the ground. The Eskimos are, in his opinion, a people of the ice, and from time immemorial had lived along the ice-border, advancing and retreating with it, but never residing far from it. All their habits of life were formed from this contiguity. He considered them to be a race distinct from the Indians, not merely in language, but also in physical traits and in character. They had brown hair and eyes: a black-eyed Eskimo was hardly ever seen. Their complexion was a clear brown, through which the play of color could be plainly observed. They were naturally a peaceful people, and he had never known a quarrel among them. Though very superstitious, they could not be properly said to have any religion. They had no conception of a future existence. They did not bury their dead, because the climate made this usually impossible. They merely conveyed the corpse to a distance from the village, and left it to be devoured by the dogs. That, they said, was the end of the man. Still they had ideas about a superior being who had created man and other animals; and they also believed in an evil spirit, who was to be propitiated, or rather menaced, into compliance with their desires.

A paper on the nature and origin of wampum, by Mr. H. Hale, described this article as shell-money, differing from the East Indian cowries as coined money differs from bullion. It consists of circular disks or cylinders, made from various kinds of sea-shells, polished to smoothness, and strung upon strings. These served as currency among the North-American Indians, and for a time among the colonists. Strings and belts of wampum were also much employed in the ceremonial usages of the Indians, and as mnemonic records. The use of this money was traced across the continent to California; thence to the Micronesian groups in the North Pacific, where it is universal; and thence to China, where in early times, according to the native authorities, the money was made of tortoise-shell disks or slips strung on strings. The modern Chinese copper money, known to Europeans as 'cash,' is made in imitation of this tortoise-shell currency, and is strung in like manner. It is also much used in ceremonial observances, like the American wampum. The mode in which the use of this form of money may have spread from Eastern Asia to America is shown by the fact that several Japanese junks have been wrecked on the west coast of this continent during the present century, and their crews have been rescued by the Indians. The Micronesians have also large sailing-vessels, in which they frequently make long voyages, and are often driven by storms to great distances out of their course. From one or other of these sources the Californian Indians may have easily learned such a simple art as that of making and using shell beads for money; and this art was one likely to spread to the other tribes among whom it was found.

In the long and interesting discussion which ensued, the views proposed in the paper were generally approved. Professor Boyd Dawkins suggested for consideration the question whether all money might not have originated in the exchange of ornament. A doubt having been expressed, whether the shell-money was among the Indians a real currency, that is, 'a measure of value,' several facts and authorities were cited on that point. Mr. Cushing stated that it was a currency among the Zuñis, and had a definite value. Dr. Tylor mentioned the decisive fact, that among the Melanesians, who nearly adjoin the people of Micronesia, the shell-money is in use, and is employed in true banker fashion. A native who lends nine strings of this money expects to receive back ten strings from the borrower at the end of a month. To gain this interest, it must be used in common as a medium of exchange, which it could not be if it were not a measure of value.

Some other valuable papers were read; and this, the first session of section H, must be deemed to have been a particularly satisfactory one.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

PROCEEDINGS OF THE SECTION OF CHEMISTRY.

DR. SPRINGER of Cincinnati exhibited and described some improvements in torsion scales and balances. These instruments are constructed with steel bands or wires, upon the twisting or torsion of which they depend for their action. Professor Caldwell inquired whether balances for chemists were made upon this principle, and their cost compared with ordinary knife-edge balances. Dr. Springer said that the very first one made was sent to Prof. F. W. Clarke at Cincinnati, and used by him for chemical analysis. Professor Clarke said that its use by him was very satisfactory. The adjustments were not easily disturbed, which was a very important matter; and it was as sensitive as a good knife-edge balance.

A paper on the chemistry of roller-milling was read by Mr. Clifford Richardson. The author stated that with ordinary milling the north-western hard winter wheat gave a dark-colored flour. This difficulty is entirely overcome by using steel or porcelain rolls run at different speeds. The results of a large number of analyses of the products of roller-milling were presented in a series of tables. The ash, oil, fibre, and albuminoids increase towards the outside of the grain. In true bran there is no gluten, the gluten cells being scattered through the interior of the grain. All the experiments were made on hard Minnesota spring wheat. Eastern wheat does not work well with roller-milling, the flour being dark-colored.

Dr. A. A. Julien read the report of progress by the committee on indexes of the literature of chemical elements, appointed in 1882. There have been completed up to the present time, Ozone, by Professor Leeds; Peroxide of hydrogen, by the same author; The speed of chemical action, by Professor Warder; Glucose, by Dr. E. J. Hallock; The action of heat on metallic salts, by Professor Prescott; and about six others are in progress. The co-operation of the Smithsonian institution had been solicited by the committees, in order to reach foreign chemists. The section unanimously indorsed the action of the committee in the steps already taken.

Prof. C. E. Munroe read a paper on examination of the methods proposed for rendering the lighter petroleum oils inexplosive. The author used alum and ammonic chloride, and found they were both insoluble in the oil, and inactive. Camphor also was used; and this reduced the flash-test, but made a more explosive mixture with air than the vapor of the original oil.

Professor Atwater read a paper on the chemistry of fish. Flounder is the least nutritive of fishes; while the salmon, when fat, is the most nutritive. Oysters have least nutritive matter among the invertebrates; and northern oysters are more nutritive than those from the south. The flesh of fish contains less fat and more water than that of vertebrates. Digestive ferments act upon the flesh of fish in the same way as upon that of the vertebrates, about ninety-eight per cent of the albuminoids being digested in both cases. As ordinarily found, fish gives from five to twenty per cent of edible matter. A member of the British association asked if the integument of the fishes had been examined. Professor Atwater replied that he had confined his attention to the muscular tissues.

Prof. F. P. Dunnington exhibited and described a new form of gas regulator, depending upon the expansion and contraction of a confined portion of air acting upon a column of mercury.

Professor Stewart made some remarks upon a new process of manufacturing leather, by which the depilitated hides are treated with sulphurous-acid gas in closed vessels, the process being completed in about twelve hours, producing a soft pliable leather.

A discussion on valence was opened by Prof. F. W. Clarke. He remarked that it was especially useful in organic chemistry in explaining isomerism and in synthesis. It was also useful in mineralogy; and he mentioned as examples of isomerism the three minerals kyanite, andalusite, and fibrolite, giving a structural formula for each. He then took up the questions of variable valence, invariable valence, and maximum valence, as points that might be discussed. He remarked, further, that valence was an attempt to explain the arrangement of the atoms in a molecule; and spoke of the drawback of being obliged to represent them on a plane surface, space of three dimensions being much nearer the true state of affairs. Prof. B. Silliman remarked that the last statement of Professor Clarke was the key to the whole difficulty about valence. A plane surface is insufficient to explain the facts. He testified to the great utility of valence, and spoke of the chaotic condition of organic chemistry before this question of valence was appreciated. It was a working hypothesis, a scaffold about a building, but not the building. Hypothesis is not always the truth. Prof. W. Ramsey, of the British association, said that the difficulties about valence could be traced to Lavoisier, who worked upon stable compounds as oxides and chlorides. He also thought that a study of the heat of formation of many compounds would be a key to the valence of the elements; and said that the difficulties of conceiving of the motions of the atoms were well illustrated in Sir William Thomson's effort to explain them in complicated vortex evolutions. Mr. A. H. Allen, of the British association, called attention to the failure of chemists to recognize the value of the work of John Newlands, in the periodic classification of the elements usually ascribed to Mendeljeff. Professor Greene remarked that it was best to consider the cause of valence. Professor Ira Remsen testified to the utility of valence. He remarked that there were two ways of teaching: one by giving all the principal theories first, and the other giving the facts and then the theories, — which latter he considered the best method. He had come to the conclusion that valence should never be mentioned until all the important properties of a compound are known. In regard to its value to young students, he thought its use was dangerous until they fully understood its meaning. He belived that the value of valence had been magnified, and that it was better to study the reactions of compound , and the methods for their synthesis, and the manner of breaking up. Mr. A. H. Allen, of the British association, said that many formulae that showed the structure of compounds according to the valence of the elements do not give any idea of the true constitution of these compounds as ascertained from a knowledge of their properties. He gave, as examples of his meaning, potassic dichromate and fuming sulphuric acid. Professor Dewar, of the Royal institution, London, maintained that the graphical method and structural formulae were most useful, but they are often presented in a way that shows an incomplete knowledge of the ideas of the person who devised the formula. He remarked that the text-books contained too many pictures of graphical formulae, and that he considered it better to follow the historical method for developing theory. Professor Atwater thought that some idea of valence should be given at the beginning, as it assisted the student's memory. Prof. W. Ramsey, of the British association, said that he was satisfied of the utility of making the student perform experiments that brought out facts to illustrate the theory of valence, and thus understand its meaning from his own work. Professor Caldwell said that he could not get along with students in chemical analysis who had not obtained some idea of the theory of valence. Professor Remsen thought that the theory of valence might do some good as an assistance to the memory; but such assistance was of doubtful value, and too empirical. Prof. J. W. Langley, vice-president, said that valence, or chemism, may be a force emanating from the atom, or it may be a force outside the atom; it is static, or dynamic, and a knowledge of it was more a physical than a chemical problem. From the educational view he thought it better to use the theory of valence in connection with the history of the theories concerning atoms and molecules. As a farther step the language and figures of magnetism might be used.

The paper on the optical methods of estimating sugar in milk, by Dr. H. W. Wiley, showed the great importance which must be attached to the influence of albumen on the specific rotary power of milk-sugar. The author prefers to use an acid solution of mercuric nitrate in precipitating albumen, for an excess fails to dissolve the precipitate. Professor Jenkins finds, that on adding sulphate of copper and the potassic hydrate the separation of albumen is very complete.

A discussion on the educational methods in laboratory practice and in the illustration of chemical lectures was opened by Professor Remsen, who remarked that in Germany the student does not go into the laboratory until he understands re-actions, while in England and the United States he is placed there at the beginning of the course. Professor Remsen follows an order of instruction in which the student first becomes acquainted with apparatus and methods of manipulation. He next makes gases, and repeats lecture experiments. He then experiments on oxidation and reduction. Next follows the quantitative analysis of air. Then come alkilimetry and acidimetry, with success. This practical work and the lectures occur simultaneously, and by that time the lecturer has reached the metallic elements the students are ready to take up test-tube re-actions with profit. During the first year the student should only just begin analysis. After the general properties of the metals are known, let the student devise methods of separation. The course of instruction in our colleges, Professor Remsen regards as too short, and superficial. Lecture-experiments should never be made for show. Aesthetics and chemistry are entirely distinct. Professor Atwater said that chemistry is taught now, as a rule, after the student has acquired the methods of the classics and has never been taught to observe facts. Chemists must show that their science will give what is called 'liberal culture,' or it will not find a place in our educational institutions. Present methods are not doing this, as they fail to make the student think for himself.

Prof. W. O. Atwater read a paper on the assimilation of atmospheric nitrogen by plants. Experiments were made on pease grown in washed sea-sand, supplied with proper nutritive solutions. The pease acquired from thirty-eight to fifty per cent more nitrogen than they contained originally, and than had been supplied as nutriment. The above result, Professor Langley remarked, is important, as it is contrary to generally received ideas.

Dr. Springer next read a paper on fermentation without combined nitrogen, in which he showed that the ferment found on the stems of tobacco-plants, and which decomposes nitrates, on being applied to starch and sugar gives rise to butyric acid, and appears to prove that we can have life without protoplasm. After a discussion upon fermentation, a motion was carried that a committee of the section should petition Congress to afford facilities for the study of fermentation. Dr. Springer, Professor Wiley, Mr. Clifford Richardson, Professor Remsen, and Professor Clarke constitute this committee.

Professor Dewar of the Royal institution read a paper on the density of solid carbonic acid. The solid acid was obtained by compressing carbonic acid snow by a hydraulic press. The specific gravity was found to be from 1.58 to 1.60 of the solid acid. Some little discussion resulted, by which it was brought out that the curves obtained from a study of the critical points of gases may explain some facts in regard to dissociation, as there are many cases where the theory of dissociation and experiment do not agree. The pressure necessary to produce the solid carbonic acid is about one and a half tons.

Professor Munroe described some experiments which tended toward the establishing of a law of deliquescence. The temperature and shape of the vessel were not taken into account.

The composition of human milk, by Prof. A. R. Leeds, was found, on using every precaution, to be: albuminoids varying from .5 to 4.25 per cent, lactose from 4.1 to 7.8 per cent, and the fat from 1.7 to 7.6 per cent. The appearance and specific gravity of the milk never indicated its composition. Improvements in apparatus for rapid gas analysis by Dr. Arthur H. Elliott consisted in reducing the length of the tubes by enlarging the upper portion of them into bulbs, and in substituting a solution of bromine in potassic bromide for the liquid element to absorb illuminants. Mr. A. H. Allen, in his communication on oils, said that shark and fish oils are often unsaponifiable, and hence are not fatty ethers. He believes them to contain cholesterine, like cod-liver oil. The fixed oils can be separated into groups, but we know no process for separating a mixture of lard and cotton-seed oil.

These communications closed the sessions of by far the most successful meeting of section C for many years.

PROCEEDINGS OF THE SECTION OF MECHANICAL SCIENCE.

OWING to previous unfavorable conditions, this was practically the first meeting of the new section (D) of mechanical science. Notwithstanding the great heat, the small and inconvenient auditorium, and the fact that the electrical exhibition deprived the section of much local support, the meeting was a greater success than had been expected, and warrants the anticipation that this will shortly become one of the leading sections of the association as it is in the British association. The attendance was large, and included many prominent English visitors, who furnished papers, and took part in the discussions. In order to indicate more definitely the scope of the section, it has been proposed to extend its title to 'mechanical science and engineering;' and it is hoped that our leading engineers and architects will give it their active support by presenting before it papers embody-