tion entirely depends by harvesting and pitting the ears at the usual time, and the fodder at a *later* period. As shown (in the table) there is a large increase of the substances containing nitrogen, as well as the carbohydrates under the new conditions. The special bearing which this, as well as other facts which cannot here be particularized, must have in modifying the existing system of stock feeding, either by ensilage or dry fodder, is hardly second in importance to its relations to sugar production.

Also, it should be noted in this connection that it is now found that corn fodder, cut after the last stage of the ripening of the grain has been reached, is subject to great loss of nutritive matter.‡ The destruction and disappearance of the soluble carbohydrates follow in that case as inevitably as their preservation and increase do after the removal or arrested development of the ear.

Except the trimmed stem, every other part of the plant will go to the silo, when sugar production is the object, and the resulting food products will be as much richer than ordinary ensilage in all the elements of nutrition as the larger proportion of the grain to the whole mass, and the more highly elaborated juices of the tops and leaves enter into it.

(To be continued.)

NATURE AND DISTRIBUTION OF NEW YORK INDIAN RELICS.

BY W. M. BEAUCHAMP, BALDWINSVILLE, N. Y.

WHILE Indian relics are almost unknown in some parts of New York, in others they are abundant. Forts, villages and camps are often found far away from lakes and rivers, for security from enemies was an important consideration, and when villages were established there was often regard to the fertility of the soil. As this and fuel failed, removal become necessary, but almost invariably the red man of New York placed his lodge on sandy ground. In a general way, however, the relic hunter will seek the banks of rivers and streams, especially at fords and rifts, with the best hopes of success. Hunters, fishermen, and traders have there left the finest articles.

He will soon learn that all sites are not alike, some noticeable things rarely, if ever, appearing with certain others. By close examination and comparison he may sometimes establish a sequence of sites, or discover relations between those far apart. He will be blind indeed if he does not soon see plain evidences of aboriginal travel and trade. He will learn one curious fact, that, in the larger part of the Empire State, the finest stone implements are among the oldest. With ample material for illustration before me, this paper will simply deal with the character and distribution of Indian articles in New York.

Chipped Implements.—Arrows, spears, knives, perforators, scrapers, and other articles, are quite generally found, and of all the usual kinds. A drab-colored hornstone is the most common material, but there is a great variety of others. All colors of jasper will be seen among these, with quartz, chalcedony, argillite, limestone and sandstone. White arrows are more prevalent in the eastern part than in the west, and some sites afford local and unique forms. Although hornstone is abundant in the long Helderberg range, much of the material was brought from a distance, and cores and chips occur abundantly far from the quarries. Caches of unfinished implements are frequently found, usually of one form and size, and between two and three inches long. I know of no form of arrow, knife, or spear ever described, which I have not figured from local specimens. Some are unique. Three of my arrows, above the notch, have the outline of the gable end of a house, with perfectly straight edges. Some triangular forms are almost as slender as a flint perforator.

Scrapers occur in great variety, and of as varied finish, but they are lacking in many places, as the Iroquis and some others did not use the stone scraper and drill. Neither need be looked for within earthworks and stockades. The leaf shape, combining the knife and scraper, is common. Mr. A. G. Richmond found scrapers with serrated edges at a fishing camp on the Mohawk. They were small and rare. I have found other forms from small to large sizes. Sometimes they are curious. One, of green jasper, long and nearly triangular, has a knob at the top, as though for suspension, and projecting points on either side of the broad base. Another rare form is sabre-shaped, the concave side being the scraper, and the convex, a knife. Flint perforators are often very fine, and vary from the simplest forms to those quite complex. Some are of very great interest. Flint hammers occur, and some very small flint disks a friend has called gambling flints. Rarely a hornstone celt has been slightly ground, but rude celts of sandstone are often chipped.

The flat sinkers, or quoits, are also chipped implements. They are sometimes quite large, and found near water,—sometimes in it. Usually they are between a rectangle and circle, often with notches on the four edges. I have found them, however, miles away from any fishing place, aud think they were often used in games. The smallest form I have resembling these, is polished, circular, about an inch across, and with two notches cut on opposite edges. Larger oval pebbles are found grooved for anchors. About Cayuga and Seneca Lakes, smaller grooved pebbles are abundant, about the size and form of a hen's egg.

Hammer stones, so called, are of endless forms, and of many uses. Like the preceding, they were in use quite recently. I have seen one on which a figure was inscribed with compasses. They may have one or more pits on one or both sides, or on every face on which there is room. The edges are not always hammered, and sometimes circular ones have been changed into chungke stones.

The grooved stones, used by the Iroquis about the beginning of the seventeenth century, are peculiar to their territory, thus far appearing in that of the Mohawks, Onondagas and Senecas. They are bowlders, in which appear one or more wide, straight and uniform grooves, finely striated from end to end, and are supposed to have been used in arrow making. This may possibly have been.

Occasionally finely polished pestles appear, but most of those along the Seneca River are merely long pebbles, showing use, and sometimes polished. Generally they are slightly chipped, and sometimes squared. Rarely a pit is made near one end. The Iroquis used, and still use the wooden pestle with double ends.

‡This is an invariable result, and it sufficiently reveals, I think, the source of the hitherto unaccountable loss of solids reported as occurring during the curing of corn fodder.

About three years ago Prof. W. A. Henry, of the Wisconsin Experiment Station, called attention to the results of tests made there to determine the amount of dry matter in green and dry corn fodder; which showed that the cured fodder lost not less than twenty per cent. of its dry substance before it was fed out as compared with the dry matter in the same fodder when it was cut down green in the field. The fact of the loss was well attested; but it was practically discredited because no sufficient cause could be assigned for it.

But in 1881 Prof. Geo. A. Cook, of New Jersey, had noticed a loss of dry substance in corn fodder under similar circumstances, and that the loss fell almost entirely upon the soluble carbohydrates. (N. J. Expt. Sta. Report for 1882.)

Prof. E. H. Farrington, of the Illinois Station, records a decrease, not definitely accounted for, of 17.3 per cent of dry matter in the whole plant cut and analyzed two weeks after the ripening of the grain. ("Science" April 15, 1892, p. 212.)

Polished Stone.—There is a gradation of chipped articles into those which are polished, often by an intermediate picking. Celts and gouges quite frequently show this. A pebble was first chipped into a form that might be used. Then it was neatly picked, at leisure moments, after being sharpened. Still in use, the final polish was given, as time allowed. The result is that rudeness of implements is no certain sign of age. The finest and rudest may lie side by side, and were used together. Every form of the gouge and celt is found in New York, from the very smallest to the largest size, and the materials for both vary from the poorest to the most elegant. A frequent local form is quite angular, having six faces, one of them very broad. Those of striped slate flare, like the white man's hatchet. The long, tapering gouge is the most common, but there are several broad forms.

Allied to these is a long stone article, rare, and mostly found in Onondaga County, which much resembles a butcher's steel without the handle. An Indian friend said the old men told him that they formerly used such a stone, with a bow-string, in making fire. It seems too frail for other uses.

Mullers, polished on one or both surfaces, or combining the hammer stone, seem of early use. Allied to these are the large bowlders, on which tools were sharpened, forming shallow depressions; and the smaller stones, plainly used as whetstones. The so-called sinew stones are rarer, but were of recent use.

Every form of stone tube is found, and almost throughout the State, but most abundantly in central New York. It would require too much space to describe the many interesting examples, some of which are of striped slate. The largest and most remarkable are of sandstone and slate, and were found on Lake Champlain, the Mohawk River, and Otisco Lake. The shorter ones are drilled from both ends; the longest from one. Some unfinished ones have been found.

A large ceremonial stone, of my own, plainly shows its mode of making. It is of a hard, light green stone, and has been picked into a form like that of a double hatchet. Polishing was then begun, and a little was done at this. Then drilling began with a tubular implement, resulting in a shallow circle, enclosing a core. There the work stopped. No form of these ceremonial stones has ever been figured which does not occur in the central part of the State, but all such things are rare in the Mohawk Valley, which travellers avoided, and where for ages no man lived. Along the great lakes, and the St. Lawrence, they are often found. While all finished articles of this kind are perforated from top to bottom, I have seen but one with lateral holes, when unbroken.

A curious little thing I picked up by Onondaga Lake. It was a small cup of sandstone, about an inch across, and perforated through the bottom. The form was nearly that of a coffee cup. One similar was found in California, and they seem to have been pendants. Quite rarely small and pretty cups or bowls of striped slate appear. In other materials they are more common. Along with these may be placed the well-known potstone vessels, usually with projecting handles. Fragments of these are abundant in many parts of the State, usually perforated, and often with a secondary use. Of course they were imported, and are found only by navigable waters. They were not used by the Iroquis, nor do they occur in connection with brown earthen ware. Many sites have no traces of any kind of vessel, and it is quite possible the hearthstones, so conspicuous in some places, may have been used in heating water in vessels of bark. These stone hearths were not customary with the Iroquis, but they dug holes in the ground for their fires, so that recent relics are often deeply imbedded. Depth has little to do with antiquity.

The half-circular polished slate knives are of general occurrence, but those with a thickened back are rarer than the simpler form in New York. Another polished slate knife is locally termed a slate arrow, being barbed, and with a similar outline. These vary much in shape, size, and material, being sometimes very delicate. As far as known, they seem confined to both sides of Lake Ontario, the St. Lawrence, and Lake Champlain. A number have been found in Canada, but they are most common near the Seneca and Oneida Rivers. They have curving edges, and were used with a handle.

Stone plummets are also somewhat local, but often of fine finish and quite variable design and material. Most of them have been found about the lower ends of Oneida and Onondaga Lakes, but they have a general resemblance to those of Ohio. Gorgets, variously perforated and formed, are scattered all through the land, from the Atlantic to the Pacific, and yet their use has not been determined. They are often of fine forms and materials. Between these and the bird-shaped stones is another class of perforated articles, somewhat pyramidal in form, and sometimes with a nipple at the top. These are comparatively rare; quite as much so as those called boat-shaped.

The bird amulets belong almost exclusively to the country drained by the great lakes, though they have been sparingly found in New England and New Jersey. Some very odd forms occur. The simplest is almost a bar, always with a sloping perforation at each end. A more common form is narrow, with a raised head and tail. Others are quite broad, with projecting knob-like ears; and similar ones are quite flattened. I have figured many of these in New York and Canada. They are usually of striped slate, and most abundant on both sides of Lake Ontario, where they are sometimes very large and fine. They may have been fetiches. Another article of slate is long and triangular, like a bayonet.

Among the ruder implements are balls, ground or chipped into facets, or with grooves for use in war clubs, but many minor articles may be passed over. Not so the pipes of stone, of which the larger part of New York specimens are comparatively recent. Until the coming of the whites most New York pipes were of clay, the Naragansetts making those of stone, but with the use of steel tools stone advanced in use. Some early examples of such pipes are found, a few of them unfinished. Platform pipes, like those of the mound builders, are hardly rare west of the Mohawk Valley. Catlinite pipes may be called modern, as that material seems to have been almost unknown in New York until near the close of the seventeenth century. By that time ornaments of red slate and pipestone became quite the fashion. The former abound on most recent sites, and are often quite tasteful.

Copper Articles.—Many fine examples of native copper articles have been collected, some very large, but the socket for receiving a handle is rare in these. They are of early date. When the whites came, brass, copper, and bronze became the rage for use and ornament; with a fair allowance of iron, pewter and lead. Many things were made on the spot, and shreds of sheet copper occur on most Iroquis sites. Pieces of this, finely notched, supplied good saws: cut into triangles and perforated, it made good arrows; rolled into cones, it furnished bangles, while more elaborate ornaments came in other ways. Not far from A.D. 1700, silver replaced bronze for ornaments and has but lately gone out of fashion.

Shell, Bone, and Horn.—Early articles of shell are quite rare in the interior of the State, though occasionally found. I have not seen half a score of shell articles that could be safely placed before A.D. 1600, leaving out the Unio shells found on so many early sites, and which were rarely worked at all. Of shell beads, used in belts, the

Iroquis probably knew very little until they had them from the whites. In the eastern part of the State the case was reversed. Small shell beads, made by Indian and not by white methods, are quite rare. They are drilled from both ends, and I have seen very few. In Cayuga County, however, some very large beads have been found which may be early. All known wampum belts are modern. Once introduced, the Iroquois used beads lavishly, and recent gorgets, beads, and ornaments of shell are frequent. Bone and horn were used earlier, and were favorite materials with the Iroquis. Ornaments made of perforated skulls appear in Jefferson County, and carved bones and horns in other places. After the Iroquis obtained knives and saws they did some tasteful work in this way. Quite handsome combs were made, usually symmetrical. Some unfinished examples show how they were made. Just before European trade vigorously commenced, they formed a few barbed fish-hooks, but I have known but four of these. The hook with the knob, but without the barb, is earlier, and quite rare. I think the barb came from a knowledge of the white man's hook, especially as one of these was from a place occupied about A.D. 1600. The four hooks were found respectively in Canada and Jefferson, Madison and Onondaga Counties. Harpoons of bone or horn are mostly recent, though not invariably. They were used by the Iroquois. Recent ornaments of bone are conventional or realistic. Mingled with them are Venetian, porcelain, and glass beads, and all kinds of trinkets. Jesuit rings have a prominent place.

Earthenware.—Most villages, and many camps, have afforded much earthenware, occasionally found entire in graves. Vessels are sometimes quite large, and often beautifully ornamented with dots and lines. Pottery is valuable in connecting sites. On a few vessels, three or four dots inside of a diamond or triangle, suggest the human face. Human faces or figures at the angles of earthen vessels, were in fashion among the Onondagas and Mohawks late in the sixteenth and early in the seventeenth centuries. The fashion lasted about thirty years, but this absolutely fixed the age of two important sites. These figures also have peculiarities connecting them with other styles, and are usually symmetrical, but in one Mohawk example one hand is raised, and the other turned down. Pipes often suggest a similar connection, or reveal striking individuality. A series of curious many-faced pipes from one neighborhood, could have been made by only one man, and others, far apart, have a similar personality. Raised figures are common on Iroquois pipe bowls; but in the earlier ones they face the smoker, in the later they are turned from him. In one instance a spirited panther's head is turned to one side. This was from a grave of the transition period, which had another with an eagle turned from the smoker. Pipe stems are often ornamented with lines and dots, and others have projecting lines running along both sides. The variety is endless. The English freely distributed the common white pipes, and they appear on most recent sites. Sometimes they are found of pewter, brass, or iron.

Among modern pipes I have an Indian one made from an immense deer's antler, which is well carved, and was finely painted in its day. Detached ornaments of terra cotta are sometimes quite artistic, and may represent the whole or some part of bird or beast. Such things must be looked for only in cemeteries or villages. It is a mistake, however, to expect relics in all graves, for scores of early tombs have been opened which had no trace of any article. Equally erroneous will it be to look for fixed modes of burial. They varied greatly within a limited space and time. One occurs to me where a young person of distinction was interred head downward.

Some of the finest articles have been found at a distance from villages and camps; often in low places, as though lost in hunting or war. This reminds me that the common opinion that broken implements necessarily indicate battle fields, is another error. In villages they were often broken accidentally, but in the great New Year's feast of the Iroquois and Hurons, wholesale destruction might be a matter of course.

I have seen a few beads of baked clay, as well as of stone. The latter are formed from fossils. In one case, in Cayuga, a fossil shark's tooth had become an arrow, and curious stones have often been slightly worked to increase a primary resemblance. A few counters of bone or clay —the latter sometimes made from broken earthenware— have been found on Onondaga sites, probably used as in the peachstone game. In this game, of course, other materials were at first used; perhaps the deer buttons which are not yet laid aside.

It may be remarked that while knives and punches were used in decorating vessels, some ornaments were formed simply by pinching the clay on the sides of vessels, and on some fragments the impression of the thumb and finger plainly remains. Traces of basket work are rare.

SARCOLOGY: A NEW MEDICAL SCIENCE.

BY WALLACE WOOD, M.D., PROFESSOR IN THE UNIVERSITY OF THE CITY OF NEW YORK.

THE recent experiments of Brown-Séquard and Dr. Hammond in injecting extracts of flesh into the blood, go to show that there may be a science of the organism, which is neither anatomy nor physiology, nor yet histology nor chemistry, and yet which may be founded upon facts and laws as sound as those upon which are based its sister sciences.

The elements with which chemistry deals are atoms and molecules; histological elements are cells, fibres, membranes and tissues; anatomy describes organs and systems; while morphology conducts the mind to higher combinations, such as antimers and metamers, the person, the couple, and the colony, the individual, and the race.

Sarcology discarding all forms and tissues, comes down, as it were, with blows of the hammer upon the solid and naked flesh, driving it down to a hard basis. It reduces this flesh to pulp, and with such pulp seeks to reconstruct the organism. In Brown-Séquard's laboratory we have brain juice and testacular juice; from Dr. Hammond we receive scientific elixirs of life labeled Cerebrine, Cardine, Teotine. Inject these into the river of life, the *milieu interne,* and each goes to its proper part and reconstructs it.

How many kinds of flesh are required to make man? Four; one for each kind of life force. One to bear the strain of each of the cardinal forces, excitation, motion, growth, production.

These forces work through nerve, muscle, vessel, and gland.

These powers are radical or elementary. In organic life there is a nervous or excitative tendency, a muscular or motor tendency, a vascular or tubular tendency, which is toward nutrition, construction, growth, and a glandular or epithelial tendency, toward efflorescence, effusiveness or production. Nerves are the agents of excitation, muscles are motor agents, tubes are the agents of construction, glands and parenchymes or epitheliums are the agents of effusion, efflorescence and productivity.

The science of sarcology rests upon the foundation of the four radical parts of the organism, the four elementary kinds of flesh. If any one is in doubt concerning the doctrine, let him dissect the serpent, a vertebrate comparatively simple, and the one best generalized. I