Osmose.

It is a well known fact that when two liquids of different compositions are separated by a porous membrane, there will result a double current in opposite directions through the membrane, the consequence is, the two liquids interchange their elements. Observation has shown that one kind of substance, known as *cristalloides*, when dissolved in water, will pass the septum with ease. The others, called *colloides* (gums, etc.), require considerable time for such passage. It becomes evident that if we separate diluted molasses from water by means of a membrane, a portion of the salts will leave the molasses and pass through the membrane into the water. Under these circumstances there would result a liquid, or molasses, the sugar of which might be crystallized. During the osmosing, a certain quantity of sugar is lost, but the reduction of the saline percentage of the molasses is so great that the residuum again constitutes a most valuable secondary product, from which sugar may be extracted. Some experiments have been made to ascertain if there existed any advantage in adding a small quantity of acid to the molasses during this process. It has been found that nearly 30 per cent of the total mineral substances will pass the membrane by the addition of acid, and only 25 per cent under ordinary circumstances.

As the molasses has been diluted by the customary osmosing process, it is evident that the additional water must be evaporated, and this, in itself, represents an extra cost of fuel of no small importance. With every system of osmosing used, it requires considerable experience to determine within what limits the operation may be made profitable.

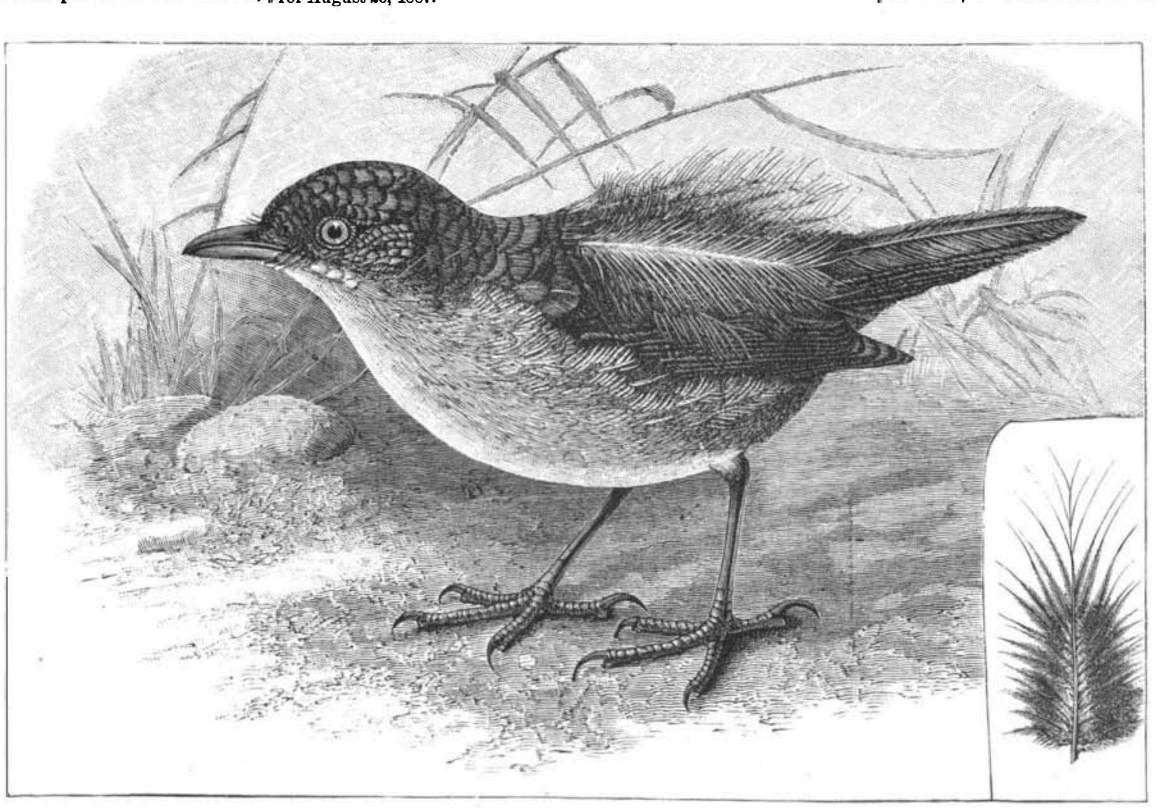
M. Dubrunfaut, the inventor of the first osmogene apparatus for molasses, called attention to the possible advisability of osmosing the sirups, or even the limed juice prior to evaporation. The objectionable salts would thereby be partly eliminated before the first crystallization, and the quantity of residuum molasses considerably reduced. The working by osmosis of saccharine juices to which lime is added is generally accomplished cold. Through the membrane pass nearly all the salts set free by the lime. The subsequent operations are the same as in the customary methods of working beet juices.

In some cases the profit from working osmogenes is very considerable; it will, therefore, be of the more interest to notice a similar but new process of beet sugar making, advocated by Dubrunfaut just before his death. This method consists in mixing lime with sirups from first centrifugals, allowing them to settle for several days, when the clear portion is osmosed in a boiling condition. The sirup, on leaving the osmogene, may be treated by carbonic acid separately, or added to the limed juices during carbonatation. The water of exosmosis may be evaporated, and worked for the alkalies, etc., it contains.—*The Sugar Beet.*

MACRONUS KETTLEWELLI.

Dr. F. H. H. Guillemard, in his interesting book "The Cruise of the Marchesa," says of his visit to the Sooloo Islands:

"Our ornithological rambles during this, our second visit to Meimbun, were productive of several species which we had not previously obtained; among others of two or three rare pigeons. Of all parts of the world, the New Guinea region is perhaps the richest in these birds, but we found them tolerably abundant here, and obtained no less than eleven different kinds. But our greatest prizes were two birds hitherto unknown to ornithologists. The first, a bush shrike of brilliant coloring, with the head and shoulders shining bluish black and the rest of the plumage bright orange yellow, I afterward named after the yacht, *Pericrocotus marchesæ*. The other bird (*Macronus kettlewelli*), a babbler, with a curious tuft of white, hair-like feathers springing from the back, was an interesting species, of which we unfortunately obtained a single specimen only." Of this we give an engraving.



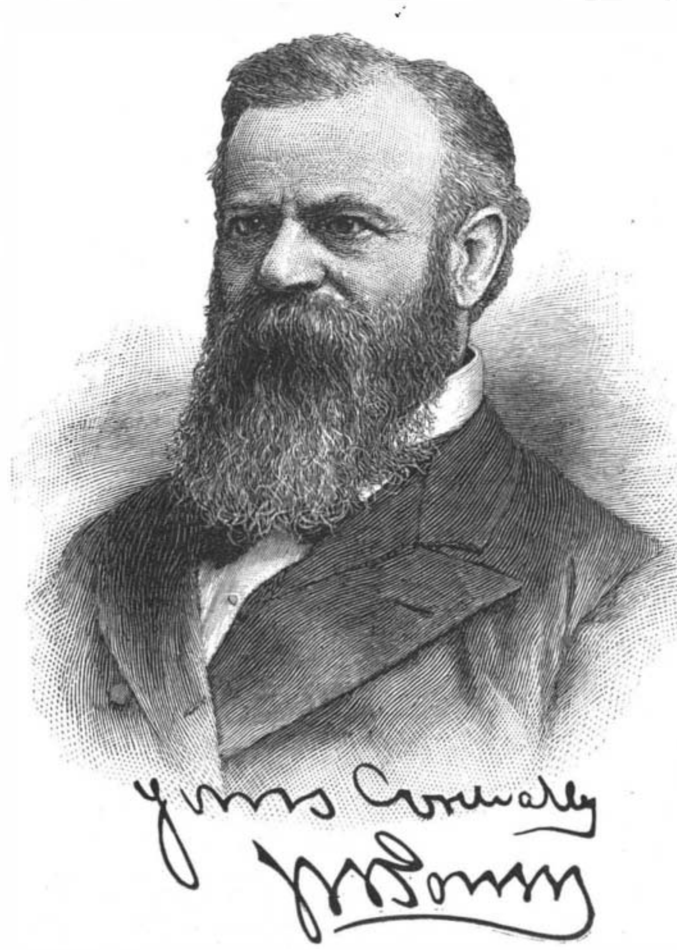
MACRONUS KETTLEWELLI.

THE Tay Bridge, Scotland, is over two miles long, has 86 piers, and spans varying from 58 to 245 feet.

JOHN WESLEY POWELL.

The American Association for the Advancement of Science is migratory. In 1887 it met in New York; in 1888 it gathers its members in Cleveland. A new president, representative as a leader in some special branch of science, is chosen each year. Biology, physics, chemistry, anthropology, and other sciences have been selected in turn. Last year the astronomer Samuel P. Langley* held that office, and this year he yields the place to a distinguished ethnologist.

John Wesley Powell was born in Mount Morris, N. Y., March 24, 1834. He is the son of a Methodist clergyman, and passed his early life in different places in Ohio, Wisconsin, and Illinois. Unable to pursue a systematic college course, he studied at Illinois College and at Wheaton College, meantime teaching at intervals in public schools, and finally he spent the years 1854–56 at Oberlin College, where he followed a special course. His early inclinations were toward the natural sciences, and he began with botany, making collections of various plants. This led him into roving habits, and he made scientific excursions on the Mississippi to St. Paul and across the Wisconsin to Mackinaw. In 1856 he descended the Mississippi in a skiff, from the Falls of St. Anthony to its mouth, and in 1857 he rowed from Pittsburg to the mouth of the Ohio. A year later he went from Ottawa, Ill., down the Illinois River to its mouth, and then ascended the Des Moines River. On all of these trips he made collections of specimens, which he disposed of to various institutions of learning in Illinois, who had come to depend on him for material with which to illustrate their lectures on natural history. He was elected secretary of the Illinois State Natural History Society, and given special advantages for continuing his researches.



At the beginning of the civil war he enlisted as a private in the 20th Illinois Volunteers, and when he reached the rank of lieutenant he was transferred to Battery B of the 2d Illinois Artillery, of which he became captain. He was promoted major and lieutenant-colonel and declined a commission as colonel. He lost his right arm at Shiloh, but on his recovery returned to the front and remained in active service until the close of the war.

In 1865 he accepted the professorship of geology and office of curator of the museum in the Iowa Wesleyan University, but soon resigned to take a similar post at the Illinois Normal University. During the summer of 1867 he visited the Rocky Mountains with his class in geology, thus inaugurating the practice since followed by teachers elsewhere. This success led to his desire to explore the great Colorado River of the West.

The success of his explorations led to his recognition by the government, and in 1870 Congress established a topographical and geological survey of the Colorado River of the West and its tributaries, which was placed under his direction. During the following years a systematic survey was conducted until the physical features of the Colorado valley, hitherto an unknown country, embracing an area of nearly 100,000 square miles, became thoroughly explored. This expedition, originally conducted under the auspices of the Smithsonian Institution, was subsequently transferred to the Department of the Interior and given the title of the Geographical and Geological Survey of the Rocky Mountain Region.

The existence of four separate surveys in the Western Territories conflicting somewhat with each other, and under different departments, resulted, in 1879, in their consolidation, forming the United States Geological Survey, of which Clarence King was appointed director. From the beginning of the controversy* Major Powell was the leading advocate of the consolidation. He represented the Department of the Interior before the committee of the National Academy of Sciences to whom the matter had been referred by Congress for its consideration, and his lucid statement before that body was, perhaps, the most powerful argument showing the necessity of consolidating the surveys that the committee received.

While exploring the Colorado valley he became deeply interested in the remains of the ancient cities of the Moquis, and, next to geology and topography, he made ethnology the chief object of his expedition. The material that he collected on this subject had been deposited with the Smithsonian Institution, and when his survey was stopped, three volumes of "Contributions to North American Ethnology" had been issued, and eight more were in course of preparation.

In order to prevent a discontinuance of this work, a Bureau of Ethnology, which has become the recognized center of ethnographic operations in the United States, was established under the direction of the Smithsonian Institution. An appropriation of $20,000 was secured in 1879, and Major Powell was given charge of the work, and has since continued at its head, issuing annual reports, beginning with the volume for 1879–80, and a series of monographs on special topics.

In 1881 Clarence King resigned from the directorship of the United States Geological Survey, and President Garfield at once appointed Major Powell to that place. He has since filled that office, ably administering the work of the greatest survey of the world.

In 1879 the survey was organized by Mr. King on a geographic basis, but with that remarkable power of system so characteristic of its present chief, it has been gradually reorganized, until at present nearly all of the work is classified by kinds. Geology, paleontology, chemistry, and geography are assigned to separate divisions. The geology is subdivided, partly by the nature of the phenomena, as

* See the sketch of Samuel P. Langley, in the SCIENTIFIC AMERICAN for August 20, 1887.

* A description of the early history of the national surveys is given in the sketch of Ferdinand V. Hayden, contained in the SCIENTIFIC AMERICAN for January 7, 1888.

the geology of quicksilver, volcanic geology, lithology, partly by stratigraphic divisions, as Archean geology, and partly by areas, as originally planned by Mr. King. The paleontologic work is classified partly on biological grounds, the vertebrates, invertebrates, and plants falling into separate divisions, and is further divided on stratigraphic lines, invertebrate paleontology being separated into paleozoic, mesozoic, and cenozoic. In the chemical division the necessary analytical work is performed, as well as various independent researches on physics and mineralogy. The principal divisions of the geographic work are areal.

For the further development of the survey two propositions are now before Congress, both favored by the director of the survey, but both originating with the citizens of Western States. The first is a proposition to make a special investigation of the subject of irrigation, selecting the lands which should be devoted to agriculture with irrigation, and indicating for reservation the sites of irrigation canals, headworks, and reservoirs for the storage of irrigation waters. The second proposition is for a special agricultural survey in connection with the general geologic work.

Major Powell has had in recent years but little time for original work, but he has not been unproductive. He constantly furnishes ideas to his assistants which they assimilate and develop. He is intimately acquainted with the scientific work of the survey, and his fruitful mind guides by suggestion, or more explicit direction, a large share of the work. The ordinary bureau chief in Washington assumes a judicial attitude toward the work under his direction, deciding the questions that are propounded to him by his assistants or by outside parties. Major Powell, on the other hand, is exceptional in that he takes the initiative himself, originating plans and finding means for their execution. The appropriations with which this work is carried on have been increased from $106,000 in 1879 to $750,000 in 1887.

His personal scientific work during the last ten years has been chiefly in anthropology. He had previously made and has since continued extensive observations in the linguistics, mythology, and sociology of American tribes, but this still remains largely unpublished. His published contributions have been principally devoted to the philosophy of the subject. These include his presidential addresses before the Anthropological Society of Washington, of which the titles of the more important are, "Outlines of Sociology" (1882), "Human Evolution" (1884), "From Savagery to Barbarism" (1885), "From Barbarism to Civilization" (1886), "Evolution of Civilized Man" (1888), and his contributions to the "Annual Report of the Bureau of Ethnology."

The degree of Ph.D. was conferred upon him by the University of Heidelberg on its 500th anniversary in 1886, and in the same year Harvard gave him an LL.D., on the occasion of her 250th anniversary. He is a member of many scientific societies, of which the most important is his connection with the National Academy of Sciences, where he was elected in 1880. Major Powell was president of the Anthropological Society of Washington from its organization in 1879 till 1888, and he was president of the Philosophical Society of Washington in 1884. He was elected a member of the American Association for the Advancement of Science in 1874, advanced to the grade of fellow in 1875, and served as vice-president in 1875, delivering an address that year on "Mythologic Philosophy," which was a most valuable contribution to anthropology, and resulted in calling the attention of the Association to the progress in that science, in consequence of which Lewis H. Morgan, the father of anthropology in this country, was chosen to the presidency of the Association for the following year.

At the New York meeting last August, Major Powell was elected to the office of president, and will conduct the sessions in Cleveland this year.

Major Powell's publications include many scientific papers and addresses and numerous government volumes that bear his name, including the reports of the various surveys with which he has been connected, the Bureau of Ethnology, and the United States Geological Survey. In addition to the works already mentioned, the special volumes that are more particularly his own are, "Report on the Geology of the Eastern Portion of the Uinta Mountains and a Region of Country Adjacent Thereto" (Washington, 1876), "Report on the Lands of the Arid Region of the United States" (1879), and "Introduction to the Study of Indian Languages" (1880).

IN the Academy of Sciences, Paris, on the snows, ice, and waters of Mars, M. Flammarion, in reply to some recent remarks on the meteorological condition of this planet, pointed out that the varying state of the polar ice caps has long been carefully observed by Maedler, Schiaparelli, and others, the inference being that Mars is not in a state of glaciation. On the contrary, its temperature is equal to, if not higher than, that of the earth, and its polar snows melt periodically to a far greater extent than on our planet.

[SCIENCE.]

Object Lessons in Oriental Faiths and Myths.

A remarkable collection will soon be opened to the world in Paris. The municipality has given a plot of ground that cost two hundred thousand dollars on the Avenue d'Jena, and a large and beautiful stone structure has been erected on it by the state, under a law passed while the present president, Carnot, was finance minister. This law secures over three hundred thousand dollars for the erection of a building, and endows the establishment thus formed with a perpetual annuity of nine thousand dollars for purposes of maintenance. The glass cases for the collection are partly placed and filled, and the public will be admitted in a few months.

The collection is primarily intended to teach the history of the development, and the characteristics, of the Oriental religions. The importance of this study strikes us forcibly when we reflect that these forms of faith still deeply influence the daily lives of more than one-half of the human race, and that they have solaced and guided tens of thousands of millions of our fellow creatures.

The originator and collector of this unique series of objects is the well known student of Oriental languages, M. Etienne Emile Guimet, the son of a wealthy citizen of Lyons. He has spent more than twenty years of an active scholarly life in voyages to, and residences in, China, Japan, and other Asiatic lands, and has devoted several millions of francs from his large fortune to this work of public instruction. In his native town he is also known for his persistent and munificent efforts to secure high class musical entertainments for the people; and, if his efforts are measured by the exquisite congregational singing that I recently heard in one of the Lyons churches, his efforts have been signally successfull.

Recently I spent the morning with M. Guimet, examining the collections already in place. We first passed through two long halls, carefully arranged, and lighted from both sides with high windows—halls, let me say, that would form admirable models for the future architects of the Metropolitan Museum. Here we found two comprehensive collections of pottery—one from China and one from Japan—each arranged geographically and historically, beginning, in the case of Japan, with the southern provinces, and ending with the northern. These most valuable gifts of M. Guimet, however, do not belong to my present subject.

From these halls we entered the lofty library, where are already placed twelve thousand volumes of books and manuscripts containing official statements in the original tongues of the dogmas, creeds, and myths of all the important Oriental forms of belief. Thence we passed to an extensive hall, in which the Japanese religions are illustrated and classed.

Illustrations of the earliest form of the Shinto nature worship begin the extensive series. First we have the round metal mirrors resting upon mimic waves of sculptured wood, that stood high in the temple to catch the earliest rays of the rising sun; then figures of the simply clad priests; then the implements for making the primitive offering of fire and incense to the unembodied god. In order of time follow the paraphernalia of the Buddhist priests, who, crossing from Corea, brought with them their gorgeous ritual and imposed it upon the nation. Then we have innumerable figures of Buddha and attendant deities in gold, silver, bronze, lacquer, and clay, representing the ideas of the important contending sects into which Buddhism was soon divided through the agency of sacerdotal ingenuity.

In the middle of the hall, under the skylight, is a representation of the interior of a Japanese temple of the first class, with original images of all the gods before whom worship is usually conducted. Here we may see how, in the imagination of the Japanese (the sacred Buddha sends forth four great agencies that save men through persuasion), they are shown to the popular eye in the form of golden figures of prophets in silken robes; and also how four other emanations from Buddha, symbolical of darkness, compel men to do right through fear, shown as carved images of black devils with gnashing teeth.

Beyond this group are series of cases containing thousands of objects explaining Japanese myths, lives of saints, and the stories told about their sacred people and places. Another extensive hall contains a series of figures and other objects elucidating the forms of belief, the myths, and the folk lore of China. In another the Greek mythology is systematized, in another the Roman, in another the Egyptian. One of the most interesting cases is that containing original images from many places in the countries and islands bordered by the Mediterranean, showing the various steps by which the Egyptian gods were accepted and adopted under new names successively by the Greeks and by the Romans. The rooms containing the collections from the western lands are as yet but partly arranged. Enough can be seen, however, to show how important and complete the series of objects must be—enough to show that the world furnishes no other collection of the kind nearly so large, or so well prepared for the serious study of the development of Oriental and ancient civilization.

M. Guimet declared that he had no theory to support in forming his museum. He has excluded the Christian and the Hebrew forms of worship from his scientific treatment, and has confined himself to those lands where religion dawned upon mankind, and where great faiths that dominated extensive territories were developed. He simply presented the authentic documents and the authorized symbols for the use of the scholar.—*L.*

Curiosities of Coal.

Does any one except a practical chemist ever stop to think of all the substances which we get from pit coal and the almost inconceivable variety of their uses? Everybody is familiar with those of them that are in daily use, such as gas, illuminating oils, coke, and paraffine, but of the greater part few persons know even the names, science advances so rapidly and its nomenclature is so extensive and so abstruse. It is no wonder that merchants and manufacturers take advantage of this ignorance to foist upon the public articles of food, of drink, or for the toilet that, if they are not always dangerous to the health, have not in them a particle of the substances which they pretend to contain. Though pit coal has been known for some hundreds of years, the discovery of its numberless products is confined to the present century. Illuminating gas was unknown a hundred years ago. Petroleum has been in use only about forty years, and it is scarcely more than fifty since some one discovered that stone coal was inflammable. Nearly all the other products derived from soft coal have been discovered and applied in the interests of science or of fraud within the last twenty-five years. The first thought in regard to coal is that it is made to give heat or warmth; the next that one of its principal uses is to illuminate. But there are obtained from it the means of producing over four hundred colors, or shades of color, among the chief of which are saffron, violet blue, and indigo. There are also obtained a great variety of perfumes—cinnamon, bitter almonds, queen of the meadows, clove, wintergreen, anise, camphor, thymol (a new French odor), vaniline, and heliotropine. Some of these are used for flavoring. Among the explosive agents whose discovery has been caused by the war spirit of the last few years in Europe are two called dinitrobenzine, or bellite, and picrates. To medicine coal has given hypnone, salicylic acid, naphthol, phenol, and antipyrine. Benzine and naphthaline are powerful insecticides. There have been found in it ammoniacal salts useful as fertilizers, tannin, saccharine (a substitute for sugar), the flavor of currants, raspberry, and pepper, pyrogallic acid and hydroquinone used in photography, and various substances familiar or unfamiliar, such as tar, rosin, asphaltum, lubricating oils, varnish, and the bitter taste of beer. By means of some of these we can have wine without the juice of the grape, beer without malt, preserves without either fruit or sugar, perfumes without flowers, and coloring matters without the vegetable or animal substances from which they have been hitherto chiefly derived.

What is to be the end of all this? Are our coal beds not only to warm and illuminate, but to feed and quench the thirst of posterity? We know that they are the luxuriant vegetation of primal epochs stored and compressed in a way that has made them highly convenient for transport and daily use. They are nature's savings laid up for a rainy day of her children, the human race, and it is probably because they are composed of the trees, the foliage, the plants, the roots, the fruits, and the flowers of the ancient world that they now so largely supply the place of our forests, plains, fields, and gardens.—*San Francisco Chronicle.*

Large Photographs of a Great Job.

We are indebted to Messrs. B. C. Miller & Sons, house movers, 979 Bergen Street, Brooklyn, for a set of three large and splendid photographic pictures, showing the moving of the great Brighton Hotel, at Coney Island, N. Y., in April last. In the SCIENTIFIC AMERICAN for April 14 we gave illustrations showing how the building was moved by means of railway cars and locomotives. One of the photograph pictures is 3 feet 9 inches long, and shows the locomotives and connected tackle arrangements in working order. The building was 460 feet long, 210 feet wide, and weighed 5,000 tons. The arrangement of the tracks and cars by which this great load was moved is clearly shown in the pictures, which have a peculiar value as original illustrations of a novel and remarkable undertaking.

A Trade Mark Case.

In the case of the Russian Cement Company *vs.* Le Page, decided recently by the Supreme Judicial Court of Massachusetts, it appeared that the appellee formed a corporation to which he sold his business with the right to use his trade mark, "Le Page's Liquid Glue." He afterward left the corporation and made use of the name, "Le Page's Improved Liquid Glue." The court granted an injunction enjoining the appellee from making use of the latter name.