correspond to the distribution of the moment. Nevertheless, in a general way, the old maps, such as that of 1877, still indicate the focus of the former group or tribe, and doubtless will long continue to do so. The Innuit tribes on the Kuskokwin have been found by Nelson to extend farther up the river than was supposed in 1877, reaching nearly or quite to Kolmakoff's trading-post. The advance up the Yukon, shown on the census map, is recent, if authentic. The St. Lawrence Island people are more nearly related to the Innuit of the American coast than to those of Asia, though their commerce is with the latter and with their Korak neighbors. As regards the Innuit of the region between the Koyukuk River and the Selawik River, the miscegenation indicated by the census map has no foundation in fact. The error doubtless arose from the permission accorded by the Innuit to special parties of Tinneh to come into and through the territory of the former for purposes of trade. The north shore of the peninsula east of Port Möller is represented by the census map as occupied by the Aleuts or Unŭngŭn. The region is really not inhabited, except for a few temporary hunting-stations, except by typical Innuit. Notwithstanding these and many other errors in this compilation, it is probably correct in extending the area of Tinneh about Selawik Lake, which is a useful addition to our knowledge. In 1880, while visiting Cook's Inlet, I was enabled to determine the essential identity of the native Innuit of Kenai with those of Prince William Sound, though among them were many Konia'gmūt, brought there for purposes of trade in hunting the sea-otter.

With regard to the Aleuts, the degree of civilization to which they have attained is very promising. The people are not scattered over the archipelago except in their hunting-parties. In the western Aleutian Islands the only permanent villages are at Attu and Atka Islands. The division into groups is rather a matter of tradition than of actuality: practically they are as much one people as those of two adjacent English counties.

The easternmost of the Innuit people are the Chūgăchîgmūt of Prince William Sound. At their eastern limit, there has long been a confusion, which I supposed I had cleared up in 1874, but which has only been finally regulated by information received from the brothers Krause, and obtained by myself in 1880. The census agent who visited them in 1881 was frightened by some boisterous demonstrations, and departed in the night in a small canoe, abandoning his equipage after a stay of some forty-eight hours. Consequently very little information was obtained by him, and that of an uncertain character.

Three stocks approximate to each other at this point, — the Chūgăchîgmūt Innuit, the Tinneh of Copper River, and the Chilkaht tribe of Tlinkit. The latter have a precarious traffic coastwise, a few canoes annually reaching the Chilkaht village (sometimes called Chilkhaak) at Controller Bay by the dangerous voyage from Yakutat. But another path lies open to them, at least at times. One of Dr. Krause's Indian guides informed him that he had descended the Altsekh River (a branch of the Atna, or Copper River), which heads near the Chilkat River at the head of Lynn Canal, to a village of his own tribe at its mouth on the seacoast. Of the visits of the Ah-tenā tribe of the Tinneh I have had personal observation; and that the Chūgăchîgmūt pass by them to the Kayak Island in summer, all authorities are agreed. This information explains the confusion of previous evidence, and shows why the vocabularies have sometimes afforded testimony in favor of one view, and sometimes of another. A jargon is probably in use in communications between the Tlinkit and the Innuit. That any ethnic intermingling of blood has taken place, I regard as too improbable to be worth consideration, having had personal evidence of the fear and hate existing between the two peoples. There is some distrust between the Tinneh and the Innuit, as elsewhere; but the bold and aggressive Tlinkit have committed so many outrages upon the timid and peaceable Chūgăchîgmūt, that the feeling there is of a much more bitter character.

I have elsewhere stated my reasons for believing that the Innuit formerly extended much farther to the south and east. Nothing has since been discovered which materially affects the grounds of this belief of mine, and the subject is an interesting one for future investigation.

PROCEEDINGS OF THE SECTION OF ANTHROPOLOGY.

The meetings of this section were held with great regularity. The papers were all read on the days indicated, and were most of them of great interest and value, the hall assigned to the meetings being always filled with an interested audience.

The first paper, by Rev. Mr. Dorsey, gave an account of a visit to the Siletz agency. The author had spent several months at this agency, engaged chiefly in linguistic studies. The agency is located near the coast of Oregon, not far from the Columbia River. The Indians at the agency are all of them more or less civilized, and some of them take newspapers. In complexion they are lighter than most Indians, and are very short. The adult women, especially the older ones, have the face disfigured by tattooed lines. In many respects, both men and women resemble the Ainos. In their treatment of strangers, the Siletz Indians are very polite. The population of the agency is made up by the consolidation of over twenty tribes, none of whom are the original Siletz. Because of this, the language spoken is a jargon. The greater part of the paper consisted of a very methodical and scholarly account of the peculiarities of this language. A few only of the characteristics mentioned can be given. The verb varies with the position of the object. They cannot say 'that man,' but must say 'that man walking,' or sitting, or standing, etc. There are three sets of cardinal numbers, human, inhuman, and inanimate. Possessive endings are found in many words. All

their villages, of which two hundred and seventy have been located, have local names; as, 'the people of the ash-trees,' 'the people by the hill, 'the people of the cañon,' etc. A man must marry a woman from another village, and his children belong to the village of their father. They will not mention the names of the wild-cat, field-mouse, and some other animals before their children, lest they bring sickness and death upon them. Five is the mystic number among them. The paper closed with the Siletz myth of the creation. Following the paper were remarks by several members of the section. Attention was called to two popular errors concerning the Indians: one, that among them women are degraded, and mere slaves. Miss Fletcher and others showed very emphatically that women have great influence in the tribe; and, when married, they lose nothing of their identity, not even their names. Another error is, that the Indian is stolid, unemotional, and even sullen; whereas, in truth, he is impulsive, fond of a joke, and keen to appreciate it; sympathetic, and grateful for any kindness shown him. One speaker mentioned some of the customs of the Pawnees, who were divided into four clans or groups; and these were so distinct from each other, that formerly the members of different clans scarcely knew each other, and they married only within their own group.

Next came a paper by Rev. W. M. Beauchamp, on the permanence of early Iroquois clans and sachemships. The speaker showed that many of the institutions of the tribes forming the Iroquois league were far from being so unchangeable as had been supposed. He believed that historical evidence showed that the famous league was itself formed gradually, and not very long before the advent of the whites; and he showed, that, in the time of Champlain and other early explorers, it was only a loose confederation. The use of wampum is not of very remote antiquity, and had been known for no long time when the country was discovered. Changes had occurred both in the number of sachems and in the mode of electing them. Although the general rule, that the chieftainship was not hereditary in the line of the father, was usually followed, there were exceptions, — the son succeeding his father in office, and, in at least one case, his son following him.

Mr. A. W. Butler then read a paper on the remains at San Juan Teotihuacan. These ruins are about twenty-seven miles from the city of Mexico, near a small station on the new railway. After proceeding a short distance from the station, the ground is covered with obsidian flakes, spear-points, knives, bits of pottery, heads and figures of pottery; while here and there appear ruins of houses, with the walls decorated in figures of bright red and yellow. The chief ruins appear first as huge masses covered with bushes and other vegetation. Only upon close examination does the pyramidal form appear. The first and largest pyramid is called 'the house of the sun.' Its base is 682 feet long and a little less in width, while its height is 221 feet. About the base are numerous small mounds; and on the eastern side is a path, which, in zigzag-fashion, passes to the top. In this path are what appear to be steps made of volcanic rock fixed in cement. From the top a great number of ruins may be seen in every direction. On the top are several larger stones than any about the pyramid; and it may be that these are what is left of the temple of the sun, which, according to early writers, stood there. North-west from this pyramid, and distant about a thousand yards, is a smaller pyramid, 'the house of the moon.' The rectangular base of this is 511 feet long and 426 wide, and the height is 137 feet. Both pyramids are truncated at the summit, and built in three terraces, each terrace receding six feet from that below. Each of the three terraces was built by itself, and made of earth covered with a coating of cement, varying in thickness from three to six inches; and finally, when the full height was reached, another coating of cement was spread over the whole. Imbedded in this outer layer are numerous fragments of volcanic rock. The author described the profusion of objects of obsidian and earthenware which were strewn over the ground about the pyramids, and urged a speedy and diligent study of the region by competent archeologists. In the discussion following the paper, the pyramids named were compared with that of Cholula, and some of the points of difference were mentioned. The pyramid of Cholula is a mass of earth like those described in the paper; but, while these are covered with cement, that is built up on the outside with adobe brick.

Following this paper was one on the significance of flora to the Iroquois, by Mrs. E. A. Smith. The paper was a study of the names given to various trees and plants in the different nations of the Iroquois, and a comparison of these names, thus tracing them up to the parent stock.

Prof. N. H. Winchell exhibited a sheet of what he believed to be an alloy of copper and silver, as very careful analysis and examination showed it to be. The author first showed that no such alloy was known as a natural product, and that hitherto nothing like it had been found among the remains of the aborigines. The sheet was about half an inch thick, of triangular shape, partly rolled up, and weighs eight pounds. It was found near Temperance River, Minn. In the remarks which followed this paper, Mr. F. W. Putnam said that he believed that all the copper objects found in the United States were made of beaten copper not cast. He also described certain ornaments made of silver and copper beaten together; but none of alloy were ever found in North America, although in South America silver and copper alloyed to form bronze had been found.

On Friday morning the opening paper was by Miss A. C. Fletcher, on the sacred war-tent, and some war customs of the Omahas. Like all of Miss Fletcher's papers, this was a very clear, minute, and valuable account, and was received by the section as a most welcome contribution. The sacred tent is used for the storing of the sacred objects of the tribe, such as are used in its rituals and ceremonies. These objects were held in great reverence, and most sedulously

guarded. The tent has a special keeper, whose business is to care for it and its contents. These contents consisted of the sacred shell, which is a large river shell or Unio. This shell is contained in several leather pouches, one within the other; and in the shell itself are placed strips of the inner bark of the cedar, and a scalp. In the tent are also the sacred wolf-skin, and two bundles covered with tanned skins. One of these bundles is somewhat like a duck in form, and contains sundry bird-skins; the other is box-like in shape, and no one now living knows its contents, except that it contains various deadly poisons. There are also a staff of cedar and one of iron-wood, a small pipe-stem, two war-pipes, tobacco, and a scalp, obtained by warriors who had obtained the wolf-skin. All of these objects, which for generations had been kept and cherished by the Omahas as their most precious possession, have been given over to the care of the Peabody museum of archaeology by their keeper, with the consent of the other chiefs. This action is most important; since it marks the determination of the tribe to leave forever the usages of their fathers, and to continue in those of civilization which they have already adopted. The use and significance of some of the sacred articles were described. The sacred shell must never touch the ground; as, if it did, a devouring fire would come from it, which would destroy vegetation, and even streams and springs. To prevent this, the shell in its pouches is hung up in the tent; and when the tribe is on the march, the shell is carried by a boy especially chosen for the purpose. This boy slings the pouch over his shoulder, and is provided with a pointed staff to assist him should he stumble. If the boy wishes to play, he may thrust his staff in the ground, and hang the shell upon it. No one, except the keeper, may even touch the sacred objects: if he does, grievous sores will come upon him. Although, if one has accidentally touched them, he may be allowed to go through certain ablutions, assisted by the keeper, until he is purified; and then the evil is averted. If an enemy is supposed to be prowling about, and it is thought best to send out scouts, they are prepared by certain ceremonies. The sacred pipes are filled and offered to them; and they are solemnly admonished to report on their return only the exact truth, and to be careful to observe well. It is regarded as a very great honor to be chosen to act as scout. The poisons contained in the box-like bundle are used in various ways. One use is in punishing a mischief-maker, or incorrigibly troublesome member of the tribe. A staff is poisoned, and given to a discreet young man, who goes at night to where the offender's ponies are, and pushes his stick against them one by one, breaking the skin, so that the poison may get into the blood; and before morning all the ponies poisoned will be dead. The severity of the punishment determines the number of ponies so destroyed. There are ten distinct honors which may be obtained from the killing of an enemy; and they may be indicated by eagle's feathers, or other ornament. These honors are, one may kill an enemy, four may strike him, four may take his scalp, and one may cut off his head. The degree of danger involved in an exploit affects the honor received from it; e.g., to strike an enemy is a greater honor than to shoot him from a distance. The speaker called attention to the fact, that Indians were very fond of deceiving the whites in their dress, putting on wholly incongruous things merely for effect or sport, and arraying themselves as they would never do when wearing only what they had a right to wear. On this account, many of Catlin's pictures are incorrect, and many of the costumes worn by the delegations to Washington are not such as the wearers would ever assume at home. A curious custom exists among the Omahas. When a warrior is recounting his deeds before the tribe, he holds a short stick in his hand over a small pack in which is a hole. When so ordered, the boasting one must unclose his hand, and let the stick drop; and if it rolls into the hole, he has told the truth; but if it rolls off, as it is very likely to do, he has at least made a mistake. When on the war-path, Indians are trained, as one expressed it, 'to walk as one dead;' that is, to be wholly indifferent and insensible to all bodily discomforts and dangers. The war-party consists of warriors and servants. The servants are usually young men, and it is for their interest to act as such; for, in this way, they accompany the war-party, and, if a conflict takes place, they are allowed to hide their kettles and camp-equipage, and to engage in the battle; and, if one strikes one of the enemy, he is promoted to the rank of warrior. The dress of the warrior is simple, and over all is thrown a buffalo-robe worn with the hair inside. This is tied by leather strings; and day and night it must be worn, and the strings not untied until the enemy is met, or else the war-path abandoned.

Mr. F. La Flesche read a paper on the laws and terms of relationship of the Omahas. This was a paper of especial value, in that it afforded the section an opportunity of hearing, not from one who had gathered his information from strangers, but from one who had received it from his parents, and grown up among the customs described, and who spoke of his own people. Reference was made so constantly to a diagram, that is impossible to give any abstract of the paper that would be of much value. The singularly intricate, and to us absurd, system of relationship which has long been in use among the Omahas, was very clearly explained.

The next paper was by Mr. W. McAdams, on the exploration of recent Indian mounds in Dakota. The mounds in question were small burial mounds. Some of them, in one case a chain of four, were connected by a path of buffalo bones, which not only extended to the mounds, but directly over some of them. The bones were bleached very white, but there was no evidence of great antiquity anywhere. Aside from a small stone axe, only human bones were taken from the mounds opened. At the close of the paper, Mr. F. W. Putnam spoke of the conditions in which bones might be well preserved, and other conditions in which they would soon decay; and on this account the soundness or decay of bones was of little value in determining their age, unless the surroundings were well known.

In a paper on the burial customs of our aborigines, Mr. Henry Gillman exhibited two skulls, which had been perforated on top in one case by a single hole, and in the other by two. The holes were a little less than half an inch in diameter. The author regarded them as made soon after death, and perhaps as part of the burial ceremonies. Cremation prevailed over Michigan. Food was left for the dead. Sometimes the totem of the deceased was cut on a cedar board and placed at the head of the grave. In some cases the wigwam was consumed with the body. Mr. La Flesche said, remarking upon this paper, that among some tribes, if people died far from home, the body could not be transported; but the flesh and soft parts were removed, and then the bones could be carried back to the home for burial. Mr. F. W. Putnam spoke of the discovery of perforated skulls in Ohio. In one mound, there was a circle of sixteen skulls around two skeletons; and eight of these skulls were perforated, and all showed marks of scrapers used to clean them. On some of these were as many as ten holes.

'Ancient pictographs in Illinois and Missouri' was the subject of the next paper, by Mr. W. McAdams. Diagrams of figures carved on the walls of a cave in Missouri were exhibited; and also other figures found in a locality in Illinois, where there were painted figures of animals. Another diagram represented a composite monster, which was painted on a cliff near Alton, and remained intact until a few years ago.

Mr. W. L. Coffinberry exhibited some very fine specimens of stone, bone, and pottery collected in Michigan, after which Rev. J. W. Sanborn read a paper on the customs, language, and legends of the Senecas. He believed that the league of the Iroquois was much more ancient than some of those who had spoken before the section regarded it, and much more complex and wonderful. The Seneca language is complex: it contains no labials, nor do *r*, *q*, and *z* appear except in words introduced from the English; *h* is found either smooth or aspirate, and with very different meanings. There are five genders, three numbers, etc. The paper closed with a very remarkable myth, or legend, which one of the tribe had told the author. In the discussion which followed, evidence was given to show that the league could not have been formed so long ago as Mr. Sanborn thought; that probably there were no Iroquois in what is now New York before A.D. 1500, and probably not before 1550.

On Monday the first paper read was a long and elaborate discussion of music in speech, by Mr. M. L. Rouse. The paper was a comparative study of several prominent modern languages from the stand-point of the elocutionist and musician.

The next paper was on the stone axe in the Champlain valley, by Prof. G. H. Perkins. The author spoke of the different sorts of stone axe found in the region named; the relative abundance and elegance of the different forms; the variety found, both as to form, material, and finish; and exhibited some of the varieties mentioned. He called attention to the fact, that, while New-England stone implements have not usually been regarded as especially elegant or beautiful, yet some of the celts and other forms of the axe found near the shores of Lake Champlain are exceedingly fine; and in beauty of material, regularity of form, and smoothness of finish, some of them may be favorably compared with the best American or European specimens.

Rev. Mr. Dorsey read a very interesting account of Indian personal names, giving numerous examples, and in many cases showing how a name came to be chosen. He also gave some of the customs followed in giving names and in changing them. This change of name is not uncommon in the case of men, or even boys; but the women do not change their names.

A most delightful account of 'An average day in camp among the Sioux' was then given by Miss Fletcher. She described the taking-down of the tent preparatory to a journey, the leader's tent being first removed early in the day; then the catching the ponies for the saddle or wagon, packing the household goods, and setting out upon the march over prairies, through rivers, and on until about three in the afternoon, a suitable place being found by water and in a grove, the camp was set up again. In a most racy and vivid manner the common incidents of such a day were given, and with the zest which came from actual experience.

Several disks cut from human skulls, and worked into ornaments, were shown by Mr. F. W. Putnam. These were found in one of the Ohio mounds. They are several inches in diameter, and ornamented with incised figures. Marks of the scraper were visible upon them; showing that they were not cut from old skulls, but that they were taken from fresh subjects, and the flesh scraped from them.

A very carefully written paper upon the number-habit was read by Dr. C. S. Minot. The author referred to numerous experiments made under the auspices of the American society for psychical research, to determine, if possible, whether the so-called mind-reading had any basis in fact. In course of these experiments, numbers were used, one person thinking of a number, and another trying to guess what it was. On the doctrine of chances, the percentage of numbers rightly guessed should have been ten; but actually it was eighteen. The difference was explained by the author, by the fact that many persons formed what he called a number-habit; i.e., they were much more likely to think of some numbers than of others; and two persons having the same habit, would guess more frequently the numbers thought of than chance alone would account for. So far as the experiments of the American society went, they did not supply any reason for a belief in mind-reading; but the English society had obtained results that seemed to show that it was possible, so that judgment should for the present be reserved. Another paper by Dr. Minot was, "Are contemporary phantasms of the dead to be explained partly as folk lore?" This paper was a thoughtful and candid review of the ghost question, with the conclusion that popular beliefs and ideas, aided by imagination, were the basis of most, if not all, phantasms of the dead.

A verbal paper by Prof. G. H. Perkins, on certain strange stone implements from Vermont, consisted chiefly of general statements concerning Vermont archeology; and the exhibition of a considerable collection of peculiar implements, with remarks upon their character and rarity. The speaker mentioned the fact, that the evidences of a former occupation of the region, more extensive than has been supposed, were increasingly convincing; and also that two distinct layers, one much below the other, afforded relics.

A very excellent account of the Cahokia mound and its surroundings, with the results of his own extensive explorations, was given by Mr. W. McAdams; and many very striking resemblances to the Mexican pyramids were brought out. The writer showed by drawings and diagrams the forms and position of many mounds, which are found in the region of Cahokia in immense numbers. Mr. F. W. Putnam gave some very practical and detailed directions as to the proper exploration of mounds, pleading earnestly for thorough work in all explorations; and illustrated its value by several examples drawn from his own recent investigations. The last paper read was by Rev. Mr. Dorsey, who presented a most interesting collection of suggestive facts respecting primary classifiers in Dhegiha and cognate languages.

THE APPLICATION OF SCIENCE TO THE PRODUCTION AND CONSUMPTION OF FOOD.[1]

MR. ATKINSON, in his opening remarks, said that he presumed the business of the association was not to popularize science by lowering its standard, but to bring the progress of science and art in their application to human welfare prominently before the public. While giving full credit to those who engage in the pursuit of knowledge for its own sake, yet Mr. Atkinson would believe that their work must finally rest for its justification upon its influence on the material welfare of the race. To this end the address was devoted to the future applications of science to the production and transportation of food. In preparing the address, the speaker endeavored to bring into clear view the vast changes, both social and scientific, which have rendered the production and distribution of all commodities, especially of food, so much easier and more equitable during the present generation than ever before, and, to some extent, to show what further progress might be immediately before us. He endeavored to demonstrate, that, in the generation which will have passed between the end of our civil war to the beginning of the next century, greater progress will have been made in the way of material welfare than in any preceding period of the same length.

It is commonly assumed that the invention of the steam-engine, spinning-frame, and power-loom made greater changes in the production and distribution of wealth in a single half-century than have ever occurred before or since; but it will be observed that the forces of steam were limited during the first half of the century to reducing the cost of labor in making textile fabrics and in working mills. It is only in recent years that it has exercised any great influence on the production or distribution of food. However important clothing may be, it is relatively unimportant as compared to food in the proportion of labor required for its production.

All the available statistics prove that to the working people of this country the cost of food measured in money, including drink for whatever it is worth, is not less than three times the cost of clothing; and the proportion is even greater for the working people of Europe. How much greater this disparity must have been twenty-five years since, when the value of grain was exhausted by transportation over a hundred and fifty miles of common highway! If, then, one-half the struggle for life, measured in money, and more than one-half when measured by the work of the household of the prosperous mechanic, is the price paid for food, it is evident that the inventions and improvements of the last twenty years, which have been mainly directed to the increased production and cheap distribution of grain and meat, have affected human welfare in even greater measure than the inventions of the last century.

After referring to the advantages to the commerce of the United States, owing to the vast area over which free competition is possible, Mr. Atkinson enumerated various changes which have been brought about by the application of more scientific methods in machinery, and by the discoveries in the last twenty-five years: he referred to the displacement of the paddle-wheel by the screw-propeller; to the perfection of the compound steam-engine; to the discovery of oil-wells; and to the growing use made of electricity.

To this picture of prosperity, there is another side: vast progress has been made in individual wealth and common welfare; the time necessary to be devoted to the struggle for life has been reduced. But, great as our progress has been, and huge as our abundance now appears to be, yet the fact remains that the average product to each person in this most prosperous country, measured in money at the point of final distribution for final consumption, does not exceed fifty to fifty-five cents per capita per day; and our whole accumulated wealth, aside from land, does not exceed two, or, at the utmost, three years' production. After we have provided for the support of the government, for taxation, each average person must find shelter, and be supplied with food and clothing out of what forty to forty-five cents will buy. Moreover, whenever any great invention displaces common laborers whose development has not been of such a kind as to fit them for other work, they suffer for the time. The Yankee boy of former days, who attended the common school for three or six months in the year, and during the rest of the year was a jack-at-all-trades, was thereby enabled to

[1] Abstract of an address delivered before the section of economice science of the American association for the advancement of science, at Ann Arbor, Aug. 26, by EDWARD ATKINSON, Esq., of Boston, vice-president of the section.