

and the danger in a clearer light. We will assume the bread in all cases to be made from a mixture of flour and water; we will say nothing of the other ingredients, for these two only are to the purpose. Such a mixture taken into the stomach in the state of a raw paste is almost absolutely indigestible. It becomes a solid mass, whose fermentation is full of danger. If on the contrary, it is cooked, say baked, it forms a firm, hard substance, which can be eaten, as we know, for a time, but which few persons choose to eat in continuance.

What we do, therefore, is to puff up the paste of flour and water by means of an elastic gas, and it is largely in the changes connected with this gas and its development that the evil resides. If it is formed properly, and the formation finished, wholesome bread is the result. There are, however, two sources of danger here indicated, only one of which we can at this moment consider—that is, that *the process is not completed*. Here is where the whole evil of hot bread in all its evil shapes reaches its culmination. The changes in chemical composition, with the molecular structure necessarily connected with them, which are required to transform paste into dough, do not cease when that dough is baked, and has thus become bread. They continue for quite a time afterward, and until they have entirely ceased the material has not become what it ought to be—bread easy of digestion. It is a burden to any stomach, to a weak one it is simply *poison*.

Here in few words is the source of unbounded difficulty and suffering. Hot bread, in any form whatever, ought never to be eaten. Some forms are very much worse than others, but all are bad, and should in reason be banished from every table. The manner in which the changes are wrought we may consider at another time.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

BY H. C. HOVEY.

Looking over the register on this, the closing day of the Minneapolis meeting, I find it to contain only 321 arrivals, which is considerably less than the usual attendance. There were 186 new members and 60 fellows elected. The list of scientific papers read includes 166 communications, most of which elicited more or less discussion by the members. It cannot be expected that I should give even the mere titles of so many valuable contributions to science, much less an account of all the papers and all that was said about them. Intensely interesting as the mathematician might find a treatise on conic sections, or on the calculus of direction and position, it may be fairly presumed that the ordinary reader would turn to fields less dry. The same may be said of chemical treatises on gammadichloridihromopropionic acid, or of astronomical observations on the light variations of *T. monoceros*. These and similar matters are highly important, but not easily made popular and entertaining.

Some of the sections, like that of statistics and economic science, for instance, actually found it difficult to get a fair hearing; while the sections of geology, biology, and anthropology were uncomfortably crowded. In selecting, therefore, a few papers as specimens of work done by the association the risk is run of choosing what attracted attention rather than what was really of greatest intrinsic excellence.

The most exciting theme in the section devoted to chemistry was, no doubt, that of "American Butters and their Adulteration," on which Prof. H. W. Wiley said that the false butters melt at about the same temperature as the true, hence a better test is by saturation, determining the amount of alcohol necessary to set the various fats free. The point of saturation is much lower for good than for poor butter. There is scarcely any soluble acid in the latter, while in the former it is about 5 per cent. The condition of the cows has also to be considered as to the production of the best butter. Oleomargarine shows a peculiar structure in polarized light. The curious fact was stated that oleomargarine had lately been made from cotton seed oil! The whole matter is receiving very careful attention from the United States Department of Agriculture.

Another paper that attracted attention was concerning the "Composition of American Wheat and Corn," by Prof. C. Richardson, of Washington, D. C. The results were tabulated of more than 200 analyses of wheat and 100 of corn. The wheats of the Atlantic States are poorest in nitrogen and albumen, and smallest in size. Those from New York are larger, but still inferior in nitrogen. Those of Maryland are the best among them. The wheats of the middle West are much larger, yet poor in quality. In Colorado, Minnesota, and Dakota we reach the most desirable wheat. The average amount of albumen in our cereals is: Wheat, 14.8; barley, 14.8; oats, 13.8-9; rye, 13.9-25; corn, 10. Corn is not so exhausting a crop as wheat, and will succeed where wheat fails.

Prof. J. C. Arthur described a poisonous aquatic weed found in the lakes of Minnesota in such quantities as to alarm the inhabitants by the sudden and mysterious mortality among their cattle and hogs. Observations as to the cause led to the discovery of a great number of minute balls, only one millimeter in diameter, with fine filaments, at the base of which the microscope disclosed small knobs containing a green liquid. These were found for a few weeks in May and June, and there was proof that cattle that drank the water in which they abounded died in a space of time varying from 20 minutes to 34 hours. The balls were a species of *Bivalaria*.

Among the most interesting short papers was one by Prof.

J. M. Coulter on "The Development of a Dandelion Flower," in which he traced the floral organs from the microscopic germ to their maturity, illustrating the subject by crayon sketches.

Prof. W. R. Dudley read an essay on the "Origin of the Flora of the Central New York Lake Region," from the Genesee River to the Oneida Lake. The whole region is a series of old eroded valleys filled with drift deposits and occasional lake basins. A large and varied flora characterized this region, whose natural habitat was variously situated to the southwest, west, and northwest. His conclusion was that the great lakes had formerly flowed through these old valleys and carried with them the several varieties of widely scattered plants that had been localized here. This theory was confirmed by the abrupt eastern limit of the peculiar flora.

Perhaps the most interesting of the many papers read in the Biological section was that by Dr. E. P. Howland, on the application of nitrous oxide and air, or oxygen, under pressure to produce anæsthesia. The application is made in condensed air chambers. The reason why nitrous oxide alone cannot be used in prolonged dental and surgical operations is that the blood does not obtain oxygen from it, hence asphyxia follows. Dr. Howland claimed to have administered this gas to over 30,000 persons, and he found the average time of producing anæsthesia to be about 50 seconds, and the average time till the return of consciousness two minutes. The longest period of unconsciousness was 35 minutes. This was effected by allowing the patient to breathe air and then inhale the nitrous oxide again before returning fully to consciousness, the interval varying from a quarter to half a minute. In experiments on animals it was found that death generally followed from breathing pure nitrous oxide for two and a half minutes. If air or oxygen is mixed with it, under ordinary pressure, it will not produce anæsthesia. But mixed with equal quantities of air and breathed from a gas bag in a condensed air chamber at 15 pounds pressure per square inch, or mixed with oxygen in proportion of 85 parts of nitrous oxide to 15 of oxygen, in a chamber where the pressure is five pounds to the square inch, the mixture can be breathed an indefinite length of time without danger or injury, producing perfect anæsthesia and also complete oxygenation of the blood.

The compression of the gas into smaller space enables the lungs to hold a sufficient quantity of each element to cause the desired effect. It has been found that by this process animals may be kept insensible for an indefinitely long period without disturbing their vital functions. The method has been applied successfully by various surgeons, and it is demonstrated that thus the progress and duration of anæsthesia may be regulated at will and with the utmost safety and precision. Dr. Howland illustrated his remarks by experiments on a living animal. No experiments have yet been made on man; but it would be perfectly safe to do so, and it may be regarded as certain that this method, now described for the first time in the United States, will shortly supersede the use of ether and chloroform.

Several valuable papers were read in the department of Anthropology. Mr. Wm. McAdams, a farmer in southern Illinois, who has for several years been delving amid the mounds, gave an interesting account of "The Great Mound of Cahokia," located between Alton and St. Louis, in the so-called American Bottom, where 200 mounds in all have been found, 72 of which are along the Cahokia Creek. The largest of these is 100 feet high, having two terraces, covering several acres and with a flat area on top of an acre and a half. It is built of black earth, pyramidal in shape, and in good preservation. Flint tools have been found in it, and an ax of white flint, smooth and polished as ivory. Opinions are divided as to the purpose of the mound, whether as the site of a temple or village. Other papers were read on the mounds and mound builders by Profs. West, Peet, Campbell, Mason, and Morse.

The chief interest, however, centered in Prof. Putnam's illustrated lecture on "Altar Mounds and their Contents." He explained the best methods of excavating mounds so as to make sure of getting all their contents, by means of a system of cross trenches. The mounds particularly described were found about five miles from Madisonville, Ohio. The diagrams showed the numerous artistic designs wrought out in constructing the mounds, and also the curious and unique objects found in them. There were perforated pearls, strings of bear's teeth, and ornaments of silver, copper, and iron. There were carved images, some of which resembled the Egyptian style of sculpture. In Prof. Putnam's opinion it is an error to suppose all the mound builders to be of one race, as much so as to say now that all men who build railroads are of one nation. There were many different kinds of Indian mounds, evidently built on different plans and for diverse purposes. The ancient mound builders probably belonged to the short-headed American Mongoloids.

By special request your correspondent repeated his illustrated lecture on "Subterranean Scenery," and he also read a paper on "Oyster Farming." The latter was discussed mainly with regard to what is being accomplished in the Connecticut portion of Long Island Sound, since the State boundary was fixed in 1879. Shell fish commissioners were appointed in 1881, by whom the oyster grounds were surveyed, and designated to applicants at the nominal price of \$1.10 per acre. The progress of oyster culture can be realized if we note the fact that whereas, in 1880, the active extent of Connecticut beds, as stated by the census, was but 6,934 acres (aside from natural beds, which cover 5,000

more), there are in 1883 single oyster farms larger than that aggregate; and the State has sold to private growers more than 100,000 acres in all. With modern appliances oysters are actually cultivated at depths varying from 25 to 75 feet, and there is no reason why nearly all the Long Island Sound might not be made productive.

Passing by numerous minor topics, the chief questions of the Association were undoubtedly two, viz., concerning the theory of evolution, and as to glacial action. President Dawson initiated the discussion in his retiring address. His utterances were judicious and respectful in their tone, but so decidedly in opposition to the extreme evolutionists, as to kindle excitement and provoke replies. Besides papers in the Biological Section bearing on the subject, by several members, it was made the burden of a lengthy address by Prof. E. D. Cope in general session, and likewise of a public address by the same champion of the theory in one of the city churches. He holds that the doctrine of direct descent of organic species from pre-existent species, throughout the geologic record, is proved and certain. The process is from simple to complex forms of life. We are approaching a complete genealogy of all existing animals, including man. Facts confirm our belief that however constant species may appear to us now, they have been at some time variable.

Even the structural characters of genera, families, and orders are variable in parts of the system. The speaker passed from a consideration of extinct mammalia to that of man himself, whom he regarded as developed from a simian ancestry, although there were gaps yet to be filled. Evolution has proceeded along the line of profitable variation, and the extinction of so many species is due to the fact that they ceased to be beneficial.

We do not pause at the "survival of the fittest," but seek the origin of the fittest, and for this there is only one explanation, namely, the action of *mind*. If its movements have produced the structures under the influence of impacts, strains, etc., the relation of mind to the development of types becomes clear. It should be added, however, that some pronounced evolutionists do not regard mind as an attribute of matter (the position taken by Cope), but as distinct from and superior to it, and obeying laws of its own, leading to the conclusion that as design proves a designer, and creation a creator, so evolution proves an evolver. At all events, it must be conceded that, in one form or another, most members of the Association appear to hold to evolution, though not always attaching the same meaning to the term. While some do not hesitate to speak of it as certainly demonstrated, others declare that it rests on no satisfactory evidence, and can, in the nature of things, never be proved; and probably the majority regard it merely as "a good working hypothesis."

On the grand question of glacial action, numerous papers were read, accompanied by discussion, in which the leading geologists of the country took part. The titles of some of these papers were as follows: "Glacial Canons;" "The Minnesota Valley in the Ice Ages;" "The Glacial Boundary between New Jersey and Illinois;" "The Terminal Moraine west of Ohio;" "The Glacial Dam at Cincinnati;" "The Kame Rivers of Maine;" "Evidences from New England against the Iceberg Theory of the Drift;" "The Eroding Power of Ice." And when I say that these were discussed by such men as Professors J. S. Newberry, J. D. Dana, Richard Owen, T. Sterry Hunt, J. P. Lesley, James Hall, E. T. Cox, Major Powell, T. C. Chamberlin, G. F. Wright, and N. H. Winchell it is evident that the interest created must have been very great. Dr. Dawson took ground against the origin of the drift in a great continental glacier, claiming that there was instead a wide glacial sea with Arctic currents and icebergs, with here and there local glaciers. The gantlet thus thrown down was lifted by those adhering to the notion of a continental glacier. The geological room became too crowded for comfort, and the closing discussions were held in the large Chapel of the University. Amid such opposing theories and conflicting facts, it was not easy for ordinary minds to find a satisfactory resting place; and the outcome of it all was probably but an accumulation of valuable material as to glacial action, to be made better use of hereafter in subsequent researches.

Concerning the general influence of the great scientific gathering amid the commercial scenes of the Northwest, there can be no doubt that good was done by bringing men of science face to face with men of secular enterprise, and the result was new enthusiasm for both.

The hospitality of Minneapolis was abundant, and was supplemented by the courteous attentions of its sister city, St. Paul. The graver duties of the Association were varied by excursions to Lake Minnetonka, the Falls of Minnebaha, the Dalles of St. Croix, and other points of local interest. Special visits were paid to the immense flour mills of Minneapolis. After the adjournment there were limited excursions to Manitoba and the Yellowstone Park. The next meeting will be held in Philadelphia, in the first week of September, 1884, and it is anticipated that the British Association will be present by a large delegation of its members. Prof. J. P. Lesley was chosen president for the ensuing year.

Minneapolis, August 24, 1883.

An effort was made in the French Chamber to force the railroad companies to adopt a new pattern of cars, with alleyways through them, as in America, but this was defeated.