

Scientific Items.

PROGRESS IN SCIENCE AND THE ARTS.

TECHNICAL BREVITIES.—Question has been raised, by reason of the unfavorable termination of a certain case, concerning the safety of bromide of ethyl, the *new anæsthetic*; but the great preponderance of evidence is favorable to the view of its advocates, that the medical profession have in it an anæsthetic superior to both ether or chloroform. A reform much needed in the matter of disposing of sewage has been introduced at Brighton Beach, by the adoption of an effective system of separating the solid from the liquid portion of the same, purifying the latter, and converting the former into a commercial fertilizer. The sooner our seaside resorts generally follow this example, the better will it be for their reputation as health resorts: for, from what is known of the utter neglect of the subject of drainage at many of these places, their freedom from filth-diseases is one of the standing marvels.

—The report of the British Consul-General at Bangkok, lately published, contains the first detailed account of the remarkable discovery made in 1879 of *valuable sapphire mines* in that part of Siam. The portion of the *Saint-Gothard Tunnel* which has given so much trouble on account of the falling in of the roof, it is now thought has been permanently fixed. The cause we have previously described. It has given so much trouble that at one time it was seriously proposed to allow it to collapse, and make a *detour* which would avoid the objectionable "stretch," altogether. The expedient was lately adopted, however, of rebuilding the supporting masonry in rings of solid granite; and thus far, the experiment has been successful. The rings are each four meters long, so that, in the event of any one of them giving way, the others will not be affected. The utmost care is taken in the work: no imperfect stones are allowed to be used; the masonry is perfect, and the walls are of extraordinary thickness—in the parts most exposed to pressure, not less than 10 feet thick.

—The curious substance known as *China moss* has a peculiar constituent called *gelose*, which has the property of absorbing and solidifying into a colorless and diaphanous jelly, five hundred times its weight of water, and is capable of forming ten times as much jelly by weight as the best animal gelatine.

—The second specimen of the fossil reptilian bird, known as the *archæopteryx*, found in the lithographic slates of Solenhofen, was purchased for five thousand dollars by Herr Siemens, of Berlin, to prevent it from coming to this country. It is now in Berlin, on deposit in the Geological Museum, with the expectation that it will be purchased by the government.

—In a recent lecture by Professor Flower, before the Royal College of Surgeons in London, the question of the *origin of man on the American continent* was discussed at some length. The statement was made that, "taking all circumstances into consideration, it is quite as likely that Asiatic man may have been derived from America as the reverse; or both may have had their source in a common centre in some region of the earth now covered by the sea."

—The prevalence of *oil-tank fires* this year, chiefly caused by lightning has caused very general remark. The *Scientific American* to account for the special liability of such tanks to be fired by lightning, advances the theory that from every such tank there is a constant escape of light hydrocarbon vapor, which forms a permanent cloud or column, rising to a great height above the tanks. This vapor is a conductor, which the lightning naturally follows, and which attracts it. This theory is ingenious, but fails to account for the immunity which iron-top tanks enjoy from destruction, and which the *Iron Age* affirms to be the fact, "from positive knowledge of all tank-fires that have been caused by lightning during the past seven years."

—Mr. Bower's plan for *protecting iron against oxidation* by treating the cleansed surfaces in a chamber of suitable size with heated air, and subsequently reducing any red oxide that may have been formed by the introduction of reducing gases, is reported in London *Iron* to have been developed on the commercial scale very satisfactorily. It is said to have become a dangerous rival to the process of Barff, who employs superheated steam for the same purpose.

—Some genius has made the interesting calculation that 72,540,000 packages, or 18,740,800,000 single pins, are manufactured yearly in the United States, representing 468 pins for every individual of our population. He makes the questionable statement, likewise, that fifty years ago it took one man a min-

ute to make 14 pins, while to-day a single workman will make 14,000 in the same time.

The assertion is made that the authorities of the New York Central Railroad intend to add to all their locomotive engines an attachment for *arresting sparks and cinders*, to prevent their escape from the smoke-stack.

—The prosperity of the *Pennsylvania Railroad Company* has been remarkable. The increase in its earnings has been at the rate of four or five millions per year, and for the first four months of the present year was at the rate of six millions and a half for all its lines.

—From a small beginning in 1832, with an appropriation of \$25,000, the *United States Coast and Geodetic Survey* has become an establishment of great importance, employing 300 men and 14 vessels, with an annual appropriation of over \$500,000.

MR. LAW'S REPORT ON THE TAY BRIDGE.

The Commissioners to investigate the cause of the Tay bridge disaster, Messrs. Rothery, Barlow and Yolland, employed Mr. Law, M. I. C. E., to examine the bridge after the fall of a portion of it to make a report thereon, which could be used as evidence on the trial. As a result he submits a long report, in which his conclusions summed up would make the statement appear as follows: The base of the pier was too narrow, occasioning a very great strain upon the struts and ties, that the angles at which the latter were disposed, and the mode of connecting to the columns were such as to render them of little or no use, and that the other imperfections which have been pointed out, lessened the power of the columns to resist a crushing strain; and further that the yielding of the struts and the ties was the immediate cause of the disaster. Some of the other imperfections alluded to were, first, the defective mode of connecting the columns at the flange joints, the bolts being one-eighth inch less in diameter than the hole, and the flanges being separated in some cases as much as three-fourths of an inch. The concrete was also found to be bad, on account of its inequality. The mode of attaching the ties to the columns by means of lugs was evidently insufficient, as in almost every instance the lugs have been torn away.

THE ENGLISH CHANNEL TUNNEL.—It is asserted that within 18 months two and a half miles of the channel tunnel between England and France will have been excavated, and that the work will be completed in four years, probably by boring from each end. There are evidently, however, contingencies, such as a break in the rock, which may destroy the whole enterprise. Meantime another bold scheme for crossing the channel contemplates a line of steel tubes 16 ft. in diameter, ballasted so as to make it weigh one and a quarter tons to a foot less than the water displaced, and held at a depth of 35 ft. below the surface (so as not to impede navigation) by being anchored by chains or caissons sunk to the bottom. Through this floating tunnel of 20 miles or so it is proposed that railway trains shall pass. The scheme appeals too strongly to credulity.

REDUCING POWER OF GRAPE-SUGAR.—Professor Böttger highly recommends the use of glucose in alkaline solution for the reduction of salts of silver, affirming that there is no procedure that is so convenient or which gives surer results. He proceeds in the following manner: Chloride of silver, freshly precipitated and well washed, is suspended in a suitable quantity of a diluted solution of caustic soda. To this a small quantity of glucose is added, when, on boiling for a few minutes, a complete reduction takes place. The metal, if collected, washed, and slightly calcined, may be obtained in form of a spongy mass of dull white color. The same method yields a very active platinum black.

THE DISSOCIATION OF IODINE.—Prof. Victor Mayer reported to the German Chemical Society of Berlin, at its last meeting, that he had succeeded in determining the vapor-density of iodine at a considerably higher temperature than before, and that he had obtained values closely approximating to those required on the assumption that the gas under the circumstances of the experiment consisted of monatomic iodine molecules. If possible, he proposes to extend his observations to still higher temperatures, and for this purpose will employ the lately-described oil-furnace of Deville and Troost, which is capable of fusing porcelain.

An extensive bed of shell marl has been discovered near Orillia, Ont.