

III.—*Trade and Commerce in the Stone Age.*

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(Read May 8, 1889.)

The term "Stone Period" or "Stone Age" was suggested in the early years of the present century by the antiquaries of Denmark as the fitting designation of that primitive era in western Europe—with its corresponding stage among diverse peoples in widely severed regions and ages,—when the use of metals was unknown. That there was a period in the history of the human race, before its Tubalcains, Vulcans, Vœlands, or other Smith-gods appeared, when man depended on stone, bone, ivory, shells, and wood, for the raw material out of which to manufacture his implements and weapons, is now universally admitted; and is confirmed by the abundant disclosures of the drift and the caves. The simple, yet highly suggestive classification, due to Thomsen of Copenhagen, was the first scientific recognition of the fact, now established by evidence derived from periods of vastly greater antiquity than the Neolithic age of Denmark. The accumulated experience of many generations was required before men mastered the useful service of fire in the smelting of ores, and the casting of metals. Nevertheless it seems probable that the knowledge of fire, and its useful service on the domestic hearth, are coëval with the existence of man as a rational being. The evidence of its practical application to the requirements for warmth and cooking carry us back to the age of cave implements, including some among the earliest known examples of man's tool-making industry. In connection with this subject, Mr. John Evans draws attention to some curious indications of the antiquity of the use of flint by the fire-producer.¹ He refers to the ingenious derivation of the word *silex* as given by Vincent of Beauvais, in the "Speculum Naturæ," "*Silex est lapis durus, sic dictus eo quod ex eo ignis exsiliat,*" and he recalls a more remarkable reminiscence of the evoking of fire in the Neolithic, if not in the Palæolithic period. Pliny informs us (lib. vii. cap. 56), that it was Pyrodes, the son of Cilix, who first devised the way to strike fire out of flint; "a myth," says Mr. Evans, "which seems to point to the use of *silex* and pyrites (from $\pi\upsilon\rho$) rather than of steel." In reality the flint and pyrites lie together in the same lower strata of the chalk. As the ancient flint-miners sunk their pits in search of the levels where the flint abounds they would meet with frequent nodules of pyrites. In the use of these as hammer-stones to break up the larger flints, the first grand discovery of the fire-producer may have been made.

But whatever was the source of this all-important discovery, it dates among the earliest manifestations of human intelligence. Nodules of iron pyrites have been found

¹ Ancient Stone Implements, p. 14.

in the caves of France and Belgium, among remains pertaining to the Palæolithic age; and are among the most interesting disclosures of the greatly more modern, though still prehistoric age, of the barrows and cairns of the Allophylian period of Britain, and of western Europe generally. Sir R. C. Hoare records the finding, among the contents of a cinerary urn, in a Wiltshire barrow, "chipped flints prepared for arrow heads, a long piece of flint, and a *pyrites*, both evidently smoothed by usage."¹ More recent explorers, apprised of the significance of such discoveries, have noted the presence of nodules of pyrites, accompanying the personal ornaments and weapons occurring in graves of the same age—deposited there either as tokens of regard, or more probably with a vague idea of their utility to the dead in the life beyond the grave. In a communication to the Society of Antiquaries of Scotland on a group of stone cists disclosed, in 1879, on the farm of Teinside, Teviotdale, Lord Rosehill thus describes part of the contents of one of them. "It was filled with dark-coloured earth, mixed with charcoal; and closely intermingled in every part with fragments of bones which had been exposed to the action of fire." A broken urn lay about ten inches from the top. "Close to the urn was a rounded piece of metallic-looking substance, which appears to be 'radiated iron pyrites,' and which," adds Lord Rosehill, "I have myself discovered in several interments."² More recently, in 1883, Major Colin Mackenzie reported to the same Society the discovery of a cist and urn in the Black Isle, Ross-shire. He thus proceeds: "Whilst gathering together the broken pieces of the urn, a round-nosed flint-flake or scraper, chipped at the edges, was found amongst the debris, and proved to have a bluish tinge, as if it had been subjected to the action of fire. Close beside it there was found a round piece of iron pyrites, flat on one side, in shape somewhat like the half of an egg, divided lengthways, only smaller. Dr. Joseph Anderson at once recognized this as forming, along with the solitary flint, nothing less than a prehistoric 'strike-light' apparatus."³ No flint is procurable in the locality; and after the closest search, no other flint implement or flake was found on the site. In communicating this interesting discovery to the Society of Antiquaries of Scotland, Major Mackenzie reviewed the disclosures of this class in Great Britain, so far as they had been noted by Hoare, Borlase, Bateman, Greenwell and Evans, furnishing a tabulated statement of eleven examples, chiefly found in barrows, and ranging over an area extending from Cornwall to Ross-shire. He draws attention to their occurrence in localities which produce neither pyrites nor flint. But with the former, at least, this need not surprise us. The prized and easily transported pyrites may be looked for in any ancient barrow or sepulchral deposit; and has probably in many cases passed unnoted before its significance was understood. Now that this is fully appreciated, it is seen to have been in use from the early dawn of primitive art; and doubtless the pyrites and flint found in localities remote from those where they occur as natural products are in most cases due to primitive barter.

The old Promethean myth represents the fire-bringer interposing on behalf of a degraded race of beings whose helpless lot had been preceded by the Hesiodic Golden, Silver and Bronze ages, as well as by an Heroic age of such demigods as the Titan son of

¹ Hoare's South Wilts., p. 195.
Proc. of Soc. Antiq. Scot., N. S., vii. 356.

² Proceedings of the Society of Antiquaries of Scotland, viii. 137.

Iapetus. By a reverse process of evolution from the lower to higher stages, the anthropoid, or Caliban of archæological science, becomes the tool-maker, the tool-user, and in the same primitive stage, the fire-maker. But the service of fire is required by man under the most varied conditions of life. The stone lamp with its moss wick, and the stone kettle, are important implements in the snow-hut of the Eskimo. On those he depends, not only for cooking, but for his supply of water from melted snow; and without the lighted taper of his stone lamp the indoor life of the long, unbroken arctic night would be passed in a rayless dungeon. He has inherited the knowledge of the palæolithic fire-maker, from whom, indeed, some have claimed for him direct genealogical descent; and he generally treasures among his most useful appliances a piece of quartz, and a nodule of pyrites, which constitute his flint and steel. At the remote extreme of the southern continent the same precious bequest is in use by the Fuegians and Patagonians of Terra del Fuego, the name of which is a memorial of its fire-using savages. The Fuegian makes a hearth of clay in the bottom of his rudely constructed bark canoe, on which he habitually keeps a fire burning. He prepares a tinder of dried moss or fungus, which is readily ignited by the spark struck from a flinty stone by means of a pyrites. The invaluable discovery is shared by the lowest races. The Australian, the Andaman Islander, and other rudest tribes of the Old and the New World, possess the same great secret, and turn it to useful account.

The tradition may have been perpetuated from generation to generation from the remotest dawn of human reason; or it may have been re-discovered independently among diverse races. But wherever the value of the pyrites in evoking the latent spark of the flint was known, it would be a coveted prize, and a valuable object of barter. The story of the old fire-makers is recorded still in the charcoal ashes of many an ancient hearth; for charcoal is one of the most indestructible of substances when buried. In the famous Kent's Hole limestone cavern at Torbay, Devonshire, explorers have systematically pursued research backward from the specifically dated stalagmitic record of "Robert Hodges, of Ireland, Feb. 20, 1688," through Saxon, Roman, British, and Neolithic strata, to the deposit where human remains lay embedded alongside of those of the woolly rhinoceros, the mammoth, the fossil horse, the hyena and cave bear. There also lay, not only the finished implements, but the flakes and flint cores that revealed the workshop of the primitive tool-maker, and the charcoal that preserved the traces of his ancient fire. So, too, in the Cromagnon rock-shelter of the Perigord, in an upper valley of the Garonne, repeated layers of charcoal, interspersed with broken bones and other culinary remains of the ancient cave-dwellers, tell of the knowledge and use of fire by palæolithic man, in western Europe's Reindeer and Mammoth ages. Compared with such disclosures of the arts and knowledge of primeval man, the discoveries on which the Danish archæologists based their systematising of prehistoric remains belong, geologically speaking, to modern eras. Denmark is underlaid essentially by Upper Cretaceous rocks, the Etage Danien of most French writers, and the Faxoe Kelke of German geologists. Drift clays and gravels overlie the cretaceous rocks in many places, with more recent deposits of sands, gravels, etc. These latter are of Neolithic age, containing bones only of existing mammals. Palæolithic deposits, with bones of extinct species, do not appear to have been recognized in Denmark; nor is there any trace of the presence of palæolithic man. Hence the field alike of Danish antiquarian research and archæological speculation was

greatly circumscribed. But thus precluded from the study of primitive arts in that vague Palæolithic dawn which lies outside of the speculations of the historian, and from any resort to classical authorities for evidence in the interpretation of local disclosures, the Danish antiquary escaped the temptation to many misleading assumptions which long perplexed the archæologists of France and England; and so his limited range has tended to facilitate the investigations into subsequent disclosures relative to the antiquity of man and his arts.

Within the old Roman provinces of western Europe, the Latin conquerors were not only accredited with whatever showed any trace of Hellenic or Roman art, but with the sole skill in working in iron. The Dane and Northman were assumed to have followed in their wake with bronze, as with runes and other essentially non-classical products; though still the beautiful leaf-shaped sword and other choicest relics of the Bronze age were not infrequently ascribed to the Romans. But philologists had not yet assigned a place to the Celtic in the Aryan family of languages. The Celt was not only assumed to be the barbarous precursor, alike of Roman and Dane, but to be the primeval man of western Europe. Hence when the first hoards of palæolithic flint implements were accidentally discovered in Sussex and Kent, their Celtic or British origin was assumed without question. But the known historic position of the Northman on Scandinavian soil prevented the crude application of the term "Danish" to every bronze relic found there; and as no Roman conqueror had trodden the soil of Denmark, the ethnology as well as the archæology of the region was left unaffected by complexities resulting from the presence of the Romans in Gaul and Britain. The absence of remains of palæolithic man still further simplified the problem; while the geology of the Danish peninsula favoured the neolithic tool-maker. Flint abounds there in amorphous nodules or blocks, and the nuclei, or cores, from which a succession of flakes have been struck, are of frequent occurrence among the relics of the Danish Stone age. Flint is no less abundant throughout the regions of France and England, on either side of the English Channel; and there, accordingly, alike in the caves and the river-drift, the rude, massive flint implements of the Palæolithic era abound.

The natural cleavage of flint, as also of the obsidian found in certain localities in the Old and New World, so readily adapts both materials to the manufacture of knives, lances, and arrow-heads, that they appear to have been turned to account by the tool-maker from the dawn of rudest art. But it must not be overlooked that obsidian is limited to volcanic regions, and flint is no more universally available than bronze or iron. In some countries it is rare; in still more it is entirely wanting; and yet its peculiar aptitude for tool-making appears to have been recognized at the earliest period; so that implements and weapons of flint, alike of the Palæolithic and the Neolithic age, abound in many localities where the raw material of the tool-maker is unknown.

It was only natural that the systematic study and classification of the manufactures of the ancient workers in flint should be first carried out in regions such as the Danish peninsula, geologically related to the Cretaceous period, and abounding in the material which most readily adapts itself to the requirements of an implement-maker ignorant of the arts of metallurgy. But the same inexhaustible store of raw material was available to the "Flint-folk" whose implements have become so familiar by reason of more recent disclosures of France and England belonging to a period when the climate, the physical

geography, and the whole animal life of western Europe, contrasted in every respect with anything we have knowledge of in remotest historic times. Those rude examples of primitive art lie alongside of the unwrought flint in such profusion that the examples of them already accumulated in the museums of Europe and America, amount to many thousands. But now that attention has been thus widely drawn to their character and significance, it is found that implements of the same class not only abound in regions geologically favorable to their production, but they occur in nearly every country in Europe, and on widely scattered localities in Asia and Africa, where no such natural resources were available for their manufacture.

The earliest known type of primitive flint implements, illustrative of a class now very familiar to archæologists, was accidentally recovered from the Quaternary gravel beds of the Thames valley, in the heart of Old London, before the close of the seventeenth century. It is a well made spear-pointed implement, with an unusually tapering point, while the butt-end is broad and roughly fashioned so that it could be used in the hand as a spade or hoe without any haft. The deposit in which it lay would now be accepted as unquestionable evidence of its Palæocosmic age; but at the date of its discovery, the Celtic era was regarded as that to which all oldest traces of European man pertained. This interesting relic is accordingly described in the Sloane Catalogue of the British Museum as "a British weapon, found with elephant's tooth, opposite to Black Mary's, near Gray's Inn Lane." In 1797, another and highly interesting discovery of the same class was communicated to the Society of Antiquaries of London by one of its members, Mr. John Frere.¹ In this case a large number of palæoliths were found lying at a depth of twelve feet from the surface, in a gravelly soil containing fresh-water shells and bones of great size. Subsequent excavations in the same locality, at Hoxne, Suffolk, confirm the presence there of the bones of the mammoth, as well as of the fossil horse and the deer. Mr. Frere was so strongly impressed with the evidence of antiquity supplied that he inclined to assign the implements to a remote age, "even beyond that of the present world." By this, however, he probably meant no more than M. Boucher de Perthes, when, so recently as 1847, he entitled his volume devoted to the corresponding discoveries in the valley of the Somme, "*Antiquités Celtiques et Antédiluviennes.*" The antiquity of man, as now understood, was then unthought of; and the word "antediluvian" sufficed as a vague expression of remote indefinite antiquity for which pre-Celtic would then have been accepted as an equivalent. Mr. Frere speaks of the flint implements as "evidently weapons of war fabricated and used by a people who had not the use of metals." He further adds: "The manner in which they lie would lead to the persuasion that it was a place of their manufacture, and not of their accidental deposit; and the numbers of them were so great that the man who carried on the brick-work told me that before he was aware of their being objects of curiosity he had emptied baskets full of them into the ruts of the adjoining road."²

When, in December, 1886, Mr. J. Allan Brown communicated to the same Society an analogous discovery near Ealing, Middlesex, English archæologists had become so familiar with the idea of the antiquity of palæolithic man, and the arts of his epoch, that the existence of pre-Celtic races in Britain was accepted as a mere truism. It was not, therefore,

¹ *Archæologia*, xiii. 204.

² *Ibid.*, xiii. 224, 225; pl. xiv, xv.

any matter of surprise to be told of the discovery of a palæolithic workshop-floor of the Drift period, near Ealing. It lay about a hundred feet above the present bed of the Thames; and here, six feet below the surface, on an ancient sloping bank of the river, an area of about forty feet square disclosed nearly six hundred unabraded worked flints, including neatly finished spear heads from five to six inches long. Along side of these lay roughly wrought axes, chipped on one or both sides to a cutting edge, and some of them unfinished. There were also flint flakes, some with serrated edges, and well-finished knives, borers, drills, chisels, etc. Waste flakes and chippings, as well as cores, or partially worked blocks of flint, were also observed in sufficient numbers to leave no doubt that here, in the place of their manufacture, lay buried beneath the accumulations of unnumbered centuries industrial products of the skilled artizans of the British Islands contemporary with the long-extinct Quaternary fauna.¹

The types of flint implements, found at Hoxne in 1797, correspond to other palæoliths recovered from rolled gravel and clay of the glacial drift in the valleys of the Thames, the Somme and the Seine. In their massive and artless rudeness they seem to realize for us some fit ideal of the primitive fabricator in his first efforts at tool-making. But the Ealing find accords with the more extended discoveries of this class. In reality, the manufactures of palæolithic man, as a whole, are less artless than many examples of modern Indian flint-work. Not a few of the stone axes have had their shape determined by that of the water-worn stones out of which they were fashioned, and so required much less skill than was necessarily expended in chipping the flint nodule into the rudest of pointed implements. Any close-grained rock, admitting of grinding and polish, was available for fashioning the larger weapons and domestic implements, alike among the men of the Neolithic age and the native races of the American continent in modern centuries. For many of the simpler requirements of the tool-user, any apt stone chip or water-worn pebble sufficed; and scarcely anything can be conceived of more rude or artless than some of the stone weapons and implements in use among savage tribes at the present day. Prof. Joseph Leidy describes a scraper employed by the Shoshone Indians in dressing buffalo skins, consisting of a thin segment of quartzite, so devoid of manipulative skill that, he says, had he noticed it among the strata of indurated clays and sandstone, instead of seeing it in actual use, he would have regarded it as an accidental spawl.² Dr. Charles C. Abbott, in his "Primitive Industry of the Native Races," furnishes illustrations of pointed flakes, or arrow tips, triangular arrow heads, spear heads, and other stone implements, only a little less rude and shapeless.³ Of a similar character is the blade of a war-club in use among the Indians of the Rio Frio, in Texas.⁴ Nothing so rude has been ascribed to artificial origin among the disclosures of the drift, though corresponding implements may have escaped notice; for were it not that the chipped piece of trachyte of the Texas war-club is inserted in a wooden haft of unmistakable human workmanship, the blade would scarcely suggest the idea of artificial origin. Mere rudeness, therefore, is no certain evidence of the first artless efforts of man to furnish himself with tools.

Until we arrive at the period of neolithic art, with its perforated hammers, grooved

¹ Athenæum, Dec. 18, 1886.

² Primitive Industry, figs. 241, 254, 292, 295, &c.

³ U. S. Geological Survey, 1872, p. 652.

⁴ Evans' Stone Implements, fig. 94.

axes, net-sinkers, gouges, adzes, and numerous other ground and polished implements, fashioned of granite, diorite, trap, and other igneous rocks, the forms of implements are few and simple, dependent to a large extent on the natural cleavage of the flint. The commoner examples of neolithic art, recovered in thousands from ancient Scandinavian, Gaulish and British graves, from the lake-dwellings of Switzerland, the Danish and British shell mounds, the peat mosses of Denmark and Ireland, and from numerous other depositories of prehistoric industrial art, are scarcely distinguishable from the flint knives, scrapers, spears and arrow heads, or the chisels and axes, manufactured by the Indians of this continent at the present day. The material available in certain localities, such as the claystone of the Haida and Babeen Indians, and the argillite of the old implement-makers of New Jersey, the obsidian of Mexico, or the quartz, jasper, and greenstone of many Canadian centres, give a specific character to the implements of the various regions; but, on the whole, the arts of the Stone period of the most diverse races and eras present striking analogies, scarcely less suggestive of the operation of a tool-making instinct than the work of the nest-builders, or the ingenious art of the beaver. But the massive and extremely rude implements of the river drift and caves present essentially different types, controlled indeed, like the productions of later artificers by the natural cleavage and other essential properties of the material in which the flint-worker wrought; but with some characteristic differences, suggestive of habits and conditions of life in which the artificer of the Mammoth or Reindeer period differed from the tool-maker of Europe's Neolithic age, or the Indian savage of modern centuries.

The tool-bearing drift-gravel of France and England presents its relics of primitive art intermingled with countless amorphous unwrought flints. Both have been subjected to the violent action of floods, to which the present condition of such geological deposits is due; and many contents of the caves, though subjected to less violence, are the results of similar causes. But, along with numerous implements of the rude drift type, the sheltered recesses of the caves have preserved, not only the smaller and more delicate flint implements, but carefully wrought tools and weapons of bone, horn and ivory. Some, at least, of these undoubtedly belong to the Palæolithic age; and therefore tend to verify conclusions, not only as to the mechanical ingenuity, but also as to the intellectual capacity of the earliest tool-makers. The large almond and tongue-shaped flint implements are so massive as to have effectually resisted the violence to which they, along with other contents of the rolled gravels in which they occur, were subjected; whereas it is only in the favoring shelter of the caves, or in rare primitive sepulchral deposits, that delicate trimmed flakes and the more perishable implements of bone and ivory, or horn, have escaped destruction.

The palæolithic implements to which Boucher de Perthes directed attention so early as 1840, were recovered from drift gravel beds, where amorphous flint nodules, both whole and fractured, abound in countless numbers; and this tended to suggest very reasonable doubts as to the artificial origin of the rude implements lying in close proximity to them. Nor was this incredulity lessened by the significance assigned by him to other contents of the same drift gravel. For so far is Boucher de Perthes from overlooking the endless variety of fractured pieces of flint recoverable from the drift beds, that his narrative is supplemented by a series of plates of "L'Industrie primitive," the larger number of which present chipped flints so obviously the mere products of accidental fracture or of

weathering, that they contributed in no slight degree to discredit the book on its first appearance. Others of them, however, show true flakes, scrapers, and fragments probably referable to smaller implements of the same class, such as would be recognized without hesitation to be of artificial origin if found alongside of undoubted flint implements in a cave deposit, or in any barrow, cist, or sepulchral urn. In so far as they belong to the true Drift, and not to the Neolithic or the Gallo-Roman period, they tend to confirm the idea that the large almond and tongue-shaped implements are not the sole relics of palæolithic art.

But now that adequate attention has been given to the stone implements of the Drift-folk, or the men of the Mammoth and Reindeer ages it becomes apparent that they are by no means limited to such localities. On the contrary, sites of native manufactories of flint implements, with abundant remains of the fractured debris of the ancient tool-makers' workshop, some of which are described on a later page, have been discovered remote from any locality where the raw material could be procured. Until the gun flint was superseded by the percussion cap, the material for its manufacture was procured by sinking shafts through the chalk until the beds of flint suited for the purpose were reached. In this the modern flint worker only repeated the practice of the primitive tool-maker. A group of ancient flint pits at Cissbury, near Worthing, has been made very familiar by the systematic explorations of Colonel A. Lane Fox. They occur in and around one of the aboriginal hill-forts of Sussex, the name of which has been connected with Cissa, the son of Ella, who is referred to by Camden as "Saxon king of those parts." But any occupation of the old hill-fort as a Saxon stronghold belongs to very recent times when compared with that of the flint workers, whose pits have attracted the notice of modern explorers. Colonel Lane Fox describes Cissbury Hill Fort as a great flint arsenal. Here within its earthen ramparts the workmen who fashioned the arms of the Stone age excavated for the beds of native flint in the underlying chalk, and industriously worked it into every variety of weapon. "In one place a collection of large flakes might be seen, where evidently the first rough outline of a flint implement had been formed. In another place, a quantity of small flakes showed where a celt had been brought to perfection by minute and careful chipping."¹ In other excavations the pounders, or stone hammers, were found, with a smooth rounded end by which they were held in the hand, and the other bruised and fractured in the manufacture of the flint implements that abound on the same site.² Twenty-five pits were explored; and from these, hundreds of worked flints were recovered in every stage of workmanship—chips, flakes, cores, balls, and finished knives; drills, scrapers, spear heads and axes or celts. In fact, Col. Lane Fox sums up his general statement of details with the remark that "Cissbury has produced specimens of nearly every type known to have been found among flint implements, from the Drift and Cave up to the Surface period,"³ But this "Woolwich" of the flint age occupied an altogether exceptional position, with the raw material immediately underlying the military enclosure, not improbably constructed on purpose to defend the primitive arsenal and workshop, and so render its garrison independent of all foreign supplies.

Other flint pits point to the labours of the industrious miner, and the probable transport of the raw material to distant localities where the prized flint could only be procured

¹ *Archæologia*, xlii. 72.

² *Ibid.*, p. 68,

³ *Ibid.*, p. 68.

from traders, who bartered it for other needful supplies. An interesting group of flint pits of this latter class has been subjected to careful exploration by the Rev. Canon Greenwell; and in a former paper read to this Section, attention was drawn to the ingenious inference of the traces of a left-handed workman among the flint-miners of the Neolithic age. This was based on facts noted in reference to two picks fashioned from the antlers of the red deer, corresponding to others of the ancient miners' tools found scattered through the long-deserted shafts and galleries of the flint pits.

The shallow depressions on the surface, which guide the explorer to those shafts of the ancient workmen, are analogous to others that reveal the funnel-shaped excavations hereafter described, on Flint Ridge, the sites of ancient flint pits of the American arrowmakers. In France, Germany and Switzerland, as well as Great Britain, many localities are no less familiar, on which the refuse flakes, and chippings of flint and other available material, show where they have been systematically fashioned into implements. The museum of the Society of Antiquaries of Scotland has acquired numerous interesting additions to its collections of objects of this class by encouraging systematic research. From the sands at Colvin and Findhorn, Morayshire; Little Ferry, Sutherlandshire; and from Burghhead, Drainie and Culbin sands, Elginshire, nearly seven thousand specimens have been recovered, consisting chiefly of flint flakes and chippings; but also including several hundred arrow-heads, knives, and scrapers, many of them unfinished or broken.

Thus, in various localities, remote from native sources of flint, a systematic manufacture of implements appears to have been carried on. There can, therefore, be scarcely any hesitation in inferring, from the evidence adduced, first a trade in the raw material brought from the distant localities of the flint mines; and then a local traffic in the manufactured implements, as was undoubtedly the case among the American aborigines at no remote date; if, indeed, it is not still practiced on this continent. This aspect of primitive interchange, both of the raw material and the products of industrial skill, in so far as it is illustrated in the practice of the Indian tribes of this continent, merits the most careful study, as a help to the interpretation of the archæological evidence pertaining to pre-historic times. To the superficial observer, stone is of universal occurrence; and it seems, therefore, needless to inquire where the implement-maker of any Stone age procured the rough block out of which he fashioned his weapon or tool. Only when copper, bronze, and iron superseded the crude material of the Stone age is it supposed to be needful to determine the sources of supply. But this is a hasty and wholly incorrect surmise. The untutored savage is indeed greatly limited in his choice of materials. We are familiar with the shell workers of the Caribbees and the Pacific Islands, and the horn and ivory workers of the Arctic regions; but where the resources of an ample range could be turned to account, the primitive workman learned at a very early date to select by preference such stones as break with a conchoidal fracture. Only where such could not be had, the most available chance-fractured chip or the apt water-worn stone was turned to account. Rude implements are accordingly met with fashioned of trap, sienite, diorite, granite, and other igneous rocks; as well as from quartzite, agate, jasper, serpentine and slate. Some of those materials were specially favored by the neolithic workmen for certain classes of their carefully finished weapons and implements, such as perforated hammers, large axes, gouges and chisels. But the natural cleavage of the flint, and the sharp edge exposed by

every fracture, adapt it for fashioning the smaller knives, lance and arrow heads, in a way no other material except obsidian equals. Hence flint appears to have been no less in request among the ancient tool-makers than copper, tin, and iron in the later periods of metallurgic art.

The fact that tin is a metal of rare occurrence, though found in nearly inexhaustible quantities in some regions, has given a peculiar significance to certain historical researches, apart from the special interest involved in the processes of the primitive metallurgist, and the widely diffused traces of workers in bronze. The comparative rarity of flint, and its total absence in many localities, suggest a like enquiry into the probable sources of its supply in regions remote from its native deposits. The flint lance or arrow-head, thrown by an enemy, or wrested from the grasp of a vanquished foe, would, as in the case of improved weapons of war in many a later age, first introduce the prized material to the notice of less favoured tribes. As the primitive tool-maker learned by experience the greater adaptability of flint than of most other stones for the manufacture of his weapons and implements, it may be assumed that it became an object of barter in localities remote from those where it abounds; and thus, by its diffusion, it may have constituted a recognized form of *pecunia* ages before the barter of pastoral tribes gave rise to the peculiar significance attached to that term.

One piece of confirmatory evidence of trade in unwrought flint is the frequent occurrence of numerous flint flakes among the prized gifts deposited with the dead. Canon Greenwell describes, among the contents of a Yorkshire barrow in the parish of Ganton, a deposit of flint flakes and chippings numbering one hundred and eighteen, along with a few finished scrapers and arrow-heads; ¹ and smaller deposits of like kind are repeatedly noted by him. Still more, he describes their occurrence under circumstances which suggest the probability of the scattering of flint flakes, like an offering of current coin, by the mourners, as the primitive grave was covered in and the memorial mound piled over the sacred spot. Flints and potsherds, he says, occur more constantly, and even more abundantly than bones; and this presents to his mind a difficult problem, in considering which he refers to an analogous practice of a very diverse age. The maimed rites at poor Ophelia's grave are familiar to the reader of "Hamlet." The priest replies to the demand of Laertes for more ample ceremony at his sister's burial:—

" . . . But that great command o'ersways the order
She should in ground unsanctified have lodged
Till the last trumpet; for charitable prayers,
Shards, flints, and pebbles should be thrown on her."

The flints and potsherds, Canon Greenwell remarks, " occur at times in very large quantities, the flints generally in the shape of mere chippings and waste pieces, but often as manufactured articles, such as arrow points, knives, saws, drills and scrapers, etc." He further notes that they are found distributed throughout the sepulchral mound, " in some instances in such quantities as to suggest the idea that the persons who were engaged in throwing up the barrow, scattered them from time to time during the process." Assuredly whatever motive actuated those who contributed such objects while the sepulchral mound

¹ British Barrows, p. 166.

was in progress of erection, they were not designed as any slight to the manes of the dead. In districts remote from those where the flint abounds, flakes and chips of the prized material must have been in constant demand to replenish the sheaf of arrows, and replace the lost or broken lance, knife, and scraper. The trader would barter the raw material for furs and other equivalents; or the industrious miner would carry off an adequate supply for his own future use. Such small objects, possessing a universally appreciable value, would be as available for current change as the African cowrie, the Ioqua shells of the Pacific coast, or the wampum-beads of the tribes to the east of the Rocky Mountains. If this assumption be correct, the scattering of flint flakes, while the mound was being piled over the grave, was a form of largess not less significant than any later tribute of reverence to the dead.

The sources whence such supplies of raw material of the old flint-worker were derived, have been sufficiently explored to furnish confirmatory evidence of some, at least, of the deductions suggested by other indications thus far noted. The archæologists of Europe are now familiar with many localities which have been the quarries and workshops, as well as the settled abodes, of palæolithic and neolithic man; nor are such unknown to us in the New World, though research has to be greatly extended before definite conclusions can be accepted relative to the earliest presence of man on the American continent. Flint and stone implements of every variety of form, and nearly every degree of rudeness, abound in the soil of the New World. But in estimating the true significance of such evidence, it has to be borne in remembrance that its indigenous population has not even now abandoned the arts of their Stone period. Implements have already been referred to still in use among the Shoshone, Texas, and other living tribes, ruder than any yet recovered from the river-drift of France or England; whilst others, more nearly resembling the palæolithic types, have been met with on this continent, some of them imbedded in the ancient rolled gravels, or glacial drift, and associated with the bones of the mastodon and other fossil mammals. But the evidence as to their antiquity or palæolithic origin has been, at best, doubtful. An imperfect flint knife, now in the museum of the University of Toronto, was recovered from a depth of upwards of fourteen feet, among rolled gravel and gold-bearing quartz of the Grinnel Leads in Kansas Territory. Flint implements from the auriferous gravel of California were produced at the Paris Exposition of 1855. According to the Geological Survey of Illinois for 1866, stone axes and flint spear-heads were obtained from a bed of local drift near Alton, underlying the loess, and at the same depth as bones of the mastodon. Similar discoveries have been repeatedly noted in Southern States. The river Chattahoochee, in Georgia, in its course down the Nacoochee valley, flows through a rich auriferous region. Explorers in search for gold have made extensive cuttings through the underlying drift-gravel, down to the slate rock upon which it rests; and during one of these excavations, at a depth of nine feet, intermingled with the gravel and boulders of the drift, three large implements were found, nearly resembling the rude flint hatchets of the drift type. Such examples, however, though repeatedly noted, have, thus far, been too isolated to admit of their use for any such comprehensive inductions as the disclosures of the glacial drift of north-western Europe have justified. The evidence hitherto adduced, when the implements of this class have been of flint, has failed to establish their palæolithic age, notwithstanding their recovery from ancient gravels. Implements of flint occur in great abundance throughout vast

areas of this continent. With the fact before us that even now the Stone period of its aborigines has not wholly passed away, careful observation is required in determining the probable age of stray specimens buried even at considerable depths.

But disclosures of an actual American implement-bearing drift appear at length to have been met with in the valley of the Delaware. These show the primitive tool-maker resorting to a granular argillite, the cleavage of which adapted itself to the requirements of his rude art. Prof. Shaler, in a report on the age of the Delaware gravel beds, describes this formation as occurring from Virginia northward to Labrador, though it is only in New Jersey and Delaware that the accompanying evidences of human art have been thus far recovered. The New Jersey drift is made up of transported material, including boulders and smaller fragments of granitic, hypogene, sandstone, and limestone rocks, along with water-worn pebbles of the same granular argillite as the characteristic stone implements recovered from it, to which, from their peculiar shape, the name of "turtle-back celts" has been given. There is little true clay in the deposit to give coherence to the mass. The type of pebble is subovate, or discoidal, suggesting its form to be due to the action of running water; and it seems probable that the stone was not quarried out of the living rock, but that the pebbles thus reduced to a convenient form were turned to account by the tool-maker. The researches of Dr. Abbott have been rewarded by the discovery in the drift-gravel of numerous examples of this peculiar type of implement, for which the one material appears to have been used, notwithstanding the varied contents of the drift-gravel in which they occur. As in the case of the French and English river drift, the fractured material is found in every stage of disintegration. Prof. Shaler says: "Along with the perfect-looking implements figured by Dr. Abbott, which are apparently as clearly artificial as the well-known remains of the valley of the Somme, there are all grades of imperfect fragments, down to the pebbles that are without a trace of chipping." But more recent discoveries in the Delaware valley point to palæolithic remains of a still earlier age. The disclosures of Dr. Abbott naturally attracted attention to the region; for there, for the first time, the American archæologist saw the promise of disclosures corresponding in character to those of the European drift-gravels. A systematic and prolonged series of investigations have accordingly been carried out by Mr. Hilborne T. Cresson, under the direction of the Peabody Museum, resulting in fresh disclosures of early American man. The Naaman's Creek rock-shelter carefully explored by him, is situated in the State of Delaware, immediately to the south of Mason and Dixon's line. There in underlying deposits, claimed to be of Post-Glacial age, rudely chipped points and other implements, all of argillite, were found; and at a higher level, others of argillite, but intermingled with bone implements, and fragments of rude pottery, and alongside of these implements fashioned of quartzite and jasper. The antiquity assigned to the Delaware implements, as determined by the age of the tool-bearing gravel is much greater than that of the Trenton gravels previously referred to; but though remains of fifteen different species of animals, including fragments of a human skull, were recovered from the cave or rock-shelter, they include none but existing fauna. But the evidence of antiquity is based most confidently on the discovery of palæoliths in situ in the true Philadelphia red-gravel. Prof. G. F. Wright remarks, in discussing the relative ages of the Trenton and Philadelphia red gravel, that both he and Prof. Lewis came to the same conclusion; assigning the deposition of

the red gravel to a period when the ice had its greatest extension, and when there was considerable local depression of the land. "During this period of greatest ice-extension and depression, the Philadelphia Red Gravel and Brick Clay were deposited by the ice-laden floods which annually poured down the valley in the summer season. As the ice retreated towards the headwaters of the valley, the period was marked also by a reëlevation of the land to about its present height, when the later deposits of gravel at Trenton took place. Dr. Abbott's discoveries at Trenton prove the presence of man on the continent at that stage of the Glacial epoch. Mr. Cresson's discoveries prove the presence of man at a far earlier stage. How much earlier will depend upon our interpretation of the general facts bearing on the question of the duality of the Glacial epoch"¹—a branch of the enquiry which it is not necessary to discuss here. It is sufficient to note that this argillite—an altogether inferior material to the flint, or hornstone of later tool-makers;—appears, thus far, to be a characteristic feature of American palæolithic art. The locality of the native rock is still undetermined; but implements fashioned of it have been found in great numbers along the escarpments facing the river Delaware. Prof. Shaler describes the material as a curious granular argillite, the like of which, he says, "I do not know in place." Should the native rock be hereafter identified, with traces of the manufactured celts in its vicinity, it may help to throw light on the age and history of the primitive American implement-makers.

The flint of the cretaceous deposits does not occur in America. True chalk is all but unknown among the cretaceous strata of this continent, although it has been found in the form of a somewhat extensive bed in Western Kansas. In Texas, the cretaceous limestones contain in places hornstone nodules distributed through them, like the flint nodules in the upper chalk beds of Europe. But though, so far, differing in origin, the hornstone and flint are practically identical; and the chert, or hornstone, which abounds in the chert-layers of the corniferous formation, of common occurrence in Canada, is simply a variety of flint, consisting essentially, like the substance to which that name is specifically applied, of amorphous silica, and with a similar cleavage. This Devonian formation is made up chiefly of limestone strata, parted in many places by layers of chert which vary in thickness from half an inch to three or four inches. The limestones are more or less bituminous, and frequently contain chert nodules. Most of their fossils are silicified. The formation underlies a considerable portion of south-western Ontario. Outcrops occur at Port Dover, Port Colborne, Kincardine, Woodstock, St. Mary's and other localities. At a point which I have explored more than once near Port Dover, implements occur in considerable numbers, along with fractured or imperfect specimens, mingled with flakes and chippings, evidently indicative of a spot where their manufacture was carried on. At this, and some others of the localities here named, Canadian flint pits may be looked for. Among other objects illustrative of primitive native arts in the museum of the University of Toronto, is a block of flint or brown chert, from which flakes have been struck off for the use of the native arrow-maker. This flint-core was found in a field on Paisley Block, in Guelph Township, along with a large flake, a scraper, and fourteen arrow-heads of various sizes, all made from the same material. Alongside of them lay a flint hammer-stone bearing marks of long use. All of those objects are now in the Toronto museum,

¹ Palæolithic Man in Eastern and Central North America, pp. 152, 153.

and appear to indicate the site of an aboriginal workshop, with one of the tools of the ancient arrow-maker, who here fashioned his implements and weapons, and traded with them to supply the need of the old Huron or Petun Indians of western Canada. The Spider Islands in Lake Winnipeg, near the outlet, have been noted by Dr. Robert Bell, as a favourite resort of the old workers in flint, where they could trade the products of their industry with parties of Indians passing in their canoes. "I have found," he says, "a considerable number of new flint implements, all of one pattern, in a grave near one of those sites of an old factory;" the body of a man—presumably the old arrow-maker—had been buried there in a sitting position, surrounded with the latest products of his industrious skill.

In 1875 I devoted several weeks to a careful study of some of the principal groups of ancient earthworks in the Ohio valley, and visited Flint Ridge to examine the native flint pits in the country of the Shawnees. They were formerly a numerous and powerful tribe of Indians. But they took part, in 1763, in the conspiracy of Pontiac, and were nearly exterminated in a battle fought in the vicinity of their old quarries. From these it is probable that not only the Shawnees, but the older race of Mound-Builders of the Ohio valley, procured the material from which they manufactured many of their implements, including some of those used by the latter, in the construction of their great earthworks.

Flint Ridge, as the locality is called, a siliceous deposit of the Carboniferous age, extends through the state of Ohio, from Newark to New Lexington. It has been worked at various points in search of the prized material; and the ancient pits can still be recognized over an extensive area by the funnel-shaped hollows, or slighter depressions where the accumulated vegetable mould of many winters has nearly effaced the traces of the old miners. The chert, or hornstone, of this locality accords with that from which the implements recovered from the mounds appear to have been chiefly made. One fact which such disclosures place beyond doubt, viz., that the so-called Mound-Builders had not advanced beyond the stage of flint or stone implements, is of great significance. Their numbers are proved by the extent of their earthworks in many localities in the Ohio valley; and the consequent supply of implements needed by them as builders must have involved a constant demand for the flint-miners and tool-makers. The great earthworks at Newark are among the most extensive structures of this class, covering an area of several miles, and characterized by the perplexing element of elaborate geometrical figures, executed on a gigantic scale by a people still in the primitive stage of stone implements; and yet giving proof of skill fully equalling, in the execution of their geometrical designs, that of the scientific land-surveyor. On this special aspect of the question, it may be well to revert to notes written immediately after a careful survey of the Newark earthworks, so as to suggest more clearly their extent and the consequent number of workmen and of tools in demand for their execution. The sacred enclosures have to be classed apart from the military works of the Mound-Builders. Their elaborate fortifications occupy isolated heights specially adapted for defence; whereas the broad river terraces have been selected for their religious works. There, on the great unbroken levels, they form groups of symmetrical enclosures, square, circular, elliptical, and octagonal, connected by long parallel avenues, suggesting analogies with the British Avebury, the Breton Carnac, or even with the temples and sphinx-avenues of the Egyptian Karnak and

Luxor : but all wrought of earth, with the simple tools made from quartzite, chert or hornstone, derived from quarries and flint-pits, such as those of Flint Ridge, the localities of which have been identified.

For a time the tendency among American archæologists was to exaggerate the antiquity of those works, and to over-estimate the artistic skill of their builders. But it now appears that some vague memories of the race have been perpetuated. The traditions of the Delawares preserved the remembrance of the Talligew or Tallegewi, a powerful nation whose western borders extended to the Mississippi, over whom they, in conjunction with the fierce warrior race of Wyandots or Iroquois, triumphed. The old name of the Mound-Builders is believed to survive, in modified form, in that of the Alleghany Mountains and River ; and the Chatta Muskogee tribes, including the Choctaws, Chickosaws, the Natchez, and other southern Indians of the same stock, are supposed to represent the ancient race. The Natchez claimed that, in their more prosperous days, they had five hundred villages, and their borders extended to the Ohio. With such assignment of an affinity to known Indian nations, the vague idea of some strange prehistoric American race of unknown antiquity vanishes ; and the latter tendency has been rather to underestimate their distinctive peculiarities. Some of these seem to separate them from any Indian tribe of which definite accounts have been preserved. Special features significant of such difference are worthy of note ; and foremost among these is the evidence of comprehensive design, and of scientific skill in the construction of their sacred enclosures. The predominant impression suggested by the great military earthworks of the Mound-Builders is that of a people coöperating under the guidance of approved leaders, with a view to the defence of large communities. Elaborate fortifications are erected on well-chosen hills or bluffs, and strengthened by ditches, mounds, and complicated approaches ; but the lines of earthwork are everywhere adapted to the natural features of the site. The sacred enclosures are, on the contrary, constructed on the level river-terraces with elaborate artificiality of design, but on a scale of magnitude not less imposing than that of the largest hill-forts. On first entering the great circle at Newark, and looking across its broad trench at the lofty embankment overshadowed with full-grown forest trees, my thoughts reverted to the Antonine vallum, which by like evidence still records the presence of the Roman masters of the world in North Britain sixteen hundred years ago. But after driving over a circuit of several miles, embracing the remarkable earthworks of which that is only a single feature ; and satisfying myself by personal observation of the existence of parallel avenues which have been traced for nearly two miles ; and of the grand oval, circles, and octagon, the smallest of which measures upwards of half-a-mile in circumference : all idea of mere combined labour is lost in the higher conviction of manifest skill, and even science. The octagon indeed is not a perfect figure. Its angles are not coincident, but the sides are very nearly equal ; and the enclosure approaches so closely to an accurate figure that its error is only demonstrated by actual survey. Connected with it by parallel embankments 350 feet long, is a true circle, measuring 2,880 feet in circumference ; and distant nearly a mile from this, but connected with it by an elaborate series of earthworks, is the great circular structure previously referred to. Its actual form is an ellipse ; the different diameters of which are 1,250 feet and 1,150 feet, respectively ; and it encloses an area of upwards of thirty acres. At the entrance, the enclosing embankment curves outward on either side for a distance of 100 feet, leaving a

level way between the ditches, eighty feet wide, and at this point it measures about thirty feet from the bottom of the ditch to the summit. The area of the enclosure is almost perfectly level, so that during rain-floods the water stands at a uniform height nearly to the edge of the ditch.

The skulls, both of the Palæolithic and Neolithic periods of Europe, have been successfully appealed to for indications of the intellectual capacity of the ancient races; and similar evidence has been employed to test that of the Mound-Builders. But ancient mounds and earthworks were habitually resorted to at long subsequent dates as favourite places of interment; so that skulls derived from modern graves are not infrequently ascribed to the ancient race; and much difficulty has been found in agreeing on a typical mound skull. Even after eliminating those derived from superficial interments, a very noticeable diversity is found in the comparatively few undoubtedly genuine mound skulls, which, as I long since suggested, may be due to the actual presence of two essentially distinct races among the ancient settlers in the Ohio valley.¹ It seems to accord with the unmistakable traces of intellectual progress of a kind foreign to the attainments of any known race of the North American continent, thus found in association with other arts and methods of work not greatly in advance of those of the Indian savage. The only satisfactory solution of the problem seems to present itself in the assumption of the existence among them of a theocratic order, like the priests of ancient Egypt, the Brahmins of India, or the Incas of Peru, under whom the vanished race of the Ohio valley—Tallegewi, Natchez, Alleghans, or other American aborigines—executed their vast geometrical earthworks with such mathematical accuracy.

The contents of the earthworks of the Ohio and Mississippi valleys show that the copper, found in a pure metallic condition at various points around Lake Superior, was not unknown to their constructors. But in this they had little advantage over the Iroquois and Algonkin tribes, in whose grave-mounds copper axes and spear-heads occasionally occur. It is even possible that working parties were despatched from time to time to the ancient copper mines on the Kewenaw peninsula, to bring back supplies of the prized malleable rock, which could be bent and hammered into a shape that no other stone was susceptible of. But the labours of the native miners were inadequate to provide supplies that could in any degree suffice to displace the flint or quartzite of the implement maker. One use, however, has been suggested for the copper, in relation to the labours of the flint-workers. Mr. George Ercol Sellers, whose researches among the workshops of the ancient tool-makers have thrown much light on their processes, was led, from careful observation of some of their unfinished work, to the opinion that copper was in special request in the operations of the flint-flakers. After referring to the well-known use of horn or bone-flakers, he thus proceeds: "From the narrowness of the cuts in some of the specimens, and the thickness of the stone where they terminate, I have inclined to the belief that, at the period they were made, the Aborigines had something stronger than bone to operate with, as I have never been able to imitate some of their deep heavy cuts with it; but I have succeeded by using a copper point, which possesses all the properties of the bone, in holding to its work without slipping, and has the strength for direct thrust required."² No copper tool, however, was recovered by him

¹ Prehistoric Man, 3rd Ed. ii. 132.

² Smithsonian Reports, part i., 1885, p. 880.

among the vast accumulations of implements and waste chips, hereafter described, on the sites of the ancient workers' industrious operations, though some of those found elsewhere may have been used for such a purpose.

The evidence that the ancient dwellers in the Ohio valley were still in their stone age is indisputable. But to a people apparently under the guidance of an order or cast far in advance of themselves in some important branches of knowledge, and by whom the utility of the metals was beginning to be discerned—though they had not yet mastered the first step in metallurgy by the use of fire,—their speedy advance beyond the neolithic stage was inevitable. But an open valley, accessible on all sides, was peculiarly unfavourable for the first transitional stage of a people just emerging from barbarism. Their numbers, it is obvious, were considerable; and agriculture must have been carried out on a large scale to furnish the means of subsistence for a settled community. They had entered on a course which, if unimpeded, would inevitably tend to develop the higher elements of social life and political organization. But their duration as a settled community appears to have been brief. Some faint tradition of the irruption of the northern barbarians of the New World survives. The Iroquois, that indomitable race of savage warriors, swept through the valley with desolating fury; the dawn of civilization on the northern continent of America was abruptly arrested; and the present name of the great river along the banks and on the tributaries of which their memorials abound, is one conferred on it by their supplanters, who were equally successful in thwarting the aims of France to introduce the higher forms of European civilization there.

Some singularly interesting information relative to the traces of the ancient flint-workers in the Ohio valley, is furnished in the paper of Mr. Sellers, already referred to. His observations were made when that region still remained, to a large extent, undisturbed by civilized intruders on the deserted Indian settlements. He notes many places along the banks of the Ohio and its tributaries, at an elevation above the spring floods except at rare intervals of violent freshets, where the flaking process of the old flint-workers had been extensively carried on, and where cores and waste chips abound. "At one of those places, on the Kentucky side of the river," he says, "I found a number of chert blocks, as when first brought from the quarry, from which no regular flakes had been split; some had a single corner broken off as a starting point. On the sharp right-angled edge of several I found the indentations left by small flakes having been knocked off, evidently by blows, as a preparation for seating the flaking tool. Most of the localities referred to are now under cultivation. Before being cleared of the timber and subjected to the plow, no surface relics were found, but on the caving and wearing away of the river banks, many spear and arrow heads and other stone relics were left on the shore. After the land had been cleared, and the plough had loosened the soil, one of the great floods that occur at intervals of some fifteen or twenty years, would wash away the loose soil, leaving the great flint workshops exposed." There, accordingly, he notes among the materials thus brought to light, the cores or nuclei thrown aside, caches stored with finished and unfinished implements and flakes, the tools and wastage, vast accumulations of splinters, etc., all serving to illustrate the processes of the ancient flint-workers.

The depth at which some accumulations occur, overlaid by the growth of the so-called primeval forest, points to them as contemporary with, if not in some cases much older than, the earthworks of the Mound-Builders. The extent, indeed, to which some

are overlaid by subsequent accumulations suggests a remote era. In 1853 Mr. Sellers first visited the site of one of those ancient work yards, on the northern bank of the Saline River, about three miles above its junction with the Ohio. The region was then covered with dense forest, with the exception of a narrow strip along the bank of the river, which had been cleared in connection with recently opened coal works. But at a later date, in sinking a cistern, about two hundred yards from the river bank, the excavation was made through a mass of flint chips. Subsequently heavy rains, after ploughing, exposed some spears and arrow points. "But it was not until the great flood of the winter of 1862 and 1863 that overflowed this ridge three or four feet with a rapid current, that the portion under cultivation on the river bank was denuded, exposing over six acres of what at first appeared to be a mass of chips or stone rubbish, but amongst it were found many hammerstones, celts, grooved axes, cores, flakes, almost innumerable scrapers and other implements, and many tynes from the buck or stag, all of which bore evidence of having been scraped to a point. On exposure to the air they fell to pieces." The actual site of the quarry appears to have been subsequently identified. "The greater number of cores, scattered flakes, finished and unfinished implements, are of the chert, from a depression in a ridge three miles to the south-east, where there are abundant indications of large quantities having been quarried." But the same great work-yard of the ancient Mound-Builders furnished evidence of other sources of supply. Mr. Sellers noted the finding "a few cores of the white chert from Missouri, and the red and yellow jasper of Kentucky and Tennessee," but he adds, "the flakes of these have mostly been found in nests or small caches, many of which have been exposed; and in every case the flakes they contained were more or less worked on their edges; whereas the flakes from the neighboring chert preserved their sharp edges as when split from the mass. These cache specimens with their worked serrated edges would, if found singly, be classed as saws or cutting implements. But here where found in mass, evidently brought from a distance, to a place where harder chert of a much better character for cutting implements abounds, they tell a different story." The material was better adapted for the manufacture of certain classes of small implements much in demand, and the serrated edge is simply the natural result of the mode of working of this species of chert and of the jasper.

The fine-grained quartzite was also in request, especially for the manufacture of the largest class of implements, including the hoes and spades, equally needed by the primitive agriculturist, and by the navvies to whose industrious toil the vast earthworks of the Ohio valley are due. The site of the old quartzite quarry appears to be about eight miles from the banks of Saline River; but there are many other localities scattered over the region extending from southern Illinois to the Mississippi, where the same substitute for chert or hornstone occurs. Some of the quartzite hoes or spades measure sixteen inches in length, with a breadth of from six to seven inches, and evince a remarkable amount of dexterity and skill in their manufacture. Here, accordingly, it becomes apparent that there was a time in the history of this continent, before its existence was revealed to the race that now peoples the Ohio valley, when that region was the scene of busy native industry, and its manufacturers quarried and wrought the chert, jasper, and quartzite, and traded the products of their skill over an extensive region. But the germs of an incipient native civilization were trodden out by the inroads of savage warriors from the north; and the towns and villages of the industrious community were replaced

by what appeared to La Salle, the discoverer and first explorer of Ohio River, as the primeval forest.

It throws an interesting light on the industrial processes of the ancient flint-workers to learn that, even in a region where the useful chert abounded, they went far afield in search of other materials specially adapted for some classes of implements. They were unquestionably a settled community, in a higher stage than any of the tribes found in occupation of that or any neighbouring region when first visited by Europeans. But many tribes, both of the Northern and Southern States, habitually travelled far distances to the sea coast, where still the ancient shell mounds attest their presence. The routes thus annually pursued by the Indians of the interior of Pennsylvania, for example, were familiar to the early surveyors, and some of their trails undoubtedly marked the foot-prints of many generations. In traversing those routes, as well as in their autumnal encampments on the coast, opportunities were afforded of selecting suitable materials for their stone implements from localities remote from their homes. The lines of those old trails have accordingly yielded numerous examples of the wayfarers' weapons and tools, as well as of unfinished implements. We are apt to think of a people in their Stone period as merely turning to account materials lying as accessible to all as the loose stones employed as missiles by the vagrant school-boy. But such an idea is manifestly inapplicable, not only to the arts of communities like those by whom the earthworks of the Ohio valley were constructed, but to many far older workers in flint or stone. The Indian arrow-maker and the pipe-maker, it is manifest, often travelled to great distances for the material best suited to their manufactures; and the use of flint or hornstone for slingstones, lance and arrow heads, as well as for knives, scrapers, axes and other domestic and agricultural tools, must have involved a constant demand for fresh supplies. It might be assumed, therefore, apart from all direct evidence, that a regular system of quarrying for the raw material both of the pipe and the implement-maker was pursued; and that by trade or barter the pipestone of divers qualities, and the chert or hornstone, the quartzite, jasper and other useful minerals, were thus furnished to tribes whose homesteads and hunting grounds yielded no such needful supplies. But the same region which abounds in such remarkable evidences of the ingenious arts of a vanished race, also furnishes to us the traces of the old miners, by whose industry the flint was quarried and roughly chipped into available forms for transport to distant localities, or for barter among the Mound-Builders in the region traversed by the great river. At various points on Flint Ridge, Ohio, and localities far beyond the limits of that state, as at Leavenworth, three hundred miles south of Cincinnati, where the grey flint abounds, evidences of systematic quarrying illustrate the character and extent of this primitive commerce. Funnel-shaped pits occur there, in many cases filled up with the accumulated vegetable mould of centuries, or only traceable by a slight depression in the surface of the ground. When cleared out, they extend to a depth of, from four or five, to nearly twenty feet. On removing the mould, the sloping sides of the pit are found to be covered with pieces of fractured flint, intermingled with unfinished or broken implements, and with others partially reduced to shape. The largest hoes and spades hitherto noted appear to have been fashioned of quartzite, but those of most common occurrence in Ohio and Kentucky are made of the grey flint or chert, which abounds in the Flint Ridge pits in blocks amply sufficing for the manufacture of tools upwards of a foot in length, such as may be assumed

to have been employed in the construction of the great earthworks. But the transportation of the unwrought blocks of hornstone to the workyards in the valley would have involved great labour in the construction of roads, as well as of sledges or waggons suited to such traffic. In lieu of this, the accumulated waste chips in the quarries show the amount of labour that was expended there in order to facilitate the transport of the useful material. Suitable flakes and chips were no doubt also carried off to be turned to account for scrapers, knives and other small implements. Partially shaped disks and other pieces of all sizes abound in the pits, but the finer manipulation, by means of which small arrow-heads, lances, drills, scrapers, etc., were fashioned, was reserved for leisure hours at home, and for the patient labour of the skilled tool-maker, for whose use the raw material was chiefly quarried.

In the tool-bearing drift of France and England the large characteristic flint implements occur in beds of gravel and clay abounding in flakes and chips in every stage of accidental fracture, to some of which M. Boucher de Perthes assigned an artificial origin, and very fanciful significance. But if the palæolithic flint-worker in any case quarried for his material before the latest geological reconstruction of the beds of rolled gravel, the fractured flints may include traces of primeval quarrying, as well as of the tool-maker's labours; for the rolled-gravel beds occur in river valleys best adapted to the habitat of post-glacial man.

In a report furnished to the Peabody Museum of Archæology, by Mr. Paul Schumacher, he contributes some interesting evidence relative to the quarrying and manufactures of the stone-workers of Southern California. The Indians of the Pacific coast, south of San Francisco, not only furnished themselves with chisels, axes, and the like class of implements, but with pots for culinary purposes, made of steatite, usually of a greenish grey colour. In 1876, Mr. Schumacher discovered various quarries of the old pot-manufacturers, with their tools and unfinished articles lying there. The softer stone had been used for pots, while the close-grained darker serpentine, was chiefly employed in making the weights for digging sticks, cups, pipes, and ornaments. "I was struck," he says, "on examining the locality through a field-glass, by the discovery of so many silverhued mounds, the debris of pits, the rock quarries and open-air workshops, so that I believed I had found the main factory of the ollas of the California aborigines."¹ He also discovered the slate quarry, where the rock had been broken off in irregular blocks, from which the pieces best adapted for chisels were selected and fashioned into the forms specially useful in making the steatite pots. A venerable Spanish lady told Mr. Schumacher that she recollected her mother telling her how the Indians had brought *ollas* in canoe-loads from the islands in Santa Barbara Channel to the mainland, and there exchanged them for such necessities as the islanders were in need of. This tradition was subsequently confirmed by an old Mexican guide. Similar evidence of systematic industry with the accompanying trade, or barter, meets the explorer at many points from the Gulf of Mexico northward to beyond the Canadian lakes. The pyrulæ from the Mexican Gulf are of frequent occurrence in Northern ossuaries and grave mounds, while corresponding southern sepulchral deposits disclose the catlinite of the Couteau des Prairies and the native copper of the Lake Superior mines. Obsidian is another prized material

¹ Report of the Peabody Museum, ii. 262.

only to be found in situ in volcanic regions, but met with in manufactured forms in many diverse regions, remote from the obsidian quarries. Dr. G. M. Dawson informs me that, in 1875 and 1876, while travelling along various Indian trails and routes in British Columbia, west of Fraser River, and between lats. 52° and 54°, chips and flakes of obsidian were not unfrequently observed. The Tinné Indians stated that the material was obtained from a mountain near the headwaters of the Salmon River (about long. 125° 40', lat. 52° 40'), which was formerly resorted to for the purpose of procuring this prized material.¹ The Indian name of this mountain is *Bece*, and Dr. Dawson further notes the suggestive fact that this word is the same with the Mexican (Aztec?) name for 'knife.' Mr. T. C. Weston, of the Geological Survey, also noted, in 1883, the finding of a flake of obsidian in connection with a layer of buffalo bones, occurring in alluvium, and evidently of considerable antiquity, near Fort McLeod, Alberta. The nearest source of such a material is the Yellowstone Park region.

Copper was procured by the tribes on the Pacific coast from some still undetermined region accessible to them. The native copper of the Lake Superior mines, as is well known, was worked extensively by its ancient miners, and undoubtedly formed a valuable object of traffic throughout the region watered by the Mississippi and its tributaries, and along the whole eastern routes to the seaboard. But, with the imperfect resources of the native miners, it was a costly rarity, procurable only in small quantities by barter with the tribes settled on the shores of Lake Superior. Axe-blades, spear-heads, knives, gorgets, armlets, tubes and beads, all fashioned out of the native copper solely with the hammer, have been recovered from ancient grave-mounds and ossuaries in the valleys of the St. Lawrence, the Hudson, the Ohio, the Mississippi, and their tributaries; and to the west of the Rocky Mountains, copper implements again occur manufactured from metal derived from some native source on the Pacific slope. The copper was, no doubt, recognized as a malleable rock, differing from all others in its ductility, and consequent reducibility, with the aid of a hammer-stone, to any desired form. The ancient miners of Lake Superior acquired the art of fashioning it into the most suitable tools for their mining operations, and were probably the manufacturers of most of the widely diffused copper implements. But for general purposes, both of industry and war, American man had to be content with the more abundant chert, hornstone, and quartzite. These were, therefore, in universal demand, and must have been industriously collected in those localities where they abound, and disposed of by a regular system of exchange for furs, wampum, or other objects of barter. Mr. W. H. Dall, in his report on "The Tribes of the Extreme North-West," notes the absence in the Aleutian Islands of any stone, such as serpentine, fit for making such celts or adzes, as he recovered from the shell-mounds. "They were," he says, "probably imported from the continental Innuït at great cost, and very highly valued;" and on a subsequent page he adds: "The intertribal traffic I have referred to is universal among the Innuït."

The occurrence of well-stored caches in some of the ancient mounds of the Ohio valley, as well as their repeated discovery in other localities, accords with the idea of systematised industrial labour, and the storing away of the needful supplies for agricultural and domestic operations, and for war. Messrs. Squier and Davis, in their

¹ Report of Progress Geol. Surv. Can., 1876-77, p. 79.

² Tribes of the Extreme North-West, pp. 81, 82.

"Ancient Monuments of the Mississippi Valley," describe one of the mounds opened by them within the great earthwork on the North Fork of Point Creek, in which, according to their estimate, about four thousand hornstone discs were disposed in regular order, in successive rows overlapping each other. In 1864, I had an opportunity of examining some specimens retained in the possession of Dr. Davis. They were mostly discs measuring about six inches long and four wide, more or less oval, or broad spear-shaped, and fashioned out of a fine gray flint with considerable uniformity of character. Mr. Squier assumed that the deposit was a religious offering; but subsequent disclosures of a like character confirm the probability that it was a hoard of material stored for the tool-maker.¹

In other, though rarer cases, the cache has been found containing finished implements. In digging a cellar at Trenton, New Jersey, a deposit of one hundred and twenty finished stone axes was brought to light, at a depth of about three feet below the surface. Another discovery of a like character was made when digging for the construction of a receiving vault of the Riverview Cemetery, near Taunton; and similar deposits are recorded as repeatedly occurring in the same State.² In two instances all the specimens were grooved axes. In another, fifty porphyry celts were found deposited in systematic order. Mr. Charles Rau has given the subject special attention, and in a paper entitled "Ancient Aboriginal Trade in North America," he furnishes evidence of addiction to certain manufactures, such as arrow-heads, hoes, and other digging tools, spear-heads, chisels, etc., by skilled native craftsmen.³ Deposits closely corresponding to the one reported by Mr. Squier as the sole contents of one of the mounds, in "Clark's Work," Ohio, have been subsequently discovered in Illinois, Wisconsin, and Kentucky. One of the Illinois deposits contained about fifteen hundred leaf-shaped or rounded discs of flint arranged in five horizontal layers. Another, said to have contained three thousand five hundred specimens, was discovered at Fredericksburg, in the same State. A smaller, but a more interesting hoard was accidentally brought to light in 1868, when some labourers in opening up a new street, at East St. Louis, in the same State of Illinois, came upon a collection of large flint tools all of the hoe and shovel type. There were about fifty of the former and twenty of the latter, made of a yellowish-brown flint, and betraying no traces of their having been used. Near by them lay several large unworked blocks of flint and green-stone, and many chippings, fragments of flint.⁴ Deposits of a like character, but varying both in the number and diversity of their contents, and, in general, showing no traces of use, have been discovered in other States to the east of the Mississippi. In the Smithsonian Report for 1877, Mr. Rau prints a curious account of "The Stock in Trade of an Aboriginal Lapidary." In the spring of the previous year Mr. Keenan presented to the the National Museum at Washington a collection of jasper ornaments, mostly unfinished, which had been found in Lawrence County, Mississippi. They were brought to light in ploughing a cotton field, where a deposit was exposed, lying about two and a half feet below the natural surface. It included four hundred and sixty-nine objects, of which twenty-two were unwrought jasper pebbles; one hundred and one were beads of an elongated cylindrical shape, and a few of them partially perforated. Others were ornaments of various forms, including two animal-shaped objects. The whole were made of jasper of

¹ Smithsonian Contributions to Knowledge, 158.

² Abbott's Primitive Industry, p. 33.

³ Smithsonian Report, 1872.

⁴ Smithsonian Report, 1868, p. 402.

a red or reddish colour, occasionally variegated with spots or streaks of pale yellow ; but nearly all were in an unfinished state, and so fully bore out the idea of their being the stock in trade of some old native workman, who finished them in sufficient numbers to meet the demands of his customers.¹

From time to time fresh disclosures prove the extent to which such systematic industry was carried on. The collections thus brought to light were unquestionably the result of prolonged labour, and were, for the most part, undoubtedly stored for purposes of trade. In some cases they were probably accumulated in the arsenal of the tribe in readiness for war. But whether we recognize in such discoveries the store of the trader, or the arsenal of the tribe, they indicate ideas of provident foresight altogether distinct from the desultory labours of the Indian savage in the preparation of his own indispensable supply of implements for the chase or for war.

But there were also, no doubt, the home-made weapons and implements, fashioned with patient industry out of the large rolled serpentine, chalcedony, jasper and agate pebbles, gathered from the sea-coast and river beds, or picked up wherever they chanced to occur. When camping out on Nepigon River, with Indian guides from the Saskatchewan, I observed them carefully collecting pieces of a metamorphic rock, underlying the syenite cliffs, which, I learned from one of them, was specially adapted for pipes. This they would carry a distance of fully eight hundred miles before reaching their lodges on the prairie. Dr. Robert Bell described to me a pipe made of fine green serpentine which he saw in the possession of an Indian on Nelson River. Its owner resisted all attempts to induce him to part with it ; assigning as a reason of its special value that it had been brought from Reindeer Lake distant several hundred miles north of Frog Portage, on Churchill River. The pipe was of a favorite Chippewayan pattern. The diverse forms in which various tribes shape the tobacco pipe are highly characteristic. In some cases this is partly due to the texture and degrees of hardness of the material employed ; but the recovery of pipes of nearly all the very diverse tribal patterns, made from the beautiful catlinite, or red pipe-stone of the Coteau des Prairies, leaves little room for doubt that the stone was transported in rough blocks and bartered by its quarriers to distant tribes. This flesh-colored rock has suggested the Sioux legend of its origin in the flesh of the antediluvian red men, who perished there in the great deluge. It is soft, of fine texture, and easily wrought into minutely varied forms of Indian art, and so was coveted by the pipe-makers of widely severed tribes. Hence red pipe-stone pipes of many ingenious forms of sculpture have been recovered from grave-mounds down the Mississippi, eastward to the Atlantic seaboard, and westward beyond the Rocky Mountains. This prized material appears to have circulated among all the Plain tribes. Pipes made of it were to be found in recent years preserved as cherished possessions among both the Sioux and the Blackfoot tribes. Dr. George M. Dawson found in 1874 part of an ancient catlinite pipe on Pyramid Creek, about lat. 49°, long. 105°.

A very different material was in use among the Assiniboin Indians, limiting the art of the pipe-sculptor to the simplest forms. It is a fine marble, much too hard to admit of minute carving, but susceptible of a high polish. This is cut into pipes of graceful form, and made so extremely thin, as to be nearly transparent ; so that when lighted the

¹Smithsonian Report, 1877, p. 293.

glowing tobacco presents a singular appearance in a dark lodge. Another favourite stone is a coarse species of jasper, also too hard for any elaborate ornamentation. But the choice of materials is by no means limited to those of the locality of the tribe. I have already referred to my Indian guides carrying away with them pieces of the pipe-stone rock on Neepigon river; and Paul Kane, the artist, during his travels, when on Athabaska River, near its source in the Rocky Mountains, observed his Assiniboin guides select a favourite bluish jasper from among the water-worn stones in the bed of the river, to carry home for the purpose of pipe manufacture, although they were then fully five hundred miles from their lodges.

The favourite material of the Chippewas was a dark, close-grained schist obtained at some points on Lake Huron. It is easily carved, and many of their pipes are decorated with groups of human figures and animals, executed with much spirit. Pabahmesad, an old Chippewa pipe-maker of unusual skill, pursued his craft on Great Manitoulin Island, on Lake Huron, in comparatively recent years. The peculiar style of his ingenious carvings may be detected on pipes recovered from widely scattered localities, for his fame as a pipe-sculptor was great. He was generally known among his people as *Pwahguneku*, the pipe-maker. He obtained his materials from the favourite resorts of different tribes, using the black pipestone of Lake Huron, the white pipestone procured on St. Joseph's Island, and the catlinite or red pipestone of the Couteau des Prairies. But the most varied and elaborate in device of all the peculiar native types of pipe sculpture are those executed by the Chimpseyan or Babeen and the Clalam Indians, of Vancouver Island and the neighbouring shores along Charlotte Sound. They are carved out of a soft blue claystone or slate, from which also bowls, platters, and other utensils are made, decorated with native legendary symbols and other devices. But the most elaborate carving is reserved for their pipes, which are not less varied and fanciful in design than the details of Norman ecclesiastical sculpture. The same easily carved claystone is in great request among the Haida Indians of the Queen Charlotte Islands for their idols, and for ornamental gorgets and utensils of various kinds. Thus the available materials of different localities are seen to modify the forms alike of implements, weapons, and articles designed for personal ornament or domestic use; and were sought for and transported to many distant points, with the same object as the tin and copper which played so important a part in the commercial exchanges of nations at the dawn of civilization.

In regions where flint or hornstone is not available, the quartzite appears to have been most commonly resorted to. I have in my possession some spear heads measuring from seven to nine inches long, which were dug up on an old Indian trail at Point Oken, lying to the north of Lake St. John, Quebec; and implements of the like material are common throughout eastern Canada. The same widely diffused material was no less freely resorted to by the tribes on the Pacific coast. The arrow-heads found throughout the Salish country of southern British Columbia are chiefly formed of quartzite, though chert is also used. The quartzite occurs in so many localities that it is difficult to trace its special source. But near the east end of Marble Cañon, and at the Big Rock Slide, about six miles above Spence's Bridge, on Thompson River, chips occur in considerable quantities, suggestive of one of the chosen localities resorted to for quarrying and manufacture. Dr. Dawson informs me, as the result of his own personal observations, that trade between the coast and interior tribes of British Columbia was formerly chiefly

carried on along the following routes:—Fraser River Valley; Bella Coola Valley, from head of Bentinck Arm; Skeena River; Sticking River; and Chilkoot Pass, from the head of Lynn Canal. By the second of the above routes oolacten oil was carried far into the interior; and the old trail leading from Bella Coola and Fraser River is still known to the inland Indians as the "Great trail." Dr. Dawson adds: "All the coast tribes of British Columbia are born traders, and possess in a high degree the mental characteristics generally attributed to the Jews. Those holding possession of the above routes regarded trade with the neighboring inland tribes as a valuable monopoly, and were ready to fight for it. They also traded among themselves, and certain localities were well-known as the source of commodities. Thus the Haida regularly purchased oolacten oil from the Tshimsians, who caught the oolacten at the mouth of the Nass and Stiking, taking in exchange cedar canoes, for the manufacture of which the Haida were celebrated. Through the agency of the Tshimsians they procured the large mountain sheep horns from the inland Indians. Cumshewa, in Queen Charlotte Islands, was, again, noted for Indian tobacco, an undetermined native plant, which was an article of trade all along the coast."¹

The old arrow-makers evidently derived pleasure from the selection of attractive materials for some of their choicest specimens of handiwork. The true crystalline quartz was prized for small arrow-heads, some of which are equally pleasing in material, form, and delicacy of finish. But the material most usually employed in eastern Canada, as well as that previously referred to as in request by the old workers of the Ohio valley for their largest implements, is a gneissoid rock of comparatively common occurrence, which chips off with a broad facet when sharply struck, and leaves an acute edge and point. In Mr. Sellers's valuable paper on the ancient workshops of Ohio and Pennsylvania, along with an account of his own experience relative to the flaking and chipping of such implements, he records some reminiscences of conversations on the subject,² with Catlin, the artist and traveller. In this communication he remarks: "Most of the arrow-points found within my reach in Philadelphia, Delaware, and Chester Counties, Pennsylvania, were chipped from massive quartz, from the opaque white to semi-transparent, and occasionally transparent." He further describes his first chance discovery of one of the native work-places. He was in company with two scientific mineralogists, when, as he writes, "we came to a place where (judging from the quantities of flakes and chips) arrow-points had been made. After much diligent search, only one perfect point was found. There were many broken ones, showing the difficulty in working the material. Mr. Lukins, a scientific mineralogist, collected a quantity of the best flakes to experiment with, and, by the strokes of a light hammer, roughed out one or two very rude imitations." Major J. H. Long traversed the continent westward to the Rocky Mountains, as head of the United States Military Topographical Department; and from him Mr. Sellers derived information of the habits of the rude western tribes long before they had been brought into direct contact with any civilized settlers. "He said that flakes prepared for points and other implements seemed to be an object of trade or commerce among the Indian tribes that he came in contact with; that there were but few places where chert or quartzite was found of sufficient hardness, and close and even grain, to flake well, and at those places there were men very expert at flaking."³

¹ Geological Survey, 1878-79, pp. 114 B, 152 B.

² Smithsonian Report, part i., 1885, p. 871.

³ Smithsonian Report, 1885, part i., p. 873.

Mr. Sellers had known Catlin in his youth, while he was still an expert worker in wood and ivory in the service of the elder Catlin, a musical instrument maker in Philadelphia, and from him he learned much relative to the modes of operation and the sources of material of the Indian workers in stone. "He considered making flakes much more of an art than the shaping them into arrow or spear-points, for a thorough knowledge of the nature of the stone to be flaked was essential; as a slight difference in its quality necessitated a totally different mode of treatment. The principal source of supply for what he termed home-made flakes was the coarse gravel bars of the rivers, where large pebbles are found. Those most easily worked into flakes for small arrow-points were chalcedony, jasper and agate. Most of the tribes had men who were expert at flaking, and who could decide at sight the best mode of working. Some of these pebbles would split into tolerably good flakes by quick and sharp blows, striking on the same point. Others would break by a cross fracture into two or more pieces. These were preferred, as good flakes could be split from their clean fractured surface, by what Mr. Catlin called 'impulsive pressure,' the tool used being a shaft or stick of between two and three inches in diameter, varying in length from thirty inches to four feet, according to the manner of using them. These were pointed with bone or buckhorn." It is thus apparent that among rude tribes of modern centuries, as in the prehistoric dawn, exceptional aptitude and skill found recognition as readily as in any civilized community. There were the quarriers and the skilled workmen, on whose joint labors the whole community largely depended for the indispensable supply of all needful tools.

In the summer of 1854, when civilization had made very slight inroads on the western wilderness, I visited a group of Chippewa lodges on the south-west shore of Lake Superior, where they still maintained many of their genuine habits. Their aged chief, Buffalo, was a fine specimen of the uncorrupted savage, dressed in native attire, and wearing the collar of grizzly bear's claws as proof of his triumph over the fiercest object of the chase. Their weapons were partly of iron, derived from the traders. But they had also their stone-tipped arrows; and one Indian was an object of an interest to a group of Indian boys as he busied himself in fashioning a water-worn pebble into an edged tool. He held an oval pebble between the finger and thumb, and used it with quick strokes as a hammer. But he was only engaged on the first rough process, and I did not see the completion of his work. No doubt, the leisure of all was turned more or less to account in supplying themselves with their ordinary weapons and missiles. But Catlin's free intercourse with the wild western tribes familiarized him with the regular sources of general supply. "The best flakes," he said, "outside of the home-made, were a subject of commerce, and came from certain localities where the chert of the best quality was quarried in sheets or blocks, as it occurs in almost continuous seams in the intercalated limestones of the coal measures. These seams are mostly cracked or broken into blocks that show the nature of the cross fracture, which is taken advantage of by the operators, who seemed to have reduced the art of flaking to almost an absolute science, with division of labour; one set of men being expert in quarrying and selecting the stone, others in preparing the blocks for the flakers."¹ But suitable and specially prized material were sometimes sought on

¹ Smithsonian Report, part i., 1885, p. 874.

different sites, and disseminated from them by the primitive trader. Along eastern Labrador and in Newfoundland arrow-heads are mostly fashioned out of a peculiar light-grey translucent quartzite. Dr. Bell informs me that near Chimo, south of Ungava Bay, is a spot resorted to by the Indians from time immemorial for this favorite material; and arrows made of it are not uncommon even in Nova Scotia. Among the tribes remote from the sea coast, where no exposed rock furnished available material for the manufacture of their stone implements, the chief source of supply was the larger pebbles of the river beds. From these the most suitable stones were carefully selected, and often carried great distances. These most easily worked into flakes for small arrow-heads are chalcedony, jasper, agate and quartz; and the finer specimens of such weapons are now greatly prized by collectors. The coast tribes both of the Atlantic and the Pacific found similar sources of supply of the stones best suited for their implements in the rolled gravel of the beach, and this appears to have been the most frequent resort of the Micmaks and other tribes of the Canadian Maritime Provinces.

I have already referred to information derived from Dr. G. M. Dawson and Dr. Robert Bell, to both of whom I have been indebted for interesting results of their own personal observations as members of the Canadian Geological Survey. Collectors are familiar with the elongated flat stones, with two or more holes bored through them, variously styled gorgets, implements for fashioning sinew into cord, etc. They are made of a grayish green clay slate, with dark streaks; and the same material is used in the manufacture of personal ornaments, ceremonial objects, and occasionally for smooth spear heads and knives. Relics fashioned of this peculiar clay slate are found throughout Ontario, from Lakes Huron and Erie to the Ottawa valley. A somewhat similar stone occurs in situ at various points, but Dr. Bell believes he has satisfactorily identified the ancient quarry at the outlet of Lake Temagamic, nearly one hundred miles north of Lake Nipissing. No clay slate procured from any other locality corresponds so exactly to the favourite material. The site is accessible by more than one canoe route; and quantities of the rock from different beds lie broken up in blocks of a size ready for transportation. Dr. Bell found on the shore of Lake Temissaming a large unfinished spear head, chipped out of this clay-slate, and ready for grinding. When the region is settled and the land cleared, sites will probably be discovered where the aboriginal exporters reduced the rough blocks to form for convenient transport.

Dr. Bell has described to me specimens of narrow and somewhat long spear points, of local manufacture, made from smoky chert found on or near Athabaska, in Mackenzie River basin; and an arrow head of brown flint from the mouth of Churchill River, Hudson Bay. The flint implements of Rainy River and Lake of the Woods are of brownish flint and chert such as are found in the drift all over the region to the south-westward of Hudson Bay; and are mostly derived from the Devonian rocks. Worn pebbles of this kind occur in the drift as far south as Lake Superior. A branch of Kinogami River, is called by the Indians Flint River (*Pewona sipi*) from the abundance of the favourite material they find in the river gravel and shingle. The finest flint implements of Canada are those of the north shore of Lake Huron, made from material corresponding to a very fine grained quartzite, approximating to chalcedony, found among the Huronian rocks of that region. Dr. Bell has referred to this in his report for 1875.

Along the western coast of the Province of Nova Scotia a high ridge of trap rock

extends, with slight interruption, from Briar Island to Cape Blomidon. Here the strong tidal rush of the sea undermines the cliff, and the winter frosts split it up, so that every year the shore is strewn with broken fragments from the cliff, exposing a variety of crystalline minerals, such as jasper, agate, etc. The beach gravel is also interspersed with numerous rounded pebbles derived originally from the same source. I am indebted to Mr. George Patterson, of New Glasgow, N.S., for some interesting notes on this subject. The pebbles of this beach seem to have been one of the chief sources of supply for the Indian implement-makers of Nova Scotia. Few localities have hitherto been noticed in the Maritime Provinces marked by any such large accumulation of chips as would suggest the probability of manufacture for the purpose of trade; though chips and finished implements occasionally occur together on the sites of Indian villages or encampments, suggestive of individual industry and home manufacture. But Mr. Patterson informs me that he has found one place at Bauchman's Beach, in the County of Lunenburg, which furnishes abundant traces of an old native workshop. There, until recently, could be gathered agate, jasper, and other varieties of the fine-grained crystalline minerals from the trap, sometimes in nodules, rounded and worn, as they occur at the base of the ocean-washed cliffs. At times they showed partial traces of working; but more frequently they were split and broken, bearing the unmistakable marks of the hammer. Along with those were cores and large quantities of flakes, or chips, with arrow-heads, more or less perfectly formed. At one time, according to Mr. Patterson's account, they might have been gathered in bushels; but recent inroads of the sea have swept away much of the old beach, and strewed the products of the Indian stone-workers where they may be stored for the wonder of men of other centuries. It is curious, indeed, to reflect on the strange memorials of the life of ages, so diverse from those with which the palæontologist now deals, that are accumulating in the submarine strata in process of formation for the instruction of coming generations, should our earth last so long. The world will, doubtless, have grown wiser before that epoch is reached. But it will require some discrimination, even in so enlightened an age, to read aright the significance of this mingling of relics of rudest barbarism with all the products of modern civilization that are being strewn along the great ocean highways between the Old and the New World.

A curious illustration of the possible confusion of evidence is shown by the discovery in 1884, of a large stone lance-head of the Eskimo type, deeply imbedded in the tissues of a whale taken at the whaling station on Ballast Point, near the harbour of San Diego, California.¹ In the museum of the University of Edinburgh is the skeleton of a whale, stranded in the ancient estuary of the Forth in a prehistoric age, when the ocean tides reached the site which had been elevated into dry land long ages before the Roman invaders of Caledonia made their way over it. Alongside of the buried whale lay a rude deerhorn implement of the old Caledonian whaler; and had the San Diego whale sunk in deep waters off the Pacific coast, it would have perpetuated a similar memorial of rudest savage life, in close proximity, doubtless, to evidences of modern civilization. Such, though in less striking form, is the process of intermingling the arts of the American Stone age with products of modern skill and refinement, that is now in progress off the Lunenburg coast of Nova Scotia. The inroads of the sea have not, however, even now

¹ Science, iii. 342.

effaced all traces of the old arrow-makers of Bauchman's Beach. Specimens of their handiwork may still be gathered along the shore. To this locality it is obvious that the inland tribes resorted from remote Indian villages for some of their most indispensable supplies. Implements of the same materials also occur at sites on the northern coast; but the larger number found there are made of quartzite, felsite, or of hard, slaty rocks, such as occur in the metamorphic rocks of the mountain ranges in the interior of the Province.

From what has thus been set forth, some general inferences of a comprehensive character are suggested. It is scarcely open to doubt that at a very early stage in the development of primitive mechanical art, the exceptional aptitude of skilled workmen was recognized and brought into use for the general benefit. Coöperation and some division of labour in the industrial arts, necessary to meet the universal demand for tools and weapons, appear also to have been recognized from a very remote period in the social life of the race. There were the quarriers for the flint, the obsidian, the shale, the pipe-stones, the favourite minerals, and the close-grained igneous rocks adapted for the variety of implements in general use. There were also the traders, by whom the raw material was transported to regions where it could only be procured by barter; as appears to be demonstrated by the repeated discovery, not only of flint and stone implements, alike in stray examples, and in well-furnished caches; but also of work places, remote from any flint-producing formation, strewn with the chips, flakes, and imperfect or unfinished implements of the tool-makers. It thus becomes obvious that the men of the earliest Stone age transported suitable material for their simple arts from many remote localities; and purchased the services of the skilled workman, with the produce of the chase, or whatever other equivalent they could offer in exchange. The further archæological search is extended, the evidence of social of social coöperation and systematized industry among the men of the Palæolithic era, as well as among those of later periods prior to the dawn of metallurgic skill, becomes more apparent. Nor is it less interesting to note these was no more equality among the men of those primitive ages, than in the later civilized stage. Diversities in capacity and consequent moral force asserted themselves in the skilled handicraftsmen of the Palæolithic dawn, much as they do in the most artificial states of modern society. As a natural concomitant to this, and an invaluable element of social coöperation, the prized flint flakes appear to have furnished a primitive medium of exchange, more generally available as a currency of recognized value than any other substitute for coined money. The principles on which the wealth of nations and the whole social fabric of human society depend, were thus already in operation ages before the merchants of Tyre, or the traders of Massala, had learned of the mineral resources of the Cassiterides; or that vaguer and still more remote era before the ancient Atlantis had vanished from the ken of the civilized dwellers around the Mediterranean Sea.