deeply notched, and differs from those already figured in the graceful concave sweep of the broad base. This unique article, of dark flint, and about one and one quarter inches long, was found at Newark Valley, Tioga county.

Fig. 92 is a small beveled arrow of dark flint, from the west shore of Cross lake, and is waterworn. Many articles are found in this condition in streams and on shores. This has a stem broadly indented on three sides, and is of unusual form for an article of this description. It is one and three eighths inches in length, and like all of its class, might easily be considered a form of scraper.

Fig. 93 has also a concave base, but much narrower. It is shouldered, and has a finely serrate edge, of irregular outline. The form is that of many Ohio specimens, and it is of a dark flint, one and one half inches long. It was found near Three River Point. Fig. 94 shows a very neat and unusual form of the notched base arrows, but it has the three conspicuous concavities which mark the last two examples. The point is broadly rounded, and while the length is but little over an inch, the width is seven eighths of an inch, from point to point. It is of common flint, and was found at Newark Valley. Fig. 95 is classed as an arrow-head, but is much like the flints so often found in caches, although smaller than most of these. It is of a light brownish grey flinty limestone, and is quite thin and sharp. The length is two and three eighths inches, and it was found on the Seneca river. Although this form, being symmetrical, is popularly classed with the arrows, its proper place seems to be among the knives.

Fig. 96 is a pretty stemmed and shouldered arrow-head of red jasper, from Baldwinsville, and is but little over one and one half inches in length. While articles of yellow jasper are quite frequent in New York, those of red jasper are rare, and sometimes, even then, the color may have been changed by heat. Fig. 97 has much the same outline, but is distinctly grooved at the base. It is a fine

article, of blue flinty limestone, and is one and five eighths inches long. It comes from the same vicinity. From its general width Fig. 98 would be called an arrow-head by many, and yet its general character is that of a perforator. The worn appearance of the point tends to confirm this view, though this may have come in other ways, as in digging, for which it seems partially fitted. There are so many forms intermediate between the arrow and the drill, that it is now described with the former, in spite of a strong conviction that it belongs to the latter. It is coarsely flaked, and is two and one eighth inches long. This also is from the Seneca river.

Fig. 99 is of purplish flint, thick and smooth, and is two inches long. It is a form not so common in arrows as in spears, and this is round pointed. The rounded base is found almost everywhere, but perhaps is nowhere very common. This fine specimen is from the Seneca river, where the larger forms sometimes occur. Fig. 100 is a triangular arrow-head of common hornstone, from Onondaga lake. Its special feature is the straight and expanded base, which is also quite sharp. The length is one inch.

Fig. 101 is a broken article, but given to show a good example of what has been called here the needle point. It is very attenuated, and the section added will show how thin and delicate it is in every way. This fragment is of very thin, dark blue flint, now about two inches long, and nearly one and one quarter wide. It was found on the Seneca river, where similar specimens sometimes occur, though not very often. If found elsewhere they have not been reported, but they are so often broken that they may have escaped attention.

A large proportion of the arrow-heads figured are from Onondaga county and vicinity, partly because these were easily accessible, but partly, also, because there they are found in greater variety than in most other places, this arising from natural causes very important to primitive man. Notable forms from other parts have been figured when possible.

While it is of importance to know how widely some leading forms are distributed, and what is their comparative abundance, the study of man's early history here requires that some unusual forms should

be recorded and illustrated. These are often the links which serve to connect widely separated sites. The knowledge already gained of the primitive articles used by the Iroquois, three centuries ago, has become of great and increasing value, and will hereafter aid in solving many problems. Different nations and ages had differing fashions, and the characteristic articles used and left behind, will throw much light on the early people of New York. To collect these articles for careful comparison, to illustrate them so faithfully that distant students may have the most significant facts before them, is something worthy of the attention of a state which has already done so much in the cause of science.

### SPEARS

As with arrows, so is it difficult to place an exact line between knives and spears. Indeed the primitive spear may often have been but a knife fastened to the end of a long pole, as men in more recent times have armed themselves, when lacking suitable weapons. Even arrow-heads may have been put to the same use in time of need. Spears and knives may both have been leaf-shaped, stemmed or notched, and may not differ in the least in outline. Often the thickness and sharpness are the only distinctive features. As regards size, this does not affect knives, but usually small points are called arrows, and the large ones spears.

Dr C. C. Abbott made a division of spears and lances, while L. H. Morgan, in his *League of the Iroquois*, omits spears from his description of their weapons. In his subsequent account, in the *Regents report* for 1852, he says that they did not use them, and although he simply asserted this it was not without some reason. Spears do not generally appear in early pictures, nor are they usually mentioned in accounts of early indian armor. As far as the pictures go, this is of little importance. They were sometimes, perhaps usually, drawn by European artists from descriptions given them, and they availed themselves of the privileges of art. Champlain expressly said that the Mohawk chiefs, whom he killed in 1609, wore arrow-proof armor, but in the picture they are as naked as all their followers. Capt. John Smith said of the Virginia indians, ' They of Accawmack

use staves like unto javelins, headed with bone. With these they dart fish swimming in the water.' This, however, may have been like the early Iroquois bone harpoon, barbed only on one side. The wooden sword, worn on the back, and sometimes with a deer's antler inserted, was mentioned by him, but no farther described. A strong point in regard to use is that on no Iroquois site in New York, has any early article been found which could be called a stone spear-head. At an early day they were abundant.

On the other hand, in his picture of Atotarho, David Cusick placed a spear in the hand of one of the messengers. Bruyas has allusions to spears in his early Mohawk lexicon, and their occasional use may be inferred from the *Jesuit relations*, but somewhat obscurely. The Iroquois sword, whatever that may have been, was often mentioned. Schoolcraft gives the word for spear in several Iroquois dialects, and Zeisberger uses for lance the name which appears in another lexicon, half a century earlier. One Virginia picture has indians with fishing spears, but these are described as having wooden points, not metal or stone. A weapon so useful was not likely to be abandoned until a substitute was found, but it seems certain that the large stone spear-head was not generally in use here three hundred years ago. History and archeology agree in this.

This is another of the curious proofs of a change in race and occupation. Iroquois and Algonquin alike seem to have known little of the higher stone art of their predecessors, and a weapon once everywhere abundant, had almost ceased to exist. A sweeping change had passed over the land, and the new comers did not inherit the arts of the old. If they did not, how could they have been their descendants? Allowing for every resemblance, there is still a wide gulf between the indian of our northern and eastern states, as first known to the whites, and those who preceded him. This difference can only be fully appreciated by those who have early sites of a known age, to examine.

Spear-heads vary greatly in character, and still more in size, if we make the minimum two and one half inches in length. In many places this would compel us to reckon more spears than arrows; and if we remember the vast numbers carried off — for these naturally

first attracted attention by their size — the disproportion will appear still greater. At the time of colonization and earlier, the indian's bow and arrows almost alone attracted attention. If the larger points are all spear-heads, his predecessors must have been as conspicuous for these. The difficulty might be solved by supposing the bow to have been a very recent invention in America. It is rather probable, as said before, that we have placed too low a limit on arrows, while forgetting how much of forest and river archery was at very short range.

This significant disproportion will appear in almost any good collection. In the classified list prepared by Mr A. E. Douglass, he has 261 New York spears and 963 arrows; from the country at large 2172 spears and 8396 arrows, or less than one fourth, and this would be a fair proportion elsewhere. Now in New York no spear-heads appear on Iroquoian sites, which supply many small stone arrow-heads, so that the New York proportion of early spears and arrows will be yet more equal. Supposing the bow and spear were at first used together, we would conclude that the arrow-heads should vastly exceed the spears; but under the present classification they do not. It is evident that this subject needs reconsideration.

While speaking of this it may be well to say a few words farther upon indian arms, which here included both less and more than is popularly known.

As has been said, early accounts make no direct mention of the spear, although there seem allusions to it. That used in fishing was altogether of a different kind. The bow was not the short one, so efficient in the hands of horsemen, but rivaled the long bows of England, while the arrows often exceeded the cloth yard shaft. Capt. John Smith said of the Sasquehanocks, that such great and well proportioned men were seldom seen, and that they had bows, arrows and clubs in proportion. Their arrows were five quarters of a yard in length, and in the picture of one of their chiefs, his bow reaches above his head. These were of the Iroquoian family, and in Champlain's pictures of encounters with the Iroquois proper, the long bow is everywhere seen. We may, therefore, conclude that this bow, still made by their descendants, was that commonly used in our forests in early days.

Of the making of the bow and arrow something may be said later, in connection with some peculiar curved scrapers, admirably adapted for this work, but yet too rare to have been commonly used. Capt. Smith, again, says that the Virginia indians made their bows by scraping them with shells, and the Iroquois may often have done the same, as they used shells for knives. The arrow shaft was straightened in several ways, and the Onondagas have not lost the art yet. It was headed with almost any hard and sharp material, or might be made entirely of wood. The arrow point might be fastened merely with gum, in the cleft shaft, or be bound on with sinew or thread. An Onondaga recently had a triangular stone arrow given him to affix to a shaft. He at once cleft the shaft, inserted the stone, took a piece of thin sinew, dexterously and neatly wound it about the wood and stone, and the arrow was ready for deadly use. Different nations used different arrows. Thus the Sasquehanocks had stone points, shaped like a heart, an inch broad, and an inch and a half or more long. It is probable that in this way Capt. Smith described the indented triangular arrow-head, as the Sasquehanocks were of the same family as the Iroquois. The latter used triangular arrows almost exclusively. The force exerted by these simple weapons was a matter of surprise to the colonists.

Shields were everywhere in use among the Iroquois but soon disappeared before firearms. Smith speaks highly of those of the Massawomeks, who seem to have been either the Eries, or a nation allied to them, and not the historic Iroquois, as many have supposed, although of that great family. Their light targets were 'made of little small sticks, woven betwixt strings of their hempe and silke grasse, as is our cloth, but so firmly that no arrow can possibly pierce them.' There was evidently nothing like these in Virginia, and those he had and used were everywhere recognized at once, as were their other arms. Champlain describes the armor of the Mohawks in 1609, very briefly. 'They were provided with arrow-proof armor, woven of cotton thread and wood.' Corlaer saw a sham fight among the Mohawks in 1634. 'Some of them wore armor and helmet that they make themselves of thin reeds and strings, so well that no arrow nor axe can pass through to wound them.' Similar passages might be quoted from others.

The Algonquins used shields of a rectangular form, and a Dutch writer of 1671 says that these covered the body up to the shoulders. In fighting these could be set on the ground, leaving both arms free. A Jesuit father, writing of a Canadian chief in 1633, said that he 'bore with him a very large buckler, very long and very wide; it covered all my body easily, and went from my feet up to my chest. They raise it and cover themselves entirely with it. It was made of a single piece of very light cedar. I do not know how they can smooth so large and wide a board with their knives. It was a little bent or curved in order the better to cover the body; and in order that the strokes of arrows, or of blows coming to split it, should not carry away the piece, he had sewed it above and below with a cord of skin. They do not carry these shields on the arm; they pass the cord which sustains them over the right shoulder, protecting the left side; and when they have aimed their blow they have only to draw back the right side to cover themselves.'

The use of the war club is well known, and this implement, with or without a stone axe or antler inserted, was the original tomahawk. The French writers often speak of the swords of the Iroquois and others, but without any precise description. They were sometimes fastened to poles by the Algonquins and used as spears. Stones or shells were used as knives, but the white man's knife soon supplanted these; and this was the lot of the stone axe, which was not grooved among the Iroquois, nor was it usually in New York or Canada. First, the French trade axe, and then the smaller steel tomahawk, became favorites, while guns took the place of bows and arrows.

Although spear-heads present a few varieties in New York not common here in arrows, so many are essentially the same, except in size, that they will require fewer illustrations. They are quite often of fine or showy materials, and are as variable in coarseness or delicacy of work as in other ways.

Leaf shaped spear-heads are often quite large. One of common flint, from Baldwinsville, has lost half an inch from its tip, and is still nine inches long, with an extreme width of two and three quarters inches. The base is neatly rounded, and the outline that which botanists term lanceolate. This form is common and when thin may

be termed a knife. Fig. 102 from Oswego county is a fine example of this type of spear. It is of pure white flint, and six and one half inches long. Articles of this showy material are frequent there, and are usually thin and finely worked. An early trail crossed that county from Oneida lake to Lake Ontario and the St Lawrence, and the many travelers lost some fine articles on the way. Between that trail and the Hudson river very few of the best early relics occur, as the Mohawk presented few temptations to those in search of game.

Fig. 103 has a straighter base than the last, and is not as neat in outline. It is quite thick, being eleven sixteenths of an inch in the short diameter, and five and one eighth inches long. The material is grey flint, and it comes from the east side of Skaneateles lake, in the town of Spofford. Another good example of this form is from the east end of Oneida lake, and is but three and seven eighths inches in length. A broad and fine one, with a slightly concave base, from St Lawrence county, is of white quartz, quite neatly chipped for this material. It is four inches long and one and seven eighths broad.

Fig. 104 is an example of a frequent and variable form, having a three-sided base. The edges may be straight or convex, and the thickness varies much. This comes from the north shore of Oneida lake, and is of black flint, five and five eighths inches long, and half an inch thick. These could only have been spears. A fine and larger one of common drab flint, from Baldwinsville, is six and one half inches long by two and three quarters wide. This has convex edges. Flinty limestone is a frequent material for these, and one from near Oneida lake, similar in form to the last, but little over four inches long, is made of birdseye limestone. Fig. 105 is one of the finest of these, made of common flint, and is seven inches long. It is very neat and symmetrical, and the form is the one so common in New York caches, though rarely as large as this. Large spears of this outline are not rare.

Those of a more triangular form are often knives, but spears will be found among them. It will not be necessary to figure many of these, or even to describe more than representative forms. A broad and massive one of common flint, from Onondaga lake, is five inches long, and has a width of nearly two and three quarters inches. The

base is concave, with rounded angles, and the edges gracefully curve to the sharp point. One of similar length and general outline, from the same place, is little more than half this width. Fig. 106 shows a beautiful spear or knife of fine white and somewhat translucent quartz, from Oneida lake. It is so thin and even that it might well be called a knife, but it would have served for a spear quite as well. The length is four and seven eighths inches, and it is scarcely three eighths of an inch thick. The greatest breadth would have been full two inches, had not an angle of the base been broken. Another beautiful example of dark jasper, from the shores of the same lake, is nine and three eighths inches long, and two and seven eighths wide. The base is straight, and the convex sides slightly expand toward the center. A beautiful lance-head from the Oswego river, has lost half an inch from its point, but is still seven and three quarters inches long. It is one and seven eighths inches wide at the slightly curved base, whence it tapers to the point. A similar one of grey quartz, from the same place, is five inches long, and two inches wide. The straight edges taper almost to the point, which they form by quickly curved lines. Fig. 107 is a very handsome one of white mottled quartz, three and five eighths inches long, and is also from Oswego county. The base is slightly rounded, almost immediately reaching the extreme width of one and five sixteenths inches, and thence sloping in nearly straight lines to the point.

Fig. 108 is a very remarkable specimen in every way. It is a fragment of a very large spear apparently, and is very evenly chipped. The material is a dark green jasper, and the straight and sharp base is four inches wide. The thickness is but five eighths inches. Nine inches from the base, where it is broken, it is three inches wide, and if continued on the same straight lines to a sharp point, it would have been nearly or quite three feet long. It is hardly probable that this could have been. It is remarkably flat, and possibly may have been used as an axe, the base forming the cutting edge, in that case.

Stemmed forms occur, with and without notches. Fig. 109 is quite broad, and has parallel sides, slightly notched at the expanded base. The point is quite obtuse, and the full length three and three quarters inches, with an average breadth of one and five eighths inches. The

material is a brownish drab flint, and it was found south of the Oneida river. It would have served quite as well as a knife. Fig. 110 is one of the simpler forms, with rounded stem, but ruder than in some examples, partly from its material. This is white translucent quartz, which allows little opportunity for delicate work. This form is frequent in many materials, and a beautiful one of chalcedony, with slightly rounded base, and four and one eighth inches long, comes from the town of Van Buren, south of the Seneca river. It is quite broad, with convex edges, and is slightly mottled. A much larger one, of reddish brown jasper, six and one quarter inches long, and three inches wide, has a point so broad and rounded as to suggest a spade. This is from Brewerton, and is coarsely chipped, though fine in outline.

Fig. 111 is a fine beveled spear-head of drab flint, found on the Seneca river southwest of Three River Point. It is three and seven sixteenths inches long, and about one and one eighth inches broad. This is narrow for a beveled spear-head, and of course there is a possibility of its being used as a scraper. In this example there is a notch in each lateral edge and the base is slightly wider than the blade. Simple notched forms like this are frequent in many sizes and materials, but beveled implements are much rarer. Many spear-heads occur with straight sides, but these are rarely parallel. The last four figures, all on one plate, are represented three fourths of the actual diameter.

Fig. 112 is a fine notched spear-head, with a small base. It is of common flint, six inches long, and the greatest width is nearly midway, where it reaches two inches. It comes from Baldwinsville, and, like most spears, is quite symmetrical. One much like it, but of light blue flint, was found at Cross lake. This approaches the double notched form. Fig. 113 has also a small base, and one perfectly simple. It is of a grey flinty limestone, and comes from the town of Elbridge. It is a trifle over six inches long, with an extreme width of one and three quarters inches, and is very symmetrical and neatly worked.

Fig. 114 is a beautiful notched spear or knife, made of a material much resembling moss agate, and often used in these larger imple-

ments. In flaking, this does not produce as sharp lines, nor always as symmetrical forms, but the effect is often fine. This is broader than usual with this material, and is almost three and one half inches long. It comes from the Seneca river, where articles of similar material often occur.

Fig. 115 is a very slender flint spear-head from the town of Wilna, Jefferson county. It is broadly notched near the base, and is four and one quarter inches long, with a width of much less than an inch. The base is about as broad as any part, and the slender form is not rare.

Fig. 116 is much like one already described, but has double notches on each side, although of a different character from those usually found. The base contracts to a point, and the notches are widely apart. It is a fine article of light grey flint, four and one quarter inches long, and was found in Oswego county, north of Brewerton, and half a mile from Oneida lake. The double notched spears seem more common in that vicinity than elsewhere, but this specimen is not of the usual type.

Quite massive and coarse spear-heads occur in several places, usually made of a grey quartzite, unsuitable for fine work. One of these, from Baldwinsville, is quite thick, and six inches long by two and one eighth inches broad. Fig. 117 is a good example from the same place, which is five and one half inches in length. Another from Owego, in Tioga county, is five and three quarters inches long, with an extreme width of two and three eighths inches. In this, however, the blade quickly contracts above the notch, giving the implement a much more slender appearance. Articles of this kind seem quite uniform in size. Fig. 118 much resembles these in form, especially the last described, but is much smaller, and of a variegated hornstone, a little over two and one eighth inches long, but the point is slightly broken. It comes from the Oswego river.

A broad form of the material resembling moss agate has been already given. They are usually longer and more slender. One of this description is from Baldwinsville, and is five inches long. It is a very fine example, a little unsymmetrical, rather broadly notched, and might be called a knife if it were sharper. Fig. 119 is one of the

finest of these, but has lost the extreme point, having been originally a little over five inches long. It has two notches on each side, and the surface is flatter and straighter than in others of this material, while it is also more slender. It was recently plowed up near Three River Point.

These spears and arrows with more than one notch on each side are but moderately rare, and are of wide distribution in New York, as compared with other parts of the country. Dr Rau figured a broken one from Maine, made of brown jasper, whose full length would have been six and one quarter inches. He marked this as 'quite exceptional,' and it had three notches on each side. It is of the usual New York form. Dr Abbott did not place this among his New Jersey forms, nor does it appear in Mr Fowke's chipped implements of the Mississippi basin and the southern states. The writer does not find it in his collection of outlines of rare articles in Ohio. One occurs in the collection of the Canadian institute, in Toronto, which is three and one half inches long, and has double notches, but there it is also called rare, and more have come under the writer's eye in central New York, within a radius of a dozen miles, than have been reported in all the country elsewhere. It might be considered a New York form.

A broken one of white flint comes from the Seneca river, and has two distinct broad notches on each side, with others which are obscure. This fragment is now two and three quarters inches long, with straight edges, tapering from a base one and one half inches wide. The original length would have been four and one half inches, unless it had a rounded obtuse point, as in the next. Fig. 120 is a fine article from Oswego Falls, and is of greenish white flint, four and three eighths inches long. The double notches are much more distinct than in the fragment just described. One of white flint comes from the Mohawk valley, and is five inches long, with three notches on each side. Another, made of red jasper, is from Brewerton, and is three inches long, with double notches. Similar ones occur there. A well wrought one of drab flint, from the same place, is three and one half inches long, and has double notches. A smaller and broadly triangular specimen, of common flint, comes from Skaneateles lake.

It has double notches, and is two and seven eighths inches long. Fig. 134 was inadvertently placed out of its proper order, but is in every way the finest of these yet found. The material is clouded quartz, and thus the flaking produced no conspicuous lines on the surface, but the outline is very neatly wrought. It is six and one half inches long, and was found in removing a stump three quarters of a mile north of Brewerton, in 1896. It is flat and thin, and nearly two inches wide, but its prominent feature is the number of notches, five on one edge and six on the other. The base is truncate, and the edges slightly curving to the sharp point.

Fig. 121 is a good example of a thin and narrowly notched spear-head of common hornstone, quite sharp, and attenuated at the point. It is about two and five eighths inches long, and is a very frequent form. This specimen is from the Seneca river, as is the next. Fig. 122 is also of hornstone, but quite thick, and slightly shouldered. The base is long, and does not expand, but is rounded at the end. It is three and one eighth inches from extreme base to the point, and is typical of a large class, very widely distributed.

Fig. 123 is a notable spear-head from Owego, near the Susquehanna river. It is of a blue grey flint, seven and one quarter inches long, and is a very rare if not unique form. Either end might have been used for a spear, had occasion required, but apparently this was the office of the longer and slender part. This had mostly concave edges, rounding to the point. The shorter and broader portion has convex edges throughout. The whole implement is neatly wrought throughout.

Some stemmed spear-heads have concave bases; perhaps no great distinction, and yet one which has attracted attention. Many others, slender, but of the notched arrow form, are made of white flint, a favorite material for spears, but obviously brought a long distance. While fine examples they present few peculiar features. Stemmed spear-heads with a convex expanding base are also frequent, and are usually notched. Fig. 125 shows a parallel sided form from Skaneateles. It is of drab flint, two and seven eighths inches long, and one and one eighth inches wide. While it is notched, the general outline is a long pentagon. Much like this, but larger, is one from Queens-

bury. Judging from collectors' reports, fine spears may not be frequent in that part of New York. In the former Wagman collection, made at Saratoga and near Lake George, but 36 spear-heads were catalogued. The largest was six and one half by two inches, and another, six by one and one half inches, had serrate edges. This collection was sold and dispersed in 1886. In Holden's *History of the town of Queensbury*, however, we are told that arrows, spears, and other indian relics are found at every carrying place between Albany and Montreal, and this we might have expected. Mr Holden adds that while gun flints, bullets, stone arrows and spears were spread broadcast in Queensbury, there were particular places where they were found abundantly.

Out of the many examples of spear-heads but one more will be noted now. Fig. 124 is a broad and thin chalcedony implement from Baldwinsville. It is triangular, with an indented base and convex edges. The length is four and one eighth inches, and it is a little over two inches wide. One peculiarity of this fine article is the neat and small notches, which are almost circular.

### KNIVES

The ruder forms of knives require but slight attention, as almost any flake or piece of hornstone might serve a temporary purpose, whether large or small. Early accounts show us an extensive use of bivalve shells, with or without alteration. Few of these can be found now, but the rude stone knives are abundant in many places, and are interesting as showing, not so much progress in economic arts, as the frequent utilizing of otherwise waste material. A flint chip was neatly edged on one side, or more, and did all that was required without farther elaboration. Fig. 126 is the type of many rather large and straight pieces, triangular in section, which were often used as knives, and might have served for scrapers. One angle or edge is left without farther work, but one or both of the other two may be delicately chipped for more effective use. Of course these could have been employed only in very simple ways. This one is of grey flint, and comes from Seneca river, where the form is frequent on many camp sites. The length of this specimen is three and one quarter inches, and one angle is quite obtuse.

Many rude knives, large and small, were nearly circular, and these also will require but slight notice. They are chipped to a sharp edge all around, and may sometimes have served as scrapers, although they do not have their peculiar features. The leaf shape is also very common and of wide distribution, varying from very small to very large. A very long one of brown flinty limestone, seven inches in length, has a surface greatly curved, being convex on one side, and concave on the other. The concave surface is a large single flake, except for the chipping along the edge. This special form is not rare, and is almost as much scraper as knife. The one described is two and one half inches wide. Another of dark hornstone, from Oswego Falls, is a typical leaf-shaped knife, five and one half inches long by two inches broad.

Fig. 127 is interesting, as being one of 23 found in the mound at Greene, Chenango county. It is of yellow jasper, three and three quarters inches long and two inches wide, and may have been buried there long after the mound was made. In the *Annals of Binghamton,* it is stated that 'At one point in the mound a large number, perhaps two hundred arrow-heads, were discovered, collected in a heap. They were of the usual form, and of yellow or black flint. Another pile of 60 or more, was found in another place in the same mound. A smaller leaf-shaped knife of yellow jasper, two and three quarters inches long, also came from a grave in Greene, as reported, but may also have been from this mound, so many articles of yellow jasper having been taken from it.

A very large and rude knife, seven and one quarter inches long, also came from a cache of 19 pieces at Baldwinsville. It was an unusually rough and mixed lot, nearly all of yellowish jasper, tinged with brown. Most of the pieces had the form usual in caches, but some were of ruder outlines, and a few could only have been utilized as scrapers.

Knives which are elliptical, or of a long diamond form, pointed at both ends, are often very fine, and are by no means rare. Fig. 128 is of drab flint, four inches long, and more slender and pointed than many of this form, besides being more angular in the center. It is quite neatly worked. A fine one of yellow jasper, from the Oneida

river, is almost a true ellipse, five inches long by two and three eighths inches broad. It is scarcely pointed, and many have this feature in other forms. A small one of common flint, which is but two inches long, differs little from fig. 128 except in size. Fig. 129 is a beautiful knife of light blue flint, five inches long. It is not a rare form, but with this outline is quite as often a scraper as a knife. Nothing can be prettier than fig. 130 which is of a beautiful banded white flint, three inches long. It comes from the town of Van Buren, some miles south of the Seneca river. Among the finest of this form is a very long and slender one from Chautauqua county. It is 11½ inches long, two and three quarters inches wide, and about a quarter of an inch thick near the two sharp points. The edges present so symmetrical a curve that the outline may be reproduced from these measurements. It was a surface find.

Three small elliptical flint knives are represented by the following numbers, all from Seneca river. These are commonly less than two inches long, but may reach seven inches. Fig. 131 is one of the small specimens, made of common flint. It is one and five eighths inches long. Fig. 132 is of similar outline, but made of dark blue flint, and of the same length. It is a neater article. Fig. 133, of grey limestone, is more slender, and is pointed. The point and part of the edges are slightly ground. It is two inches long. Specimens like these were once quite frequent.

Many stone knives approach what we call a knife form, and vary much in size. One of brown flint, four and three eighths inches long, is but moderately curved in its outline, while others are conspicuously so. A black flint knife, three and one half inches long, found on the Oswego river, is very distinctly curved in this way. Fig. 135 is of this curved form, and is quite thin and sharp. It seems to have had a straighter part of some length, for insertion in a handle. This has been partly broken off, but the remainder of the implement is still three and one quarter inches long. It is of brown flint, and comes from the Seneca river. Evans described some curved knives in Great Britain, much like these, and thought them peculiar to that land, but could assign no use for them. They seem well adapted for several purposes, but their very form suggests the knife, alike available in war or hunting.

Fig. 136 is somewhat like the last, and from the same river. It is much thicker, and not unlike some of the curious scrapers yet to be described. It is of brown flint, three and one quarter inches long, and somewhat twisted. Several have this feature. Fig. 137 is curiously curved, but is typical of quite a group. It is of brownish flint, three and five eighths inches long, and comes from the east side of Skaneateles lake. The general thickness is considerable, but the back of what might be called the handle is not sharpened, as is the rest of the implement. Another curved and twisted knife of common flint is six and one quarter inches long. All of this type vary much in thickness and neatness of work. Fig. 138 may be classed with these, though with quite a different outline. One edge is nearly straight, and the other much curved, the surface is also much curved, being concave on one side, and rounded on the other. It is of brownish flint, two and one half inches long, and comes from the Oswego river.

Some of the most delicate knives have straight bases and curving sides, the blade being broadest toward the point. Fig. 139 is one of these, of brown flint, delicately worked, and three inches long. This is from the Oswego river, and is typical of many others, always neatly finished, but often broken. Another from Three River Point is of yellow jasper, four and one eighth inches long. This is also a fine example. A longer and neatly worked specimen, made of brown flint, and five inches long, is from the east end of Oneida lake. Evans called a similar form in Great Britain a dagger, and it readily suggests that weapon, though usually rather frail for any rough usage.

Another frequent form of knife in some places is thin, parallel sided, and broken squarely off at each end, as though by design. They are somewhat local, and on many sites are never found. Fig. 141 represents one of these, of common flint, thin and bent, and two and three quarters inches long. This is from the Seneca river, where almost all have been found on two or three sites. One from Queensbury, three and one quarter inches long, seems much like these.

Triangular forms, with straight or convex sides, are common, and hardly require illustration. They vary much in width and thickness, and reach five inches in length, but are usually less. They are often curved on the surface, and are sometimes quite broad. Fig. 142 is

one out of a number of narrow knives of this form, all found on one small site on the Seneca river. They varied from three to four and one half inches in length, and were very thin and sharp. From their numbers and uniform character, it is probable they were scattered from a cache. The one figured is four and one half inches long, and one and one eighth inches broad. One of the finest of this form is of striped jasper, five inches long, and comes from Oneida lake. This, however, has curving edges, and is broadest near the center. A broader form than that last figured, appeared in a lot of 125 like specimens in a grave in Bellona, near Seneca lake. A few are nearly long, straight sided triangles. Some knives have the simple pentagonal form, so common in caches, and these are sometimes bent. This peculiarity is frequent in notched forms, usually classed as knives because of this. Fig. 146 shows an arrow form thus bent. In one instance a broad notched form from Oswego Falls, three inches long, has a distinct double curve of the surface. Other notched forms, and some of the simpler, may not have an equilateral blade.

Fig. 143 is a fine knife of grey limestone from Cross lake, much like the Queensbury knife just mentioned. It is truncate at each end, three and five eighths inches long, one and one quarter inches broad in the middle, where it is widest, and is somewhat thick. Fig. 140 is a small, slender knife, approaching the drill form, if not an implement of that kind. It is of variegated flint, two inches long, and comes from Seneca river. Fig. 144 is a coarse and heavy curved knife of hornstone, from Onondaga lake. It is five inches long and two and one quarter broad, with nearly parallel edges. This is quite a frequent form. Fig. 145 is the ordinary leaf-shaped knife found almost everywhere. This is of common flint, three and one half inches long. In other examples it would vary in size, length or breadth, ranging from broad to narrow, and similar differences will be observed in every form here represented.

### SPADES OR HOES

Spades are of very uncertain character, and some articles possibly used as such might be considered spears, knives, or even rude celts. Few are found that we can call spades and nothing more. The early

visitors had little use for those of stone here, as they came for hunting and fishing, and not to till the soil. The Iroquois, who were an agricultural people, used stone as little as possible, and made their hoes and digging tools of wood or bone; mostly the former. In Bruyas' *Mohawk lexicon,* about two centuries old, onarate is the wooden hoe, but there is no word for spade, which they would only use in digging post-holes, or pits for caches, where the hoe would be quite as serviceable. In the early book called *New England prospect,* it is said that part of the women's work was 'their planting of corne, wherein they exceede our English husband-men, keeping it so clear with their clamme shell-hooes, as if it were a garden rather than a corne-field.' Loskiel said of the cultivation of corn 'They used formerly the shoulder blade of a deer, or a tortoise-shell, sharpened upon a stone, and fastened to a thick stick, instead of a hoe.' In Van der Donck's *New Netherlands* are interesting notes on points connected with indian agriculture, although their implements are not described. 'They say that their corn and beans were received from the southern indians, who received their seed from a people who resided still further south, which may well be true. . . The maize may have been among the indians in the warm climate long ago; however, our indians say that they did eat roots and the bark of trees instead of bread, before the introduction of indian corn, or maize.' They had beans before the whites came, and 'have a peculiar way of planting them, which our people have learned to practise: when the Turkish wheat, or as it is called, maize, is half a foot above the ground, they plant the beans around it, and let them grow together. The coarse stalk serves as a bean prop, and the beans run upon it.' The Onondagas have a pretty story about this.

In the fall they burned over the places which they wished to plant the next spring. There are many accounts of the large caches in which they kept their corn, and these are yet found in many places, while the corn itself is often plowed up. One piece of woodland in Montgomery county is full of the open pits, but the Iroquois also stored corn in boxes made of bark, and sometimes had vast amounts of this. The cache method, however, was very common, and in the pits both corn and beans were stored. In his early account of the

Mohawks, the Rev. Johannes Megapolensis says, 'When their corn is ripe, they take off the ears and put them in deep pits, and preserve them therein the whole winter.' A fuller account will be found in the *New England prospect.* 'Their corn being ripe, they gather it, and drying it hard in the sunne, conveigh it to their barnes, which be great holes digged in the ground in forme of a brasse pot, seeled with rinds of trees, wherein they put their corne.'

The origin of indian corn is a question of much interest, and a great deal has been written upon it. Besides what has been said above, Roger Williams gave the New England tradition: 'The crow brought them at first an indian grain of corne in one eare, and an indian or French beane in another, from the great god Kautántouwit's field in the southwest, from whence they hold came all their corne and beanes.' Corn hills were large, and stood well apart. They are still to be seen in some New York woods, and the cultivation was very simple. Roger Williams has a note on what he thought a curious preference in tools: 'The indian women, to this day, (notwithstanding our howes,) doe use their naturall howes of shells and wood.' Spades are not mentioned, and, bearing this fact in mind, it is quite likely that those stone implements of New York which resemble what are called spades elsewhere, are to be considered hoes, if they were really digging tools. The question admits of reasonable doubt, but the classification may be allowed for present convenience. It may be added that less was needful for digging than is often supposed. In an emergency the writer has been surprised to see how much excavating he could do on an indian site with a sharp stick, or a broad and pointed stone. With improvised tools and plenty of muscle a great deal could be easily accomplished, but the necessity for this was so rare in indian life that little faith need be placed in the New York stone spade.

Fig. 147 represents the finest of these articles known to the writer. It is a leaf-shaped implement of a bluish grey stone, and came from Oneida lake, where it was plowed up in 1877. The average thickness is three eighths of an inch, and the length is 11¼ inches, with a breadth of five and one quarter inches. This and the two following figures are reduced to about two thirds of the actual size. It is sharpest at the broad end. This article seems much too large for either spear or

knife, though both these have been found quite as long, and it may be best to consider it a digging implement for the present. Smaller specimens are common, with a similar outline. An elliptical one of drab flint, five and three quarters inches long, also came from Oneida lake. Another, with straighter sides, is from Brewerton, at the foot of the same sheet of water. This is of grey flint, and is seven and three eighths inches long, and three and one half inches wide. This would be called a knife but for its size. It is not equilateral, but while one of the lateral edges is straight, the other is longer, and curves gradually to meet it at the point. Quite a number are between five and six inches long, coming from several places.

Two fine leaf-shaped implements from the Susquehanna river should be mentioned. One is from Nichols, and measures 10½ by six inches. It was found 25 years ago. The other is from Owego, and is a little smaller, being 10 inches long by four and three eighths wide. It is of a light translucent flint, and was found 50 years ago, just below the Susquehanna river bridge.

A different form of flint implement was certainly used for digging, although in a very moderate way. The form was often that of a shouldered spear, but with the point rounded and polished by contact with the earth. Fig. 149 is a good example from the Seneca river, made of grey flint, and four inches long. Fig. 148 is another of common flint, found near Rome, N. Y. This has no shoulder, and may also have been used as a knife, but the narrow point is highly polished by use. It is three and one quarter inches long. It is quite probable that this was a secondary use; a broken point being re-chipped, and then used in this way. It is even more likely that spears and knives were sometimes used in digging.

Fig. 150 is a pointed leaf-shaped implement, which one hesitates to call either spade or hoe, so handsome is the material and so fine the work. It is a fine orange jasper, five inches long and nearly three and one half inches wide. It was found on Onondaga lake, where others of less beauty occur. This figure and the following two are reduced to three fourths of the actual size. Others, of the same general shape as the last, are less pointed.

Some broad, thin, and celt-like chipped sandstones are often now classed as spades, and occur on some village sites. They would do

moderately well in digging, though a sensible savage might have much preferred a sharp stick, horn, or bone. As hoes they would have been more useful, and this may have been their office. They range from four to seven inches in length, with a proportionate width of more than half, and have a wide distribution. Fig. 151 will suffice as an example of these. It is of red sandstone, having parallel edges and rounded angles. It is chipped much like the flat net sinkers, but has no notches. The length is five and seven eighths inches, width three and three eighths, and thickness five eighths of an inch. This is from a village site on the Seneca river, where many were found. On some smaller sites they also occur, while on others they are altogether lacking. It may be added that the nature of these sites does not favor the theory that they were used in agriculture.

### CHIPPED STONE AXES

Grooved axes are rare in New York and Canada, and probably were never used by the Huron-Iroquois family. Chipped implements of an axe-like form are no more plentiful in New York, while the common celt, or polished stone axe, without grooves, is both abundant and variable. These were used by the Iroquois, even after white contact. Although iron axes quickly came into use, yet Champlain said that the Mohawks were not well supplied with these in 1609, and some still employed the primitive axe of stone. Fig. 152 shows a rudely notched implement of brown sandstone, from Oswego Falls, much like a modern hatchet in outline. It is five and five eighths inches long, and is quite flat. This is an unusual form, although other rude implements have some resemblance to it. A much neater and more regularly chipped axe of the same material, is from Brewerton. It is five inches long, with a width of two and seven eighths inches towards the cutting edge, and one and one half inches at the top. The lateral edges are straight. Fig. 153 represents a fine article of ferruginous flint, somewhat square, and five and one eighth inches long by about three and three quarters wide. It comes from the Oneida river, and is of moderate thickness. There can be no doubt that it was used as an axe.

Chipped celts were quite abundant almost everywhere, and were sometimes a final, sometimes a transitional form. The usual course

was to chip the stone into the shape of the celt, when this could be done. This might go no farther, for as a weapon of war it was already serviceable, and perhaps in some of the arts of peace. If the material was fine, it might afterwards be picked and polished. Often the edge was ground before these things were done. The finish has nothing to do with the age, for the rudest and most finished forms may be found, side by side, on the same village site. Many show all three processes in the unfinished implement. The work might go on for years, at intervals, the weapon being used nearly all the time. As the difference is thus only one of finish, except in flint celts, no illustrations need be given of those of common stone.

A micaceous stone is frequent on a few sites, showing no signs of work, but presenting such resemblances to finished celts that one can hardly doubt its use. It would soon lose all marks of human skill.

In the examination of Iroquois sites, one can hardly fail to observe how the stone age was on the wane, in this family at least. With rare exceptions stone implements were rude, and there was neither the variety nor beauty in articles of stone everywhere seen among their New York predecessors. Bird amulets, gorgets, stone tubes, scrapers, drills, and banner-stones were already things of the past. Arrows were small, comparatively few, and mostly of one form. Stones were still used in grinding corn and cracking nuts, but the wooden pestle and mortar had their established place among prosperous people. Stone vessels were forgotten, and bone and horn took the place of flint. Still, stone was necessary, and the ungrooved axe was often finely finished.

There are a few chipped celts of flint, often ground at the edge, but ground flint is rare in this country. Fig. 154 is a good example, coming from Onondaga lake. It is of common hornstone, two and three quarters inches long, seven eighths wide, and five eighths of an inch thick. It is ground to a moderately sharp edge at both ends. A broad edged one of chalcedony, three and five eighths inches long, comes from Oswego Falls. Fig. 155 is of grey flint, two inches long, one inch wide, and nine sixteenths thick. The cutting edge is neatly chipped, and one surface is much flatter than the other. This is from Onondaga lake. A much larger one of grey flint, comes from the

town of Marcy. This is eight and three eighths inches long. Fig. 156 is a well marked form. In this most of the surface is flat, the cutting edge being sharply beveled on each side. It is of drab flint, two and one quarter inches long, and five eighths of an inch thick. It comes from Seneca river. Another finely chipped celt is from near Skaneateles lake, and is represented by fig. 159. It is of brown flint, over an inch thick, and sharpened at both ends. The length is nearly four inches, and it is symmetrical throughout. Fig. 160 is of common hornstone, with parallel sides and rounded edge. It is from Cross lake, and is two and one half inches long, one and one eighth wide, and three quarters of an inch thick. It is very neatly chipped. Fig. 161 is of unusual material, being of clouded quartz, well worked. It is two inches wide, and two and seven eighths long. This is from Onondaga lake. Others might be described, but there is no great variation in form. Only a few are elliptic, but several have the wide and ground edge. Although rare, they are widely distributed, and are sometimes of choice material.

An earthwork in the town of Granby has no relics beyond small fragments of earthenware, a few flint flakes, a flat sinker, and one or two skeletons, but a rude celt of greenstone, seven and one quarter inches long, was found quite near. The indications are that its occupation was very brief. An earthwork, three miles southeast of Baldwinsville, has fine celts, but many more which are very rude, varying from three and one half to nine inches in length. One of the latter length is massive, prominently ridged on one side, and but little worked. Another of talc, four inches long, and laterally curved, is rudely chipped, but is remarkable for form and material. Some of these rough celts are a broad ellipse. The only earthwork in Wayne county furnished a rude one of dark crystalline stone, nine and one eighth inches long. Numberless examples might be given.

### PERFORATORS

Among the most remarkable and perplexing articles of flint are those known as perforators or drills. They are widely distributed, and are of a comparatively early date, in New York at least, not having been used by the Iroquois, who preferred awls of horn or

bone. Some are found in Great Britain, but of simple forms and rude workmanship. Dr Abbott well said of these, and some other things, 'It is certain that the majority of our specimens, such as scrapers, drilling stones, etc., are manufactured with greater elegance, and evince a more thorough knowledge of the chipping art. The English specimens appear to be all flakes, which have had the edges chipped, that the required shape might be given to the specimen.' Ours are usually worked over the entire surface, but not invariably, for we have specimens as rude as any in England.

In some places perforators are rare, and but six were catalogued in the Wagman collection at Saratoga. Out of 327 in Mr Douglass' collection, but 29 are credited to New York, where they really are abundant.

So slight is the division between these and arrow-heads, in very many cases, that it has recently been suggested that they are but a slender form of these. Sometimes it is a question to which class to assign some forms. A series of triangular arrows from one site, commencing with a broad form, grades insensibly into those so slender that they would be called drills anywhere else. The main difficulty, however, is to assign them a distinct use. They fit well in the spiral perforations of gorgets, but no great length would have been required for these. Possibly they may have been used in perforating wood, but this is doubtful. For piercing leather a sharp bone or thorn would have been preferable. An early writer, in speaking of shell beads, said they were drilled with a nail or a sharp stone. We might suppose that their use was of this nature, were it not for their abundance in places where large shell beads were not likely to be made. Their fragile character and few signs of use, increase the difficulties of the problem. Some, therefore, have suggested that many were pins, more or less ornamental. Dr Rau thought some of the straight, double pointed forms might have been used in fishing, the line being attached in the center, according to a well known method. The question can not be satisfactorily discussed now.

Long straight perforators or drills, for the common name will be used here, are quite common, and are usually of grey, drab, or black flint, often expanding at the base. They suggest awls or bodkins, at

once. Fig. 157 is such an article, of common flint, representing a frequent form on the Seneca river. It is three inches long, and the base is but slightly wider than the main part. One of the same form and material but four inches long, comes from Onondaga Valley. This also is straight, and has but a trifling expansion at the end. Another of similar form and material, from Brewerton, is a little thicker, and three and five eighths inches long; nor are these solitary examples, although they may represent the extreme length of this form here.

Some expanded forms do not exceed an inch in length. Fig. 158 shows one of these which is not an inch long, but which is neatly worked and symmetrical. It is of bluish flint, and was found at Baldwinsville in 1878. Fig. 162 has a thicker base than usual, and indeed is somewhate massive throughout. It is of brown flint, three and three quarters inches long, and comes from the Oswego river. Fig. 163 is a beautiful drill, yellow at the base and shading into red, which is the color most of the way towards the point. This may have been caused by heat. The base is moderately broad with concave sides, and is three and three quarters inches long. It comes from Onondaga lake. In many such forms there is little more than a quick expansion of the base, tapering, rounded, or angular, as the case may be. These vary little in length, but are often quite wide. Fig. 164 unites the scraper and drill, as in some other cases, having a scraper edge almost to the point. It is of mottled flint, two and one half inches long, and was found on the Seneca river.

Another form of the long drills was distinctly notched. Fig. 165 is a beautiful example of these. It is from the same river, and is of a mottled grey flint, three and seven eighths inches long. Both work and material are fine, and it is slightly barbed on one side. Very closely resembling this is another from the Mohawk, at Canajoharie flats. It is of drab flint, a little shorter and wider than the last, but equally fine. The length is three and three eighths inches. A broader form still, but of about half the length, comes from Brewerton, and there are many approaching these.

Excepting as they approach the triangular form, those with a very long and broad base rarely reach two inches in length. Fig. 166 is

very odd, the broad and notched base having elevated points on either side. It is from the Seneca river, and is of light brown flint, one and three eighths inches long. Fig. 167 is a frequent form, with a broad and deep base, which in some may be widest above or below. Sometimes the contraction above the base is very moderate at first. This is of common flint, and is one and one quarter inches in length. It is one of the frequent forms. Fig. 168 is one of the largest and oddest of this variety, and comes from Brewerton. It is of brown flint, and the broad and curving base has obtuse raised points, strongly suggestive of those in a drill already figured. The length is two inches, and it is nearly as broad.

Some of these expanding bases suggest the gimlet and thumb-screw, and might have been used with or without an additional handle, but the straight and slender ones, if used for perforating, would have required a handle of some kind. Fig. 169 is a small example of the thumb-screw pattern, the three arms being much alike, though one is a little longer and narrower than the others. It is of drab flint, one and one eighth inches long, and could be easily turned by the fingers. This is from Seneca river, and another from Brewerton, two inches long, presents the same concave base. This is carried still farther in fig. 170, a specimen unfortunately broken, where the wide base is almost as slender as the shaft. One prong terminates in a notched and rounded point, as if for suspension, and it is a question whether the broken part had the same feature, as is probable, or whether it was a double pointed drill. It is of black flint, two and one half inches long, and comes from the Seneca river. A smaller one, somewhat like this but with a narrower base, was found on the Canajoharie flats. The one figured, however, is unique in some respects.

Fig. 171 is a good example of the gimlet form from Onondaga lake. It is of grey flint, two and one half inches long, and very symmetrical. One from Geneva is almost equally so, and is two inches in length. This form is rarely perfect, from its great liability to injury, but more might be described. Among those having deeper expanded bases is one of rosy quartz, one and three quarters inches long. This is also from Geneva, where many small forms have been found. There are

one sided basal drills, and those oddly curved, but these seem mere freaks, and but one will now be mentioned, because some have thought it may have been used in forming a primitive fish-hook, by binding it to a perforated stick. Dr Rau (see *Prehistoric fishing*, fig. 180) shows one closely resembling this in a Greenland hook of wood and stone. Capt. John Smith speaks of a similar use of bone in Virginia. 'Their hookes are either a bone grated, as they noch their arrowes in the forme of a crooked pinne or fish-nooke, or of the splinter of a bone tyed to the clift of a little sticke, and with the end of the line they tie on the bait.' That this article is well adapted for such use will be readily seen, and Dr Rau's figure seems almost conclusive proof.

Occasionally a drill is widened in the middle, between the base and point. Very simple examples of these occur, but sometimes they are rather curious. Fig. 173 is a flat form of drab flint, one and one half inches long, and might be described as a double thumb-screw. While the center has been well preserved, both points have been broken off, but they were evidently quite short when perfect, so that the figure presents very nearly the original outline. Even now it is a most interesting article. Fig. 174 is another odd form, very wide, and deeply notched. Above the notches it might be described as broadly winged, but the barbs form its most distinctive feature. It is of drab flint, one and one quarter inches long, and was found not far from Rome, N. Y.

Many drills are nearly triangular, and occasionally one may have been formed from an arrow-head. Fig. 175 may have had such a primary use, followed by a moderate narrowing of the point. It is notched, of dark flint, one and seven eighths inches long, and was found near Three River Point. Fig. 176 is a straight perforator of common hornstone, two and five eighths inches length. The base is better finished than in most examples of this variety, which are often smaller, and of black flint. This comes from Onondaga lake, where many of this form have been found.

Sometimes one occurs, straight and uniform, which has a rounded point at each end. These grade into a broader form, which seems a small knife. A few have an erratic form, marked by a one sided

base. Some convex sided arrow-heads, as has been said, are drawn out into a slender point, suggesting a perforator, and there are rude specimens, perhaps used for temporary purposes. One of these forms, not rare, is a slender splinter of hornstone, triangular in section, and chipped so as to present three faces on the shaft. In such cases the base is sometimes left unaltered.

While perforators are widely distributed, from the Atlantic to the Pacific, their most ornamental development seems to have been in Missouri, where they grade into animal forms. This gives countenance to the idea that some may have been used merely as ornaments, a remark which will not apply to all.

### SCRAPERS

The typical scraper has one flattened side, usually formed by one or two broad flakings; and another, more or less elevated or ridged, which is beveled down to the other surface. It is often combined with the knife or drill, especially in implements approaching the leaf shape, or in distinctly curved knives. Scrapers are often very rude, some being made of flat pieces of hornstone, merely chipped down to a scraper edge. Sometimes other flat siliceous stones were utilized in the same way, resulting in rude and unusually large implements of this kind. Many were made of broken arrows, in which case the under surface may be quite delicately chipped. This secondary use may be the reason why they were so long overlooked here, as they were not attractive articles to collect until their true nature was known.

Many of them may have been used in handles, as in comparatively recent times elsewhere, but others were so large as not to require these. Carved handles of horn or bone have been occasionally found, but these may have belonged to other implements, as they came from Iroquoian sites, and that great family knew little of stone scrapers or perforators. Absence of such handles in other places, however, proves nothing, as horn or bone articles quickly decayed except in fireplaces and refuse heaps. It is still more likely, in a forest land, that handles would have been made of wood. Small scrapers would often require handles of some kind, but the larger ones might not.

They vary greatly in form and finish, and some very closely resemble those yet used by the Eskimo. They form a very widely spread class of implements, often adapted to local needs.

The ruder scrapers need not be illustrated now, as they took almost any form, like the ruder knives, presenting nothing characteristic except the beveled edge and flat under surface. A chance flake, or a flat pebble might be otherwise unaltered. Some are extremely small, being less than half an inch long, while others are quite massive. Fig. 178 is a fine example of a simple and large form from the Seneca river. The material is brown flint, two and five eighths inches long. This is boldly but neatly flaked, and is more massive and uniform in thickness than usual, as well as flatter on the under side. Another from Onondaga lake, of mottled flint and one and seven eighths inches long, is very much like this, but the under surface is somewhat curved and twisted, and the implement is proportionally broader. One of yellow jasper, from Oswego Falls, closely resembles this in size and character. A fragment of a large one from the Seneca river, is still two and three quarters by three and one quarter inches, but is of a ruder type. A very neat and depressed scraper, almost of a horse-shoe form, was found in the town of Marcy, north of the Mohawk river. It is of drab flint, and is three and one quarter inches in length.

Fig. 183 is given on account of its small size, although typical of quite a class. There is a small site on the bank of the inlet of Onondaga lake, which was a frequent camping place in early days, sometimes apparently occupied for months at a time. Bone harpoons, pottery, flint and bone articles, the so-called spades, and other things occur there. In excavating an ash-bed there this little scraper was found. It is of common flint, ridged in the center, and but seven sixteenths of an inch long. Another, but five eighths of an inch in length, comes from Seneca county.

Fig. 177 is a very curious article, not a typical scraper, and yet probably used for one of its purposes, that of fashioning the shafts of arrows. It seems to have been made from a broken arrow-head, and was found in 1889 in a cache in Cayuga county. The cache contained also twenty arrows and the same number of flint knives, a quantity of mica, some antler prongs, paint, and other things. Also a turtle

totem of grey stone. One of the arrows was translucent, and another was of white quartz. The remainder of the arrows and all the knives were of native hornstone. The writer has seen a similar article from Missouri, and supposes it to have been used in scraping the shafts of arrows in the speediest way.

Fig. 179 has one end rounded, and the other straight. The edges are somewhat parallel, but the surface is widest along the center. These opposite edges are beveled from opposite surfaces, so that there are one or two scraping edges, whichever way it may be turned. It is probable that some of the beveled arrows, so called, were scrapers of this kind. Part of the length has been lost, so that no scraper now appears at that end, if indeed there was ever any there, for in that part the edges become sharp, and probably the knife and scraper were combined. It comes from the Seneca river, and is made of brown flint, still two and seven eighths inches long. A smaller one of these has much the same character; the base and edge being beveled on one side, with the other edge beveled from the other surface. It is of light drab flint, one and three quarters inches long, and does not have the knife edge of the last mentioned. This was from Three River Point. Another similar scraper, of light grey flint, has four beveled edges on one side, nearly parallel, and is one and three quarters inches long.

Some which have been called gambling flints, are small and nearly square. They are not all distinctly scrapers, and seem to have been Iroquois gun flints, made by themselves for an emergency. The beveling is from both sides, as in a knife. As some of these were certainly made at a time when the Iroquois used deer buttons and peach stones for gambling, and as most of them were associated with European articles, they may well be classed as indian gun flints. Fig. 180 is one of these from the Seneca river. It is of dark flint, nearly an inch square. The square center is flat, and the stone is beveled to the edge on each side. Fig. 181 shows a Cayuga specimen, to which the name of gambling flint has been distinctly given. It is of hornstone, and was found, with 20 others, in a grave well supplied with European articles. This is an inch across, but others were smaller. A gun, bullets, and two gun flints, were among the

articles accompanying these. Fig. 182 is a smaller one from the same grave.

It will be remembered that the proper name of the Mohawks was Kaniengas, People of the flint, and that their proper symbol was a steel and flint; often only the former. Their associations were not so much with the flint as material for arrows. From almost the first they connected with it its fire producing powers. As soon as they had guns — and they were the earliest New York indians to possess them — they saw occasional economy in the use of their favorite stone. On this point there is a curious passage in the *Jesuit relations* of 1668, of an incident which happened when the French missionaries were about two miles north of Ticonderoga. 'We all stopped in this place, without knowing the cause of it, until we saw our savages gathering upon the edge of the water, gun flints, all nearly shaped. We gave this not much thought at the time, but afterwards learned the mystery, for our Iroquois told us that they never fail to stop in this place, to render homage to a nation of invisible men, who dwell there in the depth of the water, and are occupied in preparing gun flints, nearly all ready for the passers by, provided they do their devoirs in presenting them tobacco; if they give much of it they make them a large largess of these stones.' These men were farther described, but the French concluded that, in storms, 'when the wind comes across the lake, it casts upon this shore a quantity of stones, hard and fit to strike fire.' This sufficiently shows that the Iroquois often provided their own gun flints, instead of using those imported by traders.

Many scrapers are almost or quite elliptical, and some circular forms may be gun flints. Fig. 184 is a fine example of the former class from Brewerton. It is of drab flint, thin and flat, and the edges are beveled all around from one surface. It is one and three eighths inches in length. One much like this is from Auburn, and is one and five eighths inches long. It is by no means a rare form, but grades into knives.

A heavy, rounded, triangular scraper from Oswego Falls, has a double curve in the long section, and is one and one half inches long. Another of similar outline is from Cross lake. It is, however, uniform in thickness, with edges abruptly beveled in opposite directions,

forming a double scraper, which is not a rare feature. The length is but one inch. A handsome one of brownish, banded flint, one and one eighth inches long, comes from Baldwinsville. Fig. 185 represents this. It is of uniform thickness, a quarter of an inch, but is peculiar in having a concave and convex surface, with the scraper edge beveled from the former to the latter.

Fig. 186 is a long, leaf-shaped scraper or knife of brown flint, found near the rifts south of Three River Point. It is five and one half inches long, and suggests a long knife, but has but one or two long flakings on the under surface, to meet which there is the usual bevel nearly all around. It is moderately thin, and very much twisted. Several of this form and size occur, with many variations, and nearly all would serve for knives almost as well as scrapers, although having the characteristics of the latter.

Fig. 187 shows one of the finest scrapers, in material and form almost identical with some knives, except in the edge. It is of lustrous brownish grey flint, four and one eighth inches long, and widest in the middle, whence it tapers almost to a point at either end. This was found at Onondaga lake. The greatest width is one inch, and it is less than half that in thickness.

Quartz scrapers are rare in New York. One from Brewerton, one and three eighths inches in length, is triangular, and like others with that outline, is much the thickest at the broad scraper end. Fine leaf or rather often triangular forms, however, occur in common or light grey flints. Fig. 188 is one of these from the Seneca river, which is of dark blue flint, two inches long, and very evenly beveled around and near the end. The lateral edges are sharp, as though intended for cutting, and as it might have been used without a handle, if desired, it probably combined two implements, as was so frequently the case. Scrapers of this form are usually thin and flat, but are a little thicker at the broad end, and are also neatly chipped on the lower surface. Many are much smaller than this specimen, and some have the point turned to one side.

Among other remarkable scrapers are some from Canajoharie, found along the river bank. Fig. 189 represents a long form of these. They are not many in number, and have been reported

nowhere else. They vary from almost triangular to nearly circular. This one is of common flint, with conspicuous but obtuse serrations at the broad end, and is one and one half inches long. Some others there are much more finely and sharply serrate, but this serration is along one of the longer sides. They probably had some local use.

A very remarkable class of scrapers, combining the knife with these, occurs in but very moderate numbers, and somewhat local at that. They may be nearly straight, or very much curved, and there is usually a tang at the base, resembling a handle, drawn out into a shoulder on each side. They are quite likely to have been used in fashioning bows and arrows, for which the combination of a convex knife with a concave scraper admirably fitted them. Perhaps less than a dozen have been found in New York. Fig. 190 is a perfect example from the Seneca river, made of brown and drab flint, and three inches long. This is the typical form, much like that of a curved sword with its cross hilt. One much more curved, but unfortunately a little broken, is from Brewerton. It is of common hornstone, two and one half inches long, and has the deepest curve of any yet reported. Out of several which do not essentially differ from these, may be mentioned one of a gritty brown flint, which is one and one eighth inches long. Fig. 191 represents this, which came from the Oswego river. At the point there is a knob-like expansion. A very odd one comes from Cross lake, and is made of a light grey flint, one and seven eighths inches long. It is more angular than others, but the blade does not present so decided a curve. In others the scraper edge is quite as decidedly developed, and they grade into nearly straight forms with the same features. In all the concave edge of the blade is quite thick, while the convex edge is comparatively thin and sharp. In the supplement to his illustrations of the Smithsonian collections, Dr Rau figured a fine example from Ohio, about two inches long, but they are not described by Abbott among New Jersey articles, or by Fowke among those farther west and south. None have been reported in Canada, and they seem practically a New York implement, local even there. The advantage of the combination and the peculiar form will be readily seen.

A still rarer form, in fact quite unique, is one which did not return from a scientific mission, greatly to the owner's sorrow. Fig. 192 is

of dark green jasper, and was found on a small camp site on the Seneca river. It is broadly flaked, and the upper end is notched as if for suspension. The remarkable features, however, are the angular central projection of the broad scraper end, and its continuance on either side beyond the lateral lines. The length is one and seven eighths inches. It is greatly to be desired that this unique article should be recovered, from its local and general value. For the present the finder can only depend on his record and figure. Notches, apparently for suspension, are sometimes found in these and other articles.

Stemmed scrapers often have the outlines of arrows, and are distinguished only by the edge. Some were made from broken arrowheads, and these are readily identified by the under surface. Fig. 193 is like the long-stemmed bunts, but is a true scraper, somewhat coarsely chipped. This variety has been described in New Jersey and elsewhere. The material is a grey flinty limestone, two inches long, which is larger than the ordinary size. A long and ruder one, however, also from the Seneca river, is three and one quarter inches in length. It is quite thick, and has an unusually long stem.

Others of this general form have a slightly expanded base, as in the bunts. Fig. 194 is a good example of these, of brown flint, one and one eighth inches long, which comes from the Seneca river. A frequent short and very wide form has some general resemblance to these, but is in many ways quite distinct. They suggest what is sometimes called the sheaf of wheat pattern, and are often made of the bases of broken arrows, but the form was often the original design. Fig. 195 is a good example, and quite thick. It is of common hornstone, seven eighths of an inch long, and one and one quarter inches wide, but the base does not expand below the broad shoulders, and presents a rounding outline. Fig. 196 is broader, being one and one half inches wide, with the same length. It is of drab flint, more angular than the last, and has distinct barbs and an expanding base. It was always a scraper. This is true of another, even more angular, made of dark flint, three quarters of an inch long, and one and one quarter inches wide. Fig. 197 is another fine scraper of this type. It is of brown flint, one and one eighth inches long, and one and

three quarters wide, with a longer base than in the last. All these, as well as the following two, are from the Seneca river.

Fig. 198 is much like these, but is simply and angularly notched, and has a broad scraper edge. The material is black flint, and it is an inch long, with a little greater width. It is a rare form. Fig. 199 is another small and peculiar form, made of dark flint, and seven eighths of an inch long. It has a scraper edge nearly all around, and the notched stem seems to have been intended for insertion in a handle. The form is unique. Fig. 200 is another odd form from the same river, having rounded projections on the sides, and it is much the thickest at the scraper end, though having a somewhat massive character throughout. It is of quite dark flint, one and one quarter inches long by an inch broad.

Some others combine a short drill with a broad scraper base, but these are usually rather small. The combinations with knives are many. Few implements vary more, and their forms had probably much to do with special uses, as in dressing hides, cleaning fish, or smoothing wooden implements. Their complete disappearance in recent prehistoric times in New York, along with that of other implements quite as remarkable, argues a great and sudden change in the dwellers or visitors here. The Iroquois seem not to have used them, nor do we find any suggestion of a similar implement, as in the substitution of bone or horn perforators for those of stone. The makers of the stone scrapers disappeared from New York long ago, and yet it is clear that they were once very widely used, reaching the Pacific coast and even Mexico. Plainly the modern indian did not inherit some of the most remarkable arts of his predecessors. This is one of the significant revelations of archeology. A new race came in and early arts perished. Beyond the making of arrows and axes scarcely anything survived in New York.

This, however, must be understood of peculiar implements. The dressing of hides still went on, and some of the results have hardly been surpassed. If the Iroquois did not use the stone scraper, or anything closely resembling it, they employed something quite as effective, and perhaps in a similar way. Corlaer, in 1635, gave *canagoerat* as the Mohawk word for scraper, which may or may not have

some reference to flint, or *kahnhia.* A little later Father Bruyas defined the Mohawk *gannohouagethon,* to scrape a hide, and another word expressed the stretching process. In a rude way they are still, or were recently, in use among some of our western indians, but not in forms like those of old. The Eskimo still use them, inserted in handles, and one specimen here figured is almost exactly like those which they make.

Dr Abbott says of New Jersey scrapers, ' One feature of the European scrapers is having one side flat or uniform, the result of the breaking away of a large flake, thus giving on one side the smooth surface of a single plane of cleavage. We have all our specimens chipped upon both sides, unless it be those of about the minimum size, which appear absolutely identical with the European specimens.' In New York, however, a large proportion of the larger examples have this single cleavage, while full chipping on both sides is confined to a few. From Sir John Lubbock's illustrations, Dr Abbott also thought European specimens rudely chipped in comparison with American, and a similar comparison would show the high character of those of New York.

As regards their distribution no exact statement can be made. In some form they seem distributed throughout the world, but the proportion in any collection will vary according to the field in which it has been principally made. Mr Douglass has 220 New York scrapers, out of a total of 1061. Of these 636 came from Missouri, and 71 from Arkansas. From the New England states he has none at all. Dr Rau figured them only from Ohio and Texas. In the Wagman Saratoga collection none are mentioned, but such omissions may be due to their frequent lack of beauty. In a show collection they might make a poor figure.

### SERRATE ARROWS

The serrate arrow forms, which Evans called saws in Great Britain, are quite rare in New York, but are common farther west and south. The materials of which the few found here are made, point to a distant origin. Fig. 201 is of translucent horn colored flint, one and three quarters inches long, and it comes from Nine Mile creek, some miles

west of Onondaga lake. The base is gone, but this example is given because of its distinctly serrate character. Another broken specimen, of bluish flint, now one and one half inches long, is as serrate, and comes from the same vicinity. Good examples should occur in the southwestern part of New York, but none have yet been reported.

### FLINT HAMMERS

Flint hammers have thus far been more frequently observed in the lower Mohawk valley than elsewhere. They are rude nodules of flint, showing traces of hammering, and sometimes of chipping, but were naturally used but little in a land where field stones are abundant. They differ much from the so-called hammer-stones. Fig. 202 shows one from Spraker's basin, which is two and one quarter inches across, and just a third as thick, one broad surface being quite flat. Fig. 203 is more characteristic, and is from the Seneca river. This is one and seven eighths inches long, and an inch thick. Fig. 204 is a smaller one, not far from one and one half inches each way. Smaller ones yet appear. A more remarkable one comes from Onondaga lake, which is two and one eighth inches long. Its peculiar feature is the rough grinding in two contiguous planes at one end. Flint is rarely ground here, but when this has been done the result is commonly a polish. A few chipped hammers of greenstone present nothing worthy of remark, except a slight expansion at one end. They are from three to four inches long. The ordinary hammer-stones, and the common field stones perhaps restricted the use of these ruder implements. The faceted and picked balls of stone, possibly used in war clubs, properly belong in another class.

### MISCELLANEOUS

There are many odd flint forms of uncertain character. Fig. 205 represents one of these, being a fragment of some article unknown. It may be the base of a knife, but is strongly suggestive of the fine stone sceptres found of late in Illinois and Tennessee. In that case this would have been the upper end instead of the base. It is of thin, light drab flint, neatly worked, and is yet over three inches long. It is broken where a line of fossils crossed the stone.

Unfinished articles often awaken curiosity, and sometimes reveal the processes by which they were made, and the several stages of the work. This is notably the case with some celts, and unfinished drilling has even yet greater importance. With articles of flint it is more a question of ultimate intention. Fig. 206 is an odd article, which may have been a completed and broken implement, or an unfinished one, just as well. What we call the lower part has been broken, giving an element of uncertainty to the actual or intended form. As it now is, it is two and three eighths inches in length, and is made of common hornstone. One side is flat, and the other neatly chipped over most of the surface, the concave edge being thickest. This might be classed among implements combining the knife and scraper, for the convex edge is sharp. There are hints, also, of a future modification of the form. The striking peculiarity, however, is the rounded point, deeply indented below, as if for suspension. Fragments like this and the last, are often valuable for their peculiar features.

Fig. 207 is a small curved scraper of common flint, about one and one half inches long, which is from Cayuga county. It differs from those already described in having simply an expanded base, without a tang. The curve is greater than usual, and it has been accepted by some as the flint point of an early fish-hook, for which it might have answered, though it seems too short and thick for such a use. On the whole it seems more reasonable to place it among the curved scrapers, for grave objections might be made to the other use, and it certainly closely resembles these.

Fig. 208 is simply a flint pebble of an oval form, split in two and chipped on the flat surface. These pebbles are water-worn, and not very large, although this is one of the smaller sizes. They seem unfinished, although neatly chipped; and in their present condition would serve only for scrapers. This one is from Seneca county, and they are found there and elsewhere, although nowhere frequent.

Fig. 209 is one of the smallest forms of New York arrows, of the class called bird points. It is less than half an inch long, and comes from Tioga county, where they are frequent, but with various outlines. Many think these were made for children, on account of their small size, but they are quite as likely to have had other uses.

### FISHING AND STONE NET SINKERS

One very important article in the food of the American aborigines was fish. The accounts which early travelers and colonists give of the abundance of all descriptions of fishes in lakes and rivers, seem wonderful now, when we are trying to restore them to some degree of their early condition, and yet they are harmonious and well supported. The only difficulty the indian had was to preserve and store up this abundant supply for hours of need. In Canada and New York, eels were taken in vast numbers, and were easily preserved by smoking. It does not appear that this was usual with fish of other kinds. Salt they did not use, and it was distasteful to them. The Iroquois now ascribe their degeneracy and lack of manly vigor, to using salt meat, instead of obtaining all its fresh juices, as their ancestors did.

It becomes a matter of interest to know how they took the fish which swarmed in every stream, for certain relics have direct reference to this. In doing so, however, bare allusion will be made to harpooning, for the harpoon of colonial times was made of bone or horn, and sometimes of wood and iron, thus lying outside of those chipped stone implements to which this paper relates. Only incidentally will angling be touched upon, for the same reason.

In the account of Champlain's voyages, that great discoverer told of Huron customs. 'The men make the nets to capture fish in summer as well as in winter, when they generally fish, reaching their prey even below the ice, either with the line or the seine.' This winter fishing was described by others as well as Champlain, but he mentions the fact which is of importance here, that the net ' sinks to the bottom of the water by means of certain small stones attached to the end.' While Sagard describes the making of Huron nets and their use, he says nothing of these weights, for the one was a necessity of the other. He does, however, allude to one fact in angling, which is important if we substitute the curved and slender stone drill for the piece of bone. He said, 'We found in the bellies of several large fishes, hooks made of a piece of wood and a bone, so placed as to form a hook, and very neatly bound together with hemp.' A figure has been given of a New York stone perforator, suitable for this use. The

Canadian institute has several well adapted for this also, varying from two and one quarter to four inches in length. The early Huron practice of marrying the nets to two young girls, is well known, and seemed long established when the French first met them. The Algonquins had an old story that Michabou taught their ancestors how to make nets, having taken the hint from watching a spider catch a fly. Nets were therefore plainly an aboriginal invention, and their use is directly connected with the large numbers of flat net stones found by all considerable streams. These nets were made of native hemp, out of which some of the New York Iroquois still make thread in their primitive way.

Mr William L. Stone gave Dr Rau an 'account of a stone structure, evidently a fish-pen, in the state of New York.' It was on the right or south bank of Fish creek, the outlet of Saratoga lake, and the plan and description will be found on page 201, of *Prehistoric fishing*. It is a matter of considerable interest, and Mr Stone readily disposes of a seeming difficulty, the fact that the opening to the pound was down stream, by supposing that it was employed mainly when the fish were ascending the creek to spawn. Such pounds were frequent among the indians elsewhere within historic times, made of stones or wood, and there is no great difficulty in assigning such a use to this. In Sullivan's campaign, in 1779, a town was destroyed on the present site of Waterloo, where were 'several fish ponds abounding opposite the town.' This was the statement of Sergeant Major George Grant. Gen. John S. Clark, a well known antiquarian made a note on this: 'These were circular enclosures of stone from 30 to 40 feet in diameter, built upon the rocky bed of the stream, where the water was neither very deep or rapid, so constructed as to permit the water to pass through, but to retain the fish.' These, of course, were simply places for keeping surplus stock.

These were modern structures. When the famous 'Lessee company' made its agreement with the Six Nations in 1787-88, the indians reserved 'one half of the falls and convenient places for weirs, for the purpose of catching fish and eels, from Cross lake to the Three Rivers.' Without questioning whether eels are fish, it is clear that the Iroquois attached importance to the use of weirs, and that some

might be even now looked for in the waters mentioned. When Francis A. Vanderkemp descended the Oneida river, in 1792, at one rift he remarked, 'It was said here was an ancient indian eel-weir — by which this natural obstruction in the bed of the river had been increased.'

Several such stone weirs still remain in the Seneca river, in a more or less fragmentary condition. One which is several hundred feet in extent, runs in a zigzag way across the river, and two deep bays are in excellent order. The third was removed to permit the passage of large boats. The French missionaries mentioned such structures here in 1656, in these terms: 'The fish which are most common here are the eel and salmon, which are fished for from the spring until the end of autumn, our savages managing so well their dykes and weirs, that they take at the same time the eel which is going down, and the salmon which is going up.' They also speared fish by torchlight, but often used a peculiar wooden spear for this. Fifty years earlier they had bone harpoons.

There are several early accounts of the use of these fish-weirs, in various parts of the country, and Loskiel gives that which was common in Pennsylvania, when the shad ascended the rivers. 'The indians run a dam of stones across the stream, where its depth will admit of it, not in a straight line, but in two parts, verging towards each other in an angle. An opening is left in the middle for the water to run off. At this opening they place a large box, the bottom of which is full of holes. They then make a rope of the twigs of the wild vine, reaching across the stream, upon which boughs of about six feet in length are fastened at the distance of about two fathoms from each other. A party is detached about a mile above the dam with this rope and its appendages, who begin to move gently down the current, some guiding one, some the opposite end, whilst others keep the branches from sinking by supporting the rope in the middle with wooden forks. Thus they proceed, frightening the fishes into the opening left in the middle of the dam.'

Though their use may be inferred in this, nothing is said of stone sinkers. In another account, published by Adair in 1775, there are mentioned on the vine, 'stones attached at proper distances, to rake

the bottom.' This was another use of the flat stone sinker, differing slightly from its use in nets. The polished and grooved plummets, so distinct from these, had other uses, though notably most abundant at two early fishing resorts. The grooved pebbles were many of them sinkers.

It may be remarked that the Hurons and others placed hurdles in streams, with nets across the openings, and that the Oneidas in New York made fish pounds with two rows of stakes across streams, driving the fish into them and killing them there.

The flat stone sinker was easily made by the aborigines, and in fact is still made and used by their white successors. A small flat stone was found and neatly chipped around the edge, or sometimes left almost unchanged. As a sinker it might have two to four opposite notches by which it could be attached more securely. If used as a quoit, the notches might be omitted, and the whole surface neatly chipped. This was the sole difference between these two forms, which might be large or small in either case. Occasionally a small and thin smooth pebble is found on a village site, not over an inch across and with two opposite notches cut in the edge. These have no relation to either of the preceding forms. There are also grooved and chipped stones of considerable size, which were used for anchors, but these are somewhat rare. A series of grooved elliptical pebbles may be classed with those of picked stone, although probably net sinkers. They occur most frequently on Cayuga and Seneca lakes.

Some of the flat sinkers are quite large. Dr Rau figured one which was eight inches across, and one and three eighths inches thick, the weight being two pounds and fourteen ounces. Dr Abbott found one on the Delaware river, which was eight inches square, and had four notches. The weight was nearly five pounds. Here they are rarely much over six inches across, when of the typical form. One fine one, however, unwrought except by the slight notches, is nearly seven inches across, and two and three quarters thick. It may have been used for an anchor, for which it is well fitted in every way.

While abundant near many fishing places on the land, heaps of them have been found in Onondaga lake below the present low water mark, itself the result of drainage. The unnotched forms are

found on village sites, more or less remote from water, and undoubtedly were some form of quoit, or they might also have been used somewhat like the southern chungke stone. They occur in many places where they have attracted little or no attention. Fig. 211 represents an example, made from red sandstone. This has no notches, and was found on a village site in Cayuga county, four miles from any water where nets could have been used. Notched forms, however, occur in earthworks from one and a half to three miles from water. Fig. 212 is a good example of the notched form, three and seven eighths by four and one quarter inches. This is a grey sandstone sinker of medium size, from Cross lake, and is rather thin. The larger sinkers usually have four notches. Grooved sinkers or anchors of the larger and ruder forms scarcely require illustration. One of coarse sandstone comes from Brewerton, and is six inches long by four and one quarter wide, the thickness being three inches. On the flattened surface, lengthwise, a broad and deep groove goes all the way around. Few worked anchors are found.

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This is a summary of the leading forms of chipped stone implements found in New York. They preceded and survived the finer articles of polished stone, which is naturally the next subject to be treated, and of which New York furnishes so many good examples. That every important locality will yield striking varieties of chipped implements not here illustrated, is to be expected. The purpose of such a paper is to furnish information, but yet more to be a basis for comparison, so that collectors may judge of the real value of the articles they find, and thus be induced to contribute rare specimens to this department of the state museum.

In conclusion it may be said that the value of many articles depends greatly upon the places where they were found, and that a good record of localities is essential to scientific progress. A good local map, on which sites may be placed; a book of outlines, however rude, with descriptive notes, will aid greatly in doing a noble work for the people of New York. These every collector should have.

# EXPLANATION OF PLATES

Fuller descriptions are given in bulletin. For exact page reference see index under *Plates*.

## Arrow-heads

| FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES | FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES |
|---|---|---|---|---|---|---|---|
| 1 | Drab hornstone | 4 | ..... | 52 | Common horn-stone..... | 2¼ | 1⅜ at base |
| 2 | Mottled flint | 1 | 1 | 53 | Drab flint | 1 1/16 | ..... |
| 3 | Brown " | ..... | 1⅜ | 54 | Brown " | 1+ | ..... |
| 4a | Dark " | ..... | 1¼ | 55 | Brown horn-stone..... | 1 5/16 | ..... |
| 4b | Drab " | ..... | 1 1/16 | 56 | Dark-blue flint | 2 | ..... |
| 4c | *a*..... | ..... | ..... | 57 | Common " | 2 | ..... |
| 5 | Dark flint | 1¼ | ..... | 58 | Light brown" | 1¼ | ⅞ at base |
| 6 | Drab " | 2½ | ..... | 59 | Drab " | 2½ | 1⅝ |
| 7 | Drab " | 2 | ..... | 60 | Light color'd" | 1— | ..... |
| 8 | Common " | 1⅛ | ..... | 61 | Dark " | 1 | ..... |
| 9 | Mottled " | 2 | ..... | 62 | Light bluish " | 1½ | ..... |
| 10 | Grey " | 1¼ | ..... | 63 | White " | 1⅛ | ..... |
| 11 | Grey " | ..... | ..... | 64 | Dark blue " | 1 | ..... |
| 12 | White " | ..... | ..... | 65 | Drab " | ⅞ | ..... |
| 13 | Lustrous " | 2⅛ | ..... | 66 | Drab " | 1 | ..... |
| 14 | Bluish-grey " | 2½ | ..... | 67 | Drab " | 2 | ..... |
| 15 | Common " | 1¾ | ..... | 68 | Common " | 1⅞ | ..... |
| 16 | Dark " | 2¼ | ..... | 69 | Drab " | 1¾ | ..... |
| 17 | Common " | 2 | ..... | 70 | Drab " | 2¼ | ..... |
| 18 | Common " | 1¾ | ..... | 71 | Black " | 2 | ..... |
| 19 | Stone ..... | 1½ | ..... | 72 | Common " | 1¼ | ..... |
| 20 | Grey flint | 1¾ | ..... | 73 | Dark " | 1⅞ | ..... |
| 21 | Common " | 1½ | ..... | 74 | Dark " | 2½ | ..... |
| 22 | Common " | 2¾ | ..... | 75 | Dark hornstone | 2⅛ | ..... |
| 23 | Brown flinty sandstone... | 1⅜ | ..... | 76 | Dark flint | 2 | ..... |
| 24 | Dark blue flint | 1¼ | ..... | 77 | Light " | 1¼ | 1½ |
| 25 | Lustrous jasper | 1⅞ | ..... | 78 | Brown " | 2¼ | ..... |
| 26 | Grey flint..... | 1⅞ | ..... | 79 | Drab " | ⅞ | ..... |
| 27 | Yellow jasper.. | 1 | ..... | 80 | Black " | 1½ | ..... |
| 28 | Flint..... | 1¼ | ..... | 81 | Dark " | 1¼ | ..... |
| 29 | *a*..... | ..... | ..... | 82 | *a*..... | 1⅛ | ..... |
| 30 | Yellow jasper.. | ¾ | ..... | 83 | White quartz.. | 2 | ..... |
| 31 | White flint | 2⅛ | ..... | 84 | Drab flint | 2¼ | ..... |
| 32 | Common " | 1½ | ..... | 85 | Blue " | 2⅛ | ..... |
| 33 | Brown " | 1¾ | ..... | 86 | Common horn-stone ..... | 1¾ | ..... |
| 34 | White " | 1⅝ | ..... | 87 | Olive slate..... | ..... | ..... |
| 35 | Drab " | 1⅛ | ..... | 88 | Drab flint | 2¼ | ..... |
| 36 | Drab " | 1⅛ | ..... | 89 | Brown " | 1 | ..... |
| 37 | Grey limestone | 2 | 2— | 90 | Drab " | 1⅛ | ..... |
| 38 | Common flint.. | 1½ | ..... | 91 | Dark " | 1¼ | ..... |
| 39 | Yellow jasper.. | 1 | ..... | 92 | Dark " | 1⅜ | ..... |
| 40 | Black flint..... | 1⅝ | ..... | 93 | Dark " | 1½ | ..... |
| 41 | Shark's tooth.. | 1½ | ..... | 94 | Common " | 1+ | ⅞ |
| 42 | Grey flint | 2½ | ..... | 95 | Grey flinty limestone ... | 2⅜ | ..... |
| 43 | Common " | 2½ | ..... | 96 | Red jasper..... | 1½+ | ..... |
| 44 | Blue " | ..... | 1½ at base | 97 | Blue flinty limestone.... | 1⅝ | ..... |
| 45 | Common horn-stone..... | ..... | 1¼ at base | 98 | *a*..... | 2⅛ | ..... |
| 46 | Drab flint | 1½ | ..... | 99 | Purplish flint.. | 2 | ..... |
| 47 | Drab " | 1¾ | ..... | 100 | Common horn-stone..... | 1 | ..... |
| 48 | Brown " | 1¾ | ..... | 101 | Dark blue flint | 2 | 1¼ |
| 49 | Brown " | 1½ | 1⅜ | | | | |
| 50 | Brownish-white flint ..... | 1⅝ | ..... | | | | |
| 51 | Brown flint... | 1⅞ | ..... | | | | |

*a* Not given

# EXPLANATION OF PLATES, *continued*

## Spear-heads

| FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES | FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES |
|---|---|---|---|---|---|---|---|
| 102 | White flint | 6½ | ..... | 114 | Resembles moss agate.. | 3½ | ..... |
| 103 | Grey " | 5⅛ | ..... | 115 | Flint..... | 4¼ | 1— |
| 104 | Black " | 5⅝ | ..... | 116 | Grey flint..... | 4¼ | ..... |
| 105 | Common " | 7 | ..... | 117 | " quartzite (?) | 5½ | ..... |
| 106 | Translucent quartz..... | 4⅞ | 2 | 118 | Variegated hornstone... | 2⅛ | ..... |
| 107 | White mottled quartz..... | 3⅝ | 1 1/16 | 119 | Resembles moss agate.. | 5+ | ..... |
| 108 | Green jasper.. | 9 from base[b] | 4 at base | 120 | Greenish white flint..... | 4⅜ | ..... |
| 109 | Drab flint | 3¾ | 1⅝ | 121 | Common hornstone..... | 2⅝ | ..... |
| 110 | White translucent quartz.. | ..... | ..... | 122 | Hornstone.... | 3⅛ | ..... |
| 111 | Drab flint | 3 7/16 | 1⅛ | 123 | Blue grey flint | 7¼ | ..... |
| 112 | Common " | 6 | 2 | 124 | Chalcedony... | 4⅛ | 2 |
| 113 | Grey flinty limestone... | 6+ | 1¾ | 125 | Drab flint.... | 2⅞ | 1⅛ |

## Knives

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 126 | Grey flint..... | 3¼ | ..... | 137 | Brown flint | 3⅝ | ..... |
| 127 | Yellow jasper | 3¾ | 2 | 138 | Brown " | 2½ | ..... |
| 128 | Drab flint | 4 | ..... | 139 | Brown " | 3 | ..... |
| 129 | Light blue " | 5 | ..... | 140 | Variegated " | 2 | ..... |
| 130 | White " | 3 | ..... | 141 | Common " | 2¾ | ..... |
| 131 | Common " | 1⅝ | ..... | 142 | *a* ..... | 4½ | 1⅛ |
| 132 | Dark blue " | 1⅝ | ..... | 143 | Grey limestone | 3⅝ | 1¼ |
| 133 | Grey limestone | 2 | ..... | 144 | Hornstone.... | 5 | 2¼ |
| 134 | Clouded quartz | 6½ | 2 | 145 | Common flint.. | 3½ | ..... |
| 135 | Brown flint | 3¼ *b* | ..... | 146 | Bent arrow form..... | ..... | ..... |
| 136 | Brown " | 3¼ | ..... | | | | |

## Spades or hoes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 147 | Bluish grey stone..... | 11¼ | 5¼ | 149 | Grey flint..... | 4 | ..... |
| 148 | Common flint | 3¼ | ..... | 150 | Orange jasper | 5 | 3½ |
| | | | | 151 | Red sandstone | 5⅞ | 3⅜ |

## Chipped stone axes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 152 | Brown sandstone..... | 5⅝ | ..... | 156 | Drab flint.... | 2¼ | ..... |
| | | | | 157 | *c* ..... | ..... | ..... |
| 153 | Ferruginous flint..... | 5⅛ | 3¾ | 158 | *c* ..... | ..... | ..... |
| | | | | 159 | Brown flint... | 4 | ..... |
| 154 | Common hornstone ..... | 2¾ | ⅞ | 160 | Common hornstone..... | 2½ | 1⅛ |
| 155 | Grey flint.... | 2 | 1 | 161 | Clouded quartz | 2⅞ | 2 |

## Perforators

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *157* | Common flint | 3 | 3+ | 169 | Drab flint | 1⅛ | ..... |
| *158* | Bluish " | 1— | ..... | 170 | Black " | 2½ | ..... |
| 162 | Brown " | 3¾ | ..... | 171 | Grey " | 2½ | ..... |
| 163 | Yellow shaded to red..... | 3¾ | ..... | 172 | *a* ..... | ..... | ..... |
| | | | | 173 | Drab flint | 1½ | ..... |
| 164 | Mottled flint | 2½ | ..... | 174 | Drab " | 1¼ | ..... |
| 165 | Grey " | 3 7/8 | ..... | 175 | Dark " | 1⅞ | ..... |
| 166 | Light brown" | 1⅜ | ..... | 176 | Common hornstone..... | 2⅝ | ..... |
| 167 | Common " | 1¼ | ..... | | | | |
| 168 | Brown " | 2 | 2— | | | | |

*a* Not given *b* Fragment. Length unknown *c* See under *Perforators*

# EXPLANATION OF PLATES, *concluded*

## Scrapers

| FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES | FIG. | MATERIAL | LENGTH IN INCHES | WIDTH IN INCHES |
|---|---|---|---|---|---|---|---|
| 177 | Broken arrow head | ..... | ..... | 189 | Common flint | 1½ | ..... |
| | | | | 190 | Brown " | 3 | ..... |
| 178 | Brown flint | 2⅝ | ..... | 191 | Brown " | 1⅛ | ..... |
| 179 | Brown " | 2⅞ | ..... | 192 | Green jasper | 1⅞ | ..... |
| 180 | Dark " | 1 | 1 | 193 | Grey flinty limestone | 2 | ..... |
| 181 | Hornstone | ..... | 1 | | | | |
| 182 | Hornstone | ..... | 1— | 194 | Brown flint | 1⅛ | ..... |
| 183 | Common flint | ⅛ | ..... | 195 | Hornstone | ⅞ | 1¼ |
| 184 | Drab " | 1⅜ | ..... | 196 | Drab flint | 1½ | 1½ |
| 185 | Brown " | 1⅛ | ..... | 197 | Brown " | 1⅛ | 1¾ |
| 186 | Brown " | 5½ | ..... | 198 | Black " | 1 | 1+ |
| 187 | Brownish grey flint | 4⅛ | 1 | 199 | Dark " | ⅞ | ..... |
| | | | | 200 | Dark " | 1¼ | 1 |
| 188 | Dark blue flint | 2 | ..... | | | | |

## Serrate arrow

| | | | |
|---|---|---|---|
| 201 | Translucent fl't | 1¾ | ..... |

## Flint hammers

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 202 | ..... | ..... | 2¼ | 204 | ..... | 1½ | 1½ |
| 203 | ..... | 1⅞ | ..... | | | | |

## Miscellaneous

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 205 | Drab flint | 3 | ..... | 208 | Flint pebble | ..... | ..... |
| 206 | Hornstone | 2⅜ | ..... | 209 | Bird point arrow | ½— | ..... |
| 207 | Common flint | 1½ | ..... | | | | |

## Stone sinkers

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 210 | *a* ..... | ..... | ..... | 212 | Grey sandstone | 3⅞ | 4¼ |
| 211 | Red sandstone | ..... | ..... | | | | |

*a* Not given


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4.a
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4.c
4.b
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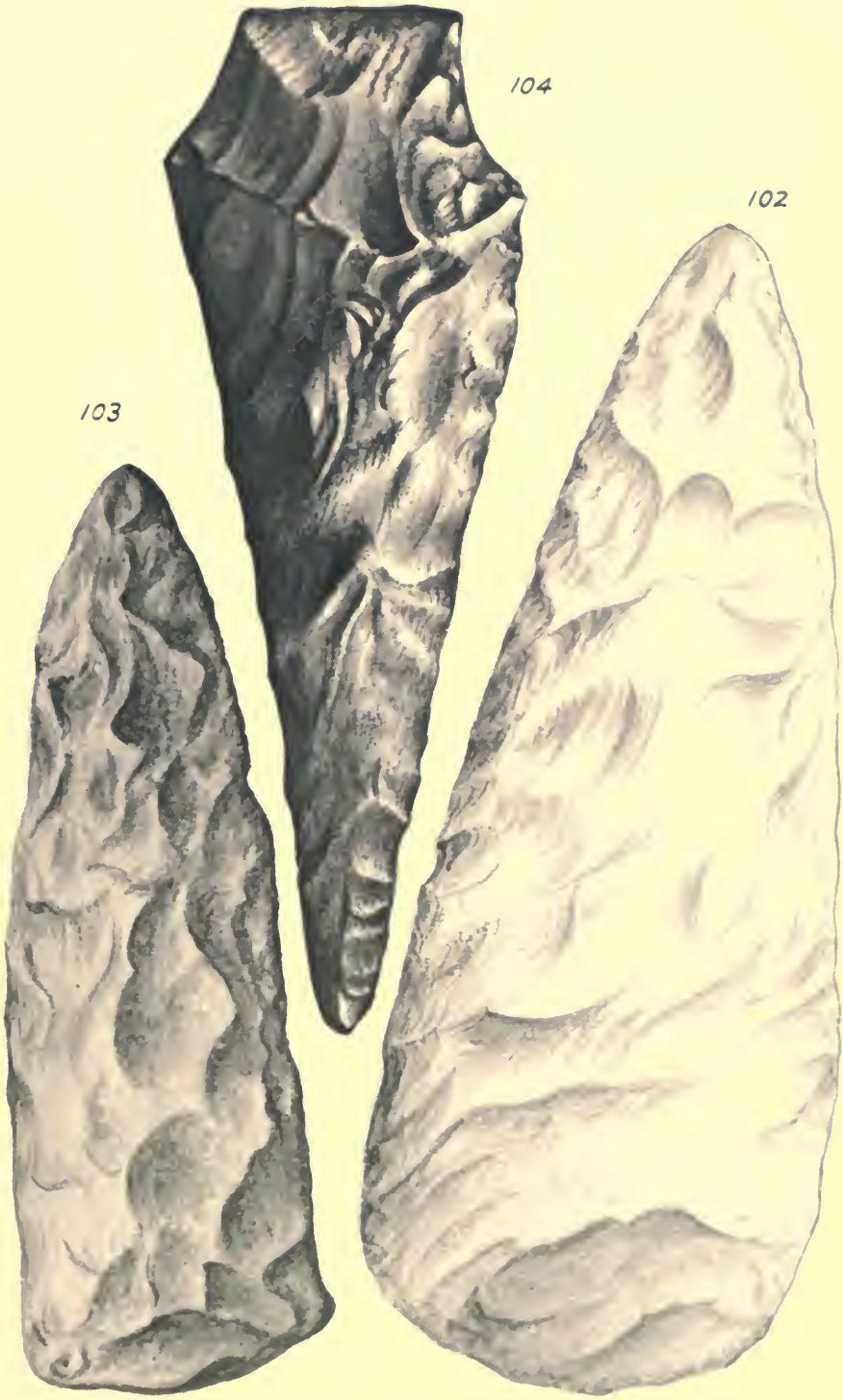
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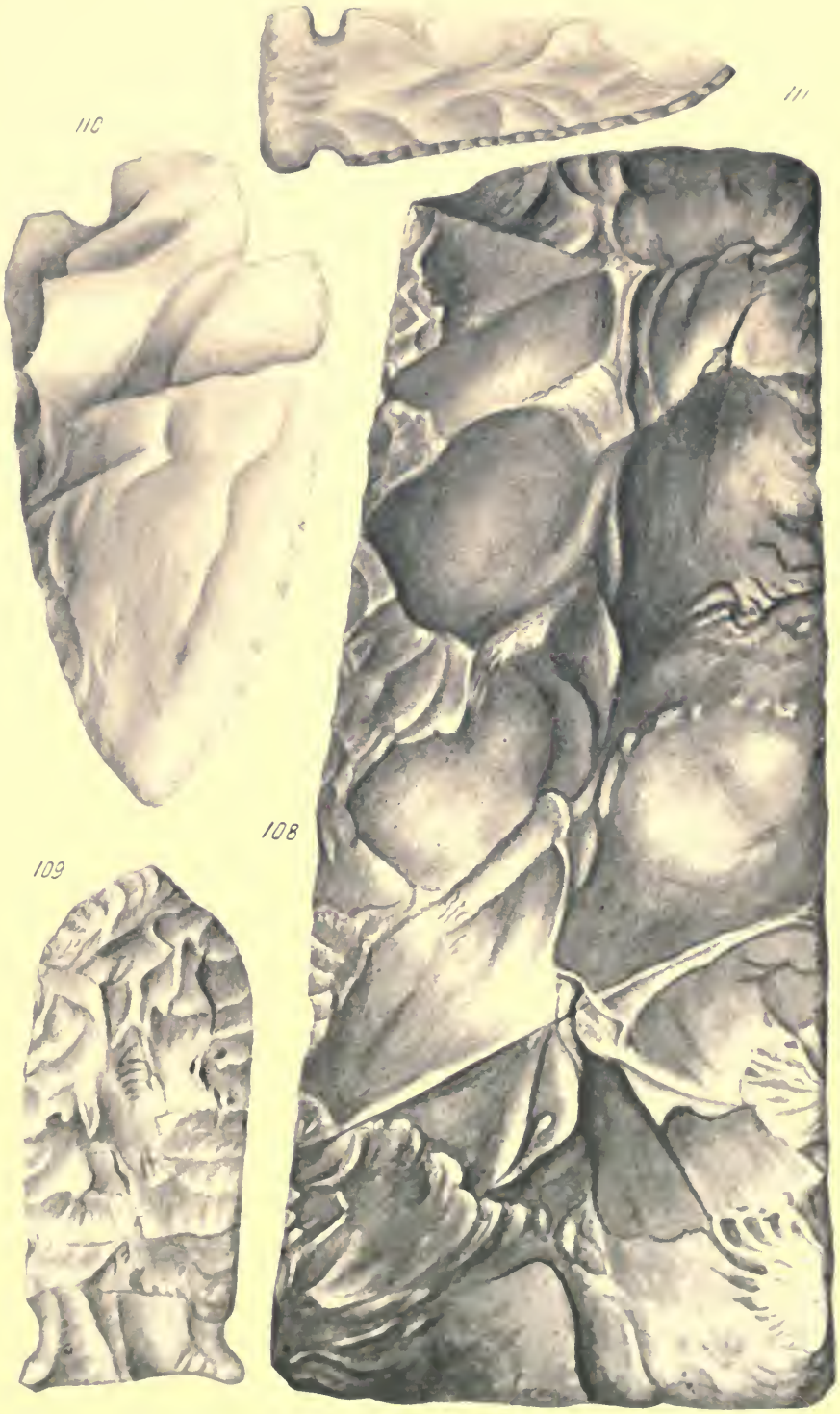
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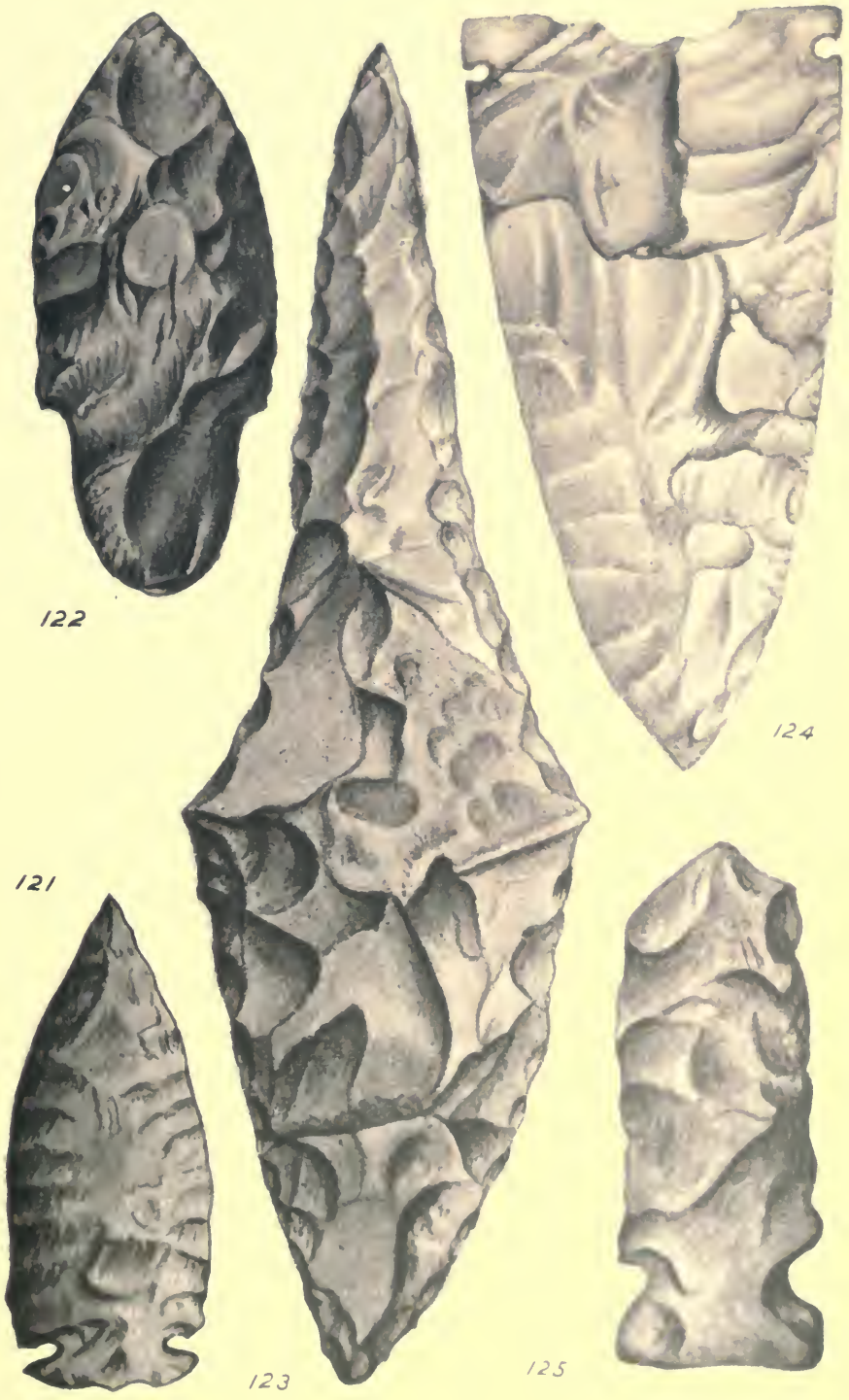
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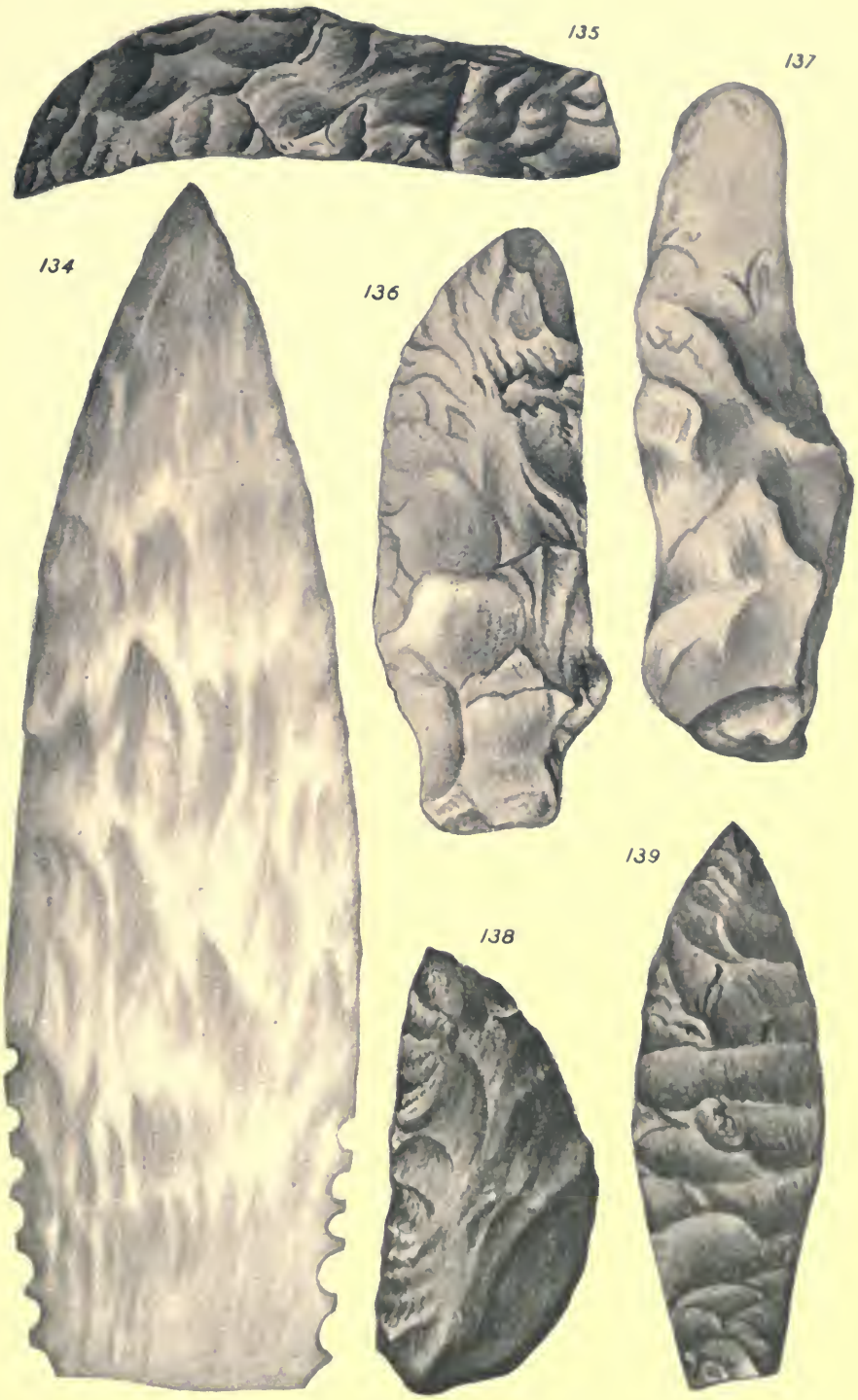
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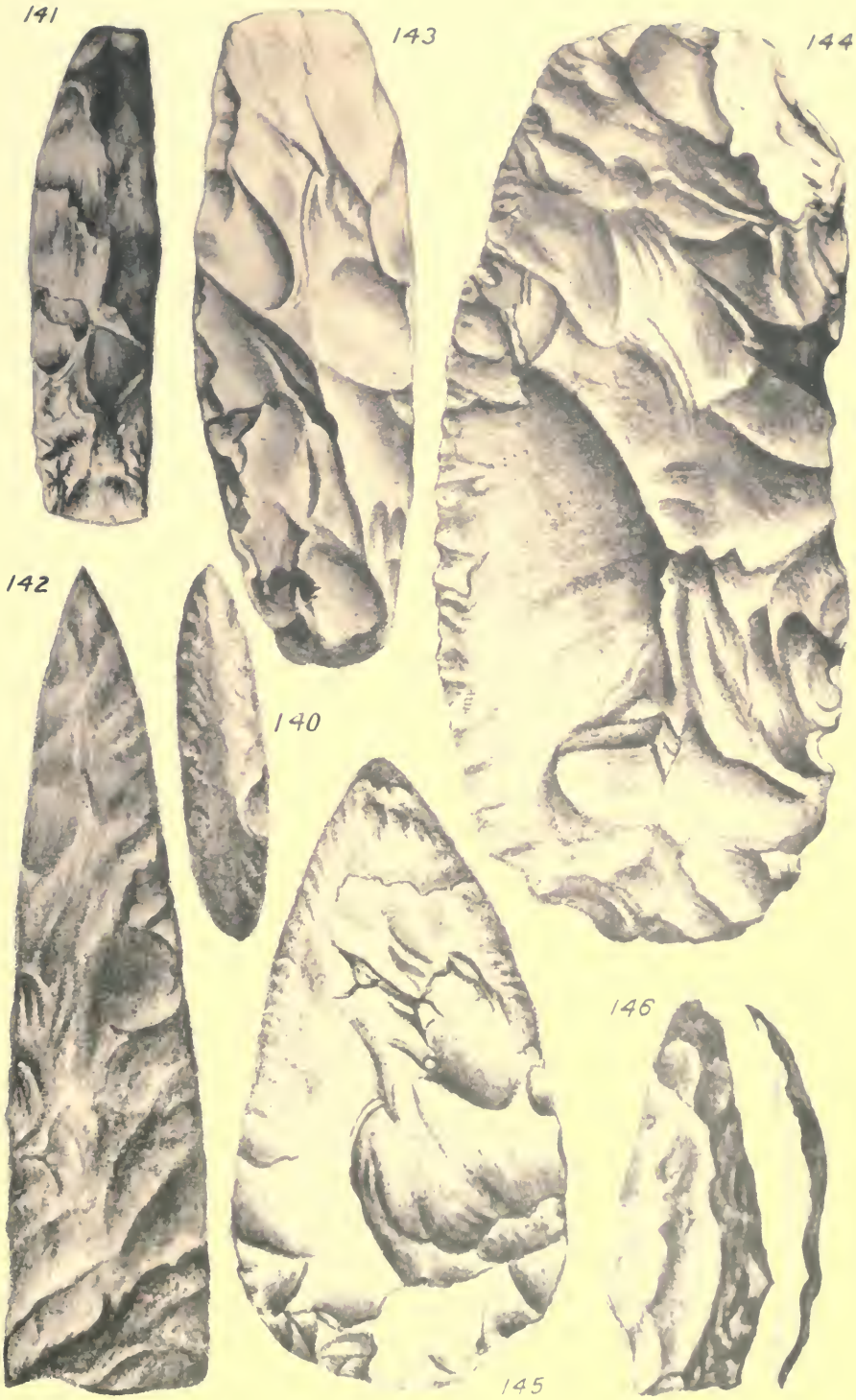
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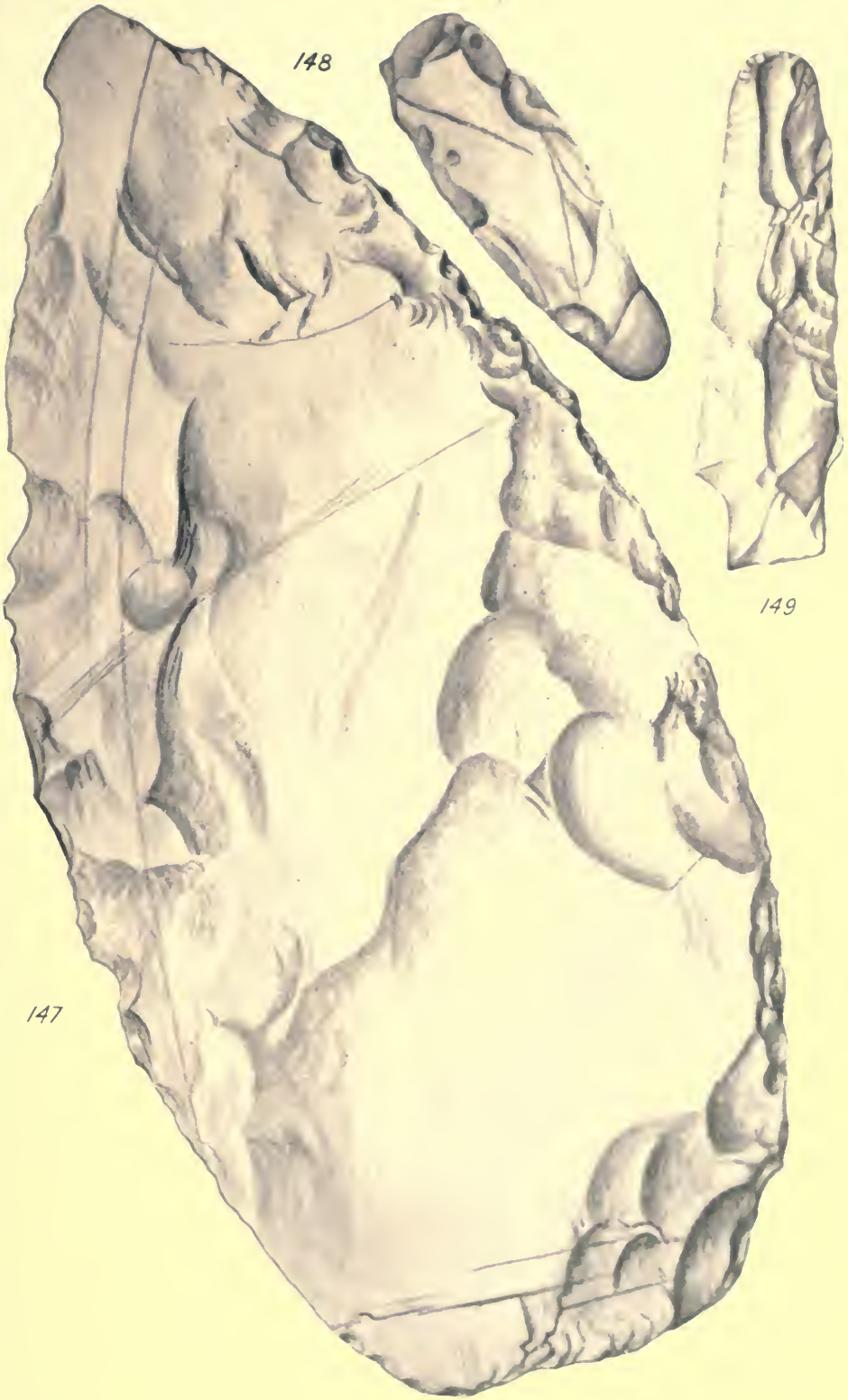
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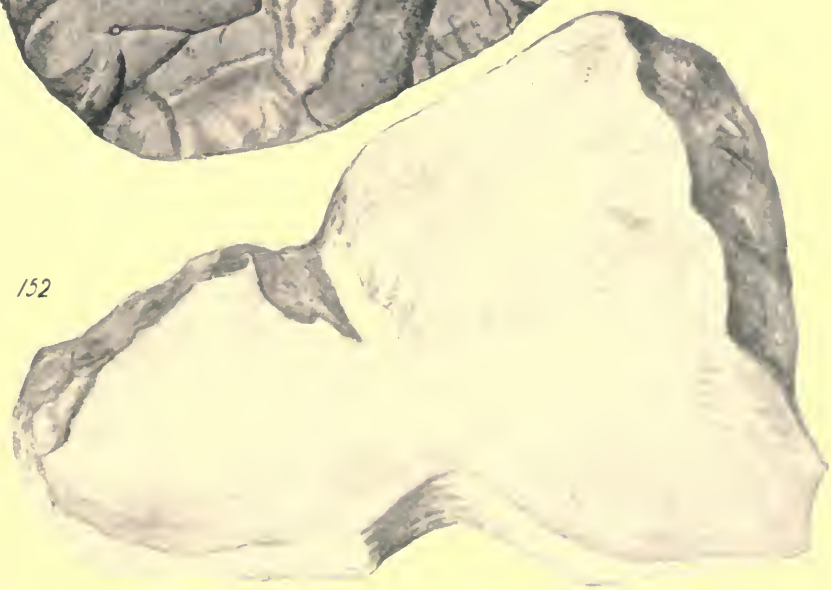

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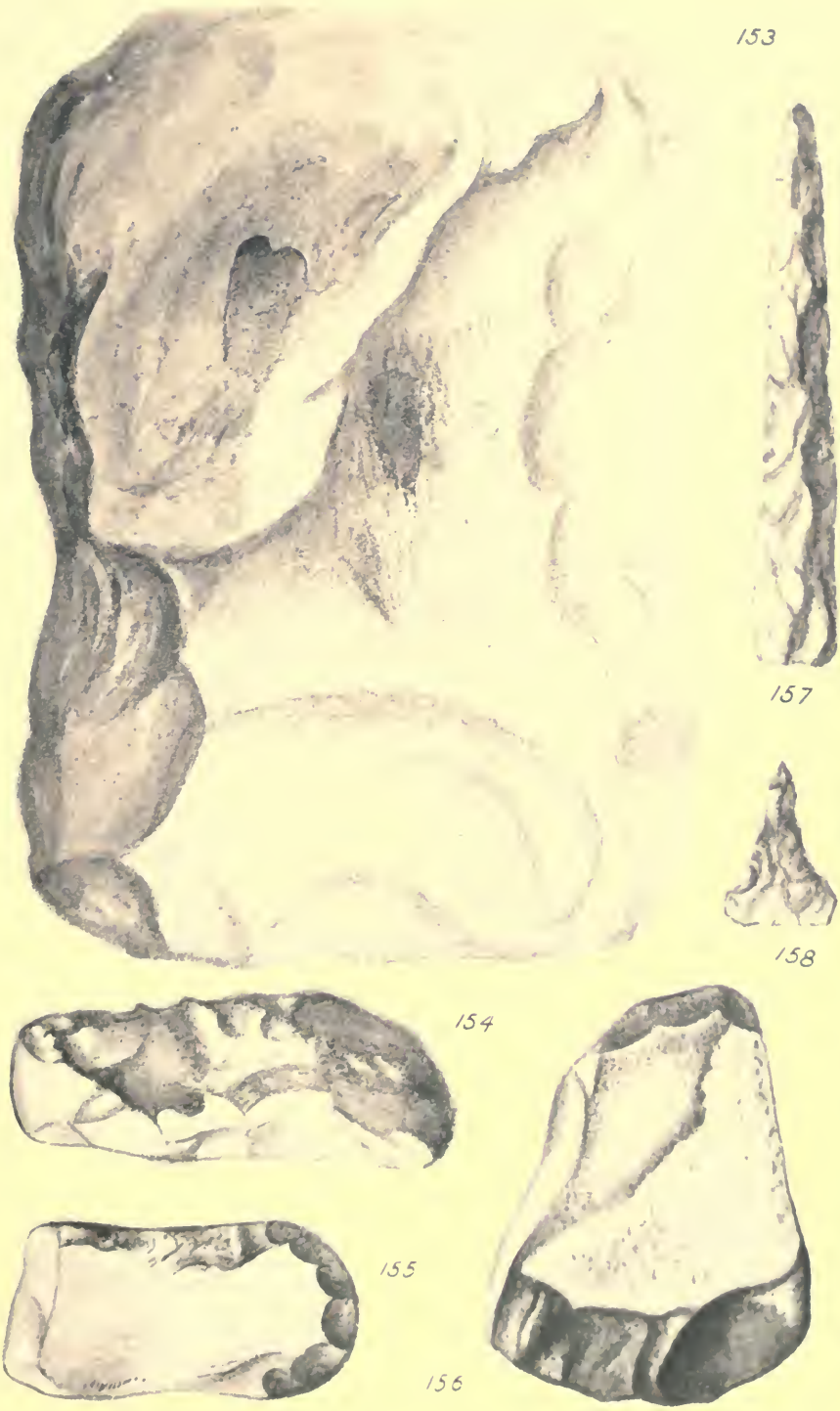
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