time reported that a great majority of those whose opinions had been sought had expressed themselves in favor of a consecutive numbering of the hours of the day from 1 to 24.

At the evening session on Tuesday, June 10, the society were welcomed to Buffalo by the city officers; and the president of the society, Mr. D. J. Whittemore, delivered the annual address. On Wednesday an excursion was made to the so-called Tifft farm, where improvements are being made, designed to facilitate the transfer of coal from the railroads to the lake vessels. They will consist in an extensive system of docks, excavated on the mainland, together with coal-pockets and other structures for loading into the boats. Near by, an extensive storage-place for coal is provided; the loaded cars being drawn up a long incline of trestle-work, from which they descend by gravity after unloading their coal beneath. The mountain of coal thus formed is penetrated by a wooden tunnel eight feet square, into which cars are run and loaded through sliding doors, when the coal is to be transported to the pockets at the docks. At this place a hundred and twenty thousand tons of coal may be stored during the season, when navigation is closed, or from Dec. 1 to May 1. Although the dock frontage of Buffalo already measures five miles, the Tifft farm improvements will add eight miles more, at an estimated cost of eighty dollars per foot front. The unloading and loading facilities are already so complete at Buffalo, that a two-thousand ton vessel may arrive loaded with grain, and depart loaded with coal, within eighteen hours. There is a growing demand, however, for greater capacity as the lake traffic increases.

Thursday was devoted to an excursion to Niagara Falls and the new cantilever bridge, and on Friday the reading of papers was resumed. Mr. E. L. Corthell, chief engineer of the West-Shore railroad, and formerly in charge of the works at the mouth of the Mississippi, read a paper on the South-Pass jetties, dwelling chiefly upon the lessons which had been taught by their construction. The channel is now nearly straight for two and a quarter miles, and the depth is continually increasing. A survey made last May showed the least depth through the channel to be forty feet except in a few places, and everywhere much in excess of that guaranteed by the contract. Moreover, the jetties had now become thoroughly embedded in the sand, which had become firmly packed into all their interstices, so that their permanence was assured. There was, further, no advance of the bar toward the gulf, although a rapid advance had been predicted by many engineers. The effect on commerce had been very great, and there was now no delay whatever at the mouth of the river; so that New Orleans might be said to have a better channel from the ocean than any other city in America. The results of the work had clearly proved the advantage of a concentration of the force of the current, and had shown that the river could obtain what it could maintain, and that it could not maintain what it could not obtain. Altogether, the result of the works had been in every way satisfactory.

A paper by Mr. Benjamin Reese, on the management of forces engaged in railroad-track repairs, was listened to with evident appreciation by the railroad engineers present.

Mr. E. Sweet, state engineer of New York, contributed a paper on the enlargement of the Erie Canal, arguing, that, in order to be a proper highway, the canal should be large enough to carry the largest lake vessels, or eighteen feet deep and a hundred feet wide on the bottom, with locks four hundred and fifty feet long and sixty feet wide. The cost of the improvements proposed, which would involve a relocation of part of the canal, and the canalization by locks and dams of the Mohawk River, as well as some works on the Hudson, was estimated at from a hundred and twenty-five to a hundred and fifty million dollars; while the probable tonnage was placed at twenty to twenty-five million tons per annum. Thirty years ago the Erie Canal carried nine-tenths of all the traffic between Buffalo and New York, while now it carries less than one-fifth of the total. The paper was followed by one prepared by Capt. Drake of Buffalo, urging the importance and the cheapness of water-carriage.

Mr. J. J. R. Croes of New York read a paper, comparing the water-rates in a large number of cities and towns. Assuming the conditions of a dwelling for seven persons, he found that the rates would vary in different towns from five dollars to seventy-two dollars per annum, and that they were by no means in proportion to the cost of the works. The average rates in different parts of the country were compared, and the advantages of measuring the water delivered to consumers were discussed.

The remainder of the session was devoted to a discussion on the subject of steel, and a comparison between steel and iron for structural purposes; but, on account of the want of time, a number of papers were read by title only.

RECENT OBSERVATIONS ON EXPLOSIVE AGENTS.

JUDGING from the many attempts made to vary the form and composition of 'explosive gelatine,' this method of using nitroglycerine is meeting with favor. As invented by Nobel, it is made by dissolving seven parts of soluble gun-cotton in ninety-three parts of nitroglycerine at a temperature of 35° C. Under the circumstances, the whole mass gelatinizes, and, when cool, is quite a stiff and translucent jelly, insoluble in water, quite insensible to shocks, and holding its nitroglycerine firmly. Unfortunately its stability has become a matter of doubt. Hill, Gen. Abbot, and others have cited instances of spontaneous decomposition during storage; and the writer has recently described the circumstances attending a similar case occurring under his own observation. The cause is believed to exist in the lack of uniformity of composition of the gun-cotton, and the failure to remove from it the last traces of free acid. It is hoped that these difficulties may be overcome.

The variations from the above composition have consisted in varying the proportions given, in the addition of camphor, benzene, and the like substances to increase the insensibility, and of oxidizing and combustible agents to cheapen the cost and modify the force of the explosive. The widest departure from the original explosive gelatine is probably found in the substance styled 'forcite,' invented by J. M. Lewin. This is made by subjecting finely powdered paper stock, or other form of cellulose, to the action of high-pressure steam until the cellulose is converted into a gelatinous mass. This is then cooled and immersed in water, where it preserves its gelatinous form indefinitely. Seven parts of this gelatinized cellulose, seventy-five parts of nitroglycerine, and eighteen parts of nitre are incorporated together over a water-bath at a temperature of 40° C. The result is a whitish, opaque, gelatinous mass. The ingredients are varied by substituting dextrine and ordinary cellulose for a part of the gelatinized cellulose. Judging from some of the descriptions of this powder, various coloring-matters are also used. It is claimed for this explosive, that while it is stable, and holds its nitroglycerine so firmly that it is not separated by sulphuric ether, alcohol, or water, and while it burns in the open air without explosion, yet it may be exploded in a drill-hole by ordinary fuses. Three factories are now producing this explosive in Europe, and one has recently been started on a very extensive scale in New Jersey. These last works are stated to have a capacity of five tons of powder per day. A novelty in these works is the use of India-rubber pipes laid underground for conveying the nitroglycerine from the converting-house to the incorporating-houses.

Among the processes invented for making nitroglycerine, the one devised by Boutmy and Faucher seemed to offer the best assurance of safety, owing to the absence of all energetic action during the operation of conversion. In this process nitric and sulphuric acids were mixed together in equal proportions. A second mixture was then made, with one part of glycerine to three and two-tenths parts of sulphuric acid. When quite cooled, fifty-six parts of the first mixture were mixed in an earthenware vessel with forty-two parts of the second mixture, and allowed to remain from ten to twenty-four hours, when the nitroglycerine was found to have formed quietly, and collected more or less completely on the top of the acids. The failure of the nitroglycerine to separate completely and at once from the acids has been pointed out as a source of danger in the process, since nitroglycerine is decomposed through prolonged contact with strong acids. In spite of this, the process has been in use at the French government factory at Vonges since 1872, and but one accident is recorded. They dealt, however, with comparatively limited quantities, and used pure materials.

Probably the first attempt to apply the process on a commercial scale was made at Pembrey, in Wales, in 1882, where an iron converter was constructed for nitrating fifteen hundred pounds of glycerine in each charge. The process of mixing differed from that used at Vonges, in that, while the final mixing was done there by hand with a wooden paddle, at Pembrey the sulphoglycerine mixture was blown into the acid mixture in the form of a spray, while the acid mixture was being agitated by a blast of air. The process, as thus modified, had been in operation but a few months, when the converter, while containing from five hundred to six hundred pounds of nitroglycerine, was blown up. Col. Majendie has given an extended account of the circumstances in his report, No. 48, to the home secretary; and he considers the explosion due to violent chemical action, established in acid nitroglycerine present in the converter. Dr. Dupré, however, found the glycerine used to be contaminated with fatty acids, while no effort had been made to free the nitric acid from nitrous acid. This lack of care would have led to danger in any process.

Some years since, Dr. Sprengel proposed a convenient and safe way of forming explosives by using oxidizing and combustible agents of such a nature that they could be readily mixed at the place where wanted for use. Several such mixtures have been devised; among others, 'rackarock,' which consists of potassium chlorate and nitro-benzene, and which has given good results. For this explosive the chlorate is furnished in bags of suitable size; and, when wanted for use, these bags are immersed in the liquid nitrobenzene for a determined length of time, when they are ready to be exploded. The most recent explosive of this class, 'panclastite,' is composed of liquid nitrogen tetroxide and a combustible agent, preferably carbon disulphide, in the proportion of three volumes of the first liquid to two of the second. The heat developed by the combustion of this mixture is estimated at about 3000° C.; and, when burning freely, the light is so bright as to equal that of the calcium light. The inventor claims that its explosive power, when confined, surpasses that of dynamite; but the French explosive commission, when using Abel's lead cylinder test, obtained a slightly less value. With a mixture of equal volumes of nitrogen tetroxide and of nitrotoluene, however, they obtained the same value as for dynamite No. 1. Notwithstanding the power of the panclastite mixtures, it is questionable whether such a substance as nitrogen tetroxide can be brought into any general use.

While much attention has been given to the high explosives, the claims of gunpowder have not been overlooked; and many changes have been proposed in the form, size, shape, and density of the grain, and in the mode of manufacture and composition of the mixture. The most novel among these is the hydrocarbon-powder, made from a mixture of nitre or potassium chlorate with a solid hydrocarbon, such as paraffine, asphaltum, India-rubber, and the like. The incorporation is effected by the aid of a volatile liquid solvent, which dissolves the hydrocarbon, and furnishes a plastic mass, which may be moulded into any desired form, and then hardened by allowing the solvent to evaporate. A peculiar advantage claimed for the powder is its imperviousness to water.

A variety of gunpowder made by the Rottweil-

Hamburg powder company at Duneberg, is, however, attracting the most attention on account of the high initial velocities and low pressures which it has actually given in practice. The grains weigh about forty-two grams, have a specific gravity of 1.86, and have the hexagonal prismatic form so generally adopted in Europe, with one canal. They have the color of cocoa; and from this characteristic the powder has become known as 'cocoa' powder. The reddish hue seems to be due to red-burned charcoal. Powders heretofore made with red coal have been found to be readily inflammable, and to explode with dangerous brusqueness, producing high local pressures; and hence care has been taken to select only well-burned black coal for the manufacture of military gunpowders. In spite of the fact that 'cocoa' powder contains red coal, it has been found by experiment, that a grain of it burns slowly and with very slight deflagration, when ignited in the open air; and that a mass as great as fifty-five kilograms, when enclosed in a wooden box and ignited, burned slowly, without exploding, and simply raised the cover of the box without displacing it. This may be owing to the large percentage of charcoal, the low percentage of sulphur, and the high specific gravity; but the slowness of combustion is equally marked when a grain is crushed to meal-powder; and it is probable that there is a difference in the kind of charcoal, as well as in the quantity. In addition, it is claimed that this powder is but slightly hygroscopic, and yields very little smoke. The advantage of this last-mentioned property is shown by the recent experience at Alexandria, where the English were compelled from time to time to cease firing, to allow the smoke from their guns to clear away; and in the Sudan, where the English were blinded by the smoke, under which the enemy crept upon them. On the other hand, it is stated that 'cocoa' powder fouls badly.

With gunpowder, as with all mechanical mixtures, the uniformity of the product depends largely upon the thoroughness of the incorporation. To test gunpowder for this most important condition, it is customary to flash a quantity upon a plate of glass, and to examine the residue; but the deliquescent and perishable character of the deposit necessitates immediate examination, while long and frequent experience with the test is required in order to enable one to draw a proper conclusion from the observation. Col. Chabrier has proposed the use of paper, colored blue by starch and potassium iodide, upon which to make the flash, the color being discharged by the combustion of the powder. The test-papers of this process, however, are also evanescent, and the trained memory must be relied upon in reaching a decision. The writer has recently proposed the use of a paper colored with Turnbull's blue, such as is produced in the 'blue-print' process of photography; since the color of this paper is discharged by the action of such alkaline salts as are formed in the combustion of gunpowder. For use, the paper is dampened; the powder is placed upon it in a uniform heap, and then flashed. The paper is exposed to the action of the residue for half a minute, and then washed in running water, and dried. The result is, that, wherever a globule has rested, the color is bleached. It is believed that these spots will be smaller and more uniformly distributed as the incorporation approaches completeness, provided the state of the different samples tested is otherwise the same. These test-papers can be preserved without change, and may be filed as standards for comparison, or forwarded to experts for examination.

CHAS. E. MUNROE.

NOTICES OF ETHNOLOGIC PUBLICATIONS.

THE ethnology of the Eskimo, better called Innuit people, is to us of an ever-renewed interest, not only on account of the researches around the arctic pole, in the furtherance of which this race has been eminently helpful, but also for the peculiar ethnographic position of the people among the other American nations. Dr. Franz Boas has discussed the present seats of the Neitchillik-Eskimo, first seen by Sir John Ross (1829–33), and recently visited by Lieut. Schwatka, and illustrates his article by a topographic map.[1] Another article of singular interest, by Edward B. Tyler, deals with "Old Scandinavian civilization among the modern Eskimos," with two plates,[2] and contains a large amount of facts new to science. Bering's Straits, considered as the 'bridge' between the two continents and hemispheres, necessarily calls the attention of all ethnologists to the tribes inhabiting both sides of it. The ethnographic relations of these are expounded with minute care by Prof. G. Gerland of the Strasburg university, in a paper inscribed "Zur ethnographie des äussersten nordostens von Asien."[3] The tribes on the Asiatic side are described from the accounts given by the latest travellers, and old errors concerning them are refuted.

Rev. J. Owen Dorsey, formerly missionary among the Ponka Indians, and a specialist in the study of all tribes and languages of the Dakotan family, has given a lucid 'account of the war customs of the Osages'[4] as the result of a visit to that tribe, made in 1883. These interesting war and hunting customs are chiefly based upon the gentile or totem-clan system. The rules observed in encamping and other military acts were most rigidly and unalterably enforced, perhaps more so than our own military regulations, and through their archaic forms testify to a high antiquity. Customs like these may be traced among all the warlike tribes of the Mississippi plains, even at the present time, when they are hedged in within the narrow limits of Indian reservations. Numerous illustrations facilitate a clearer understanding of the practices described.

Dr. W. J. Hoffman presents us a "Comparison of Eskimo pictographs with those of other American aborigines,"[5] interspersing his article with numerous

[1] *Zeitschr. gesellsch. erdk. Berlin*, xviii. 222.
[2] *Journ. anthrop. inst.*, 1884, 348.
[3] *Zeitschr. gesellsch. erdk. Berlin*, xviii. 194.
[4] *Amer. nat.*, 1884, 113.
[5] *Trans. anthrop. soc. Wash.*, ii. 128.