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(Illustrated articles are marked with an asterisk.)

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For the Week Ending July 12, 1890.

Price 10 cents. For sale by all newsdealers.

AMMONIA.

The wholesale price of concentrated liquid ammonia has recently advanced from 5¼ cents a pound to 9 cents, and at this writing it is extremely difficult to get enough to supply the demand even at that price. The immediate cause of this great advance in price is due to the unexpectedly large orders from the manufacturers of artificial ice which have been received during the last few weeks.

The ammonia which is used in ice making is obtained from what is known as gas liquor, and is produced in the process of carbonization of coal in gas manufacturing. At this season of the year only about 40 per cent of the amount of gas liquor is to be had which is available in the winter season, owing to the decreased consumption of gas in summer. The laws of several States require gas companies to remove the ammonia from their product, as it greatly improves its quality, but it has only been within recent years that the element thus obtained has been utilized for the production of refined ammonia, which is now in such great demand that manufacturers find themselves totally unable to supply it. Still another cause exists for the scarcity of ammonia, and that is the changing of a large number of companies from the carbonization of coal in the production of illuminating gas to the making of what is known as water gas. In the latter process no ammoniacal liquor is produced, and thus a productive source of supply of the raw material for the manufacture of concentrated ammonia has been entirely cut off.

Very ingenious machinery is used in extracting the ammoniacal liquor from the gas, and the former is then disposed of to chemical companies, who subject it to a special course of treatment to prepare it for general use.

Sulphate of ammonia is produced by the carbonization of bone and animal matter, but this product is generally employed as a fertilizer. Aqua ammonia has been made from the salt, but not to any great extent, and it so happens that the supply of the sulphate is short, even in foreign lands, where manufacturers have vainly attempted to supply themselves with the much coveted article. Ammonia, also familiarly known as hartshorn, is said to be one of the few substances known to the chemistry of the ancients, being referred to by Pliny under the name of vehement odor, which he evolved by mixing lime with nitrum or what was probably sal ammoniac. The name ammonia was given in ancient times because of the fact that sal ammoniac was originally obtained by heating camel's dung in Libya near the temple of Jupiter Ammon.

Ice manufacturers say that some other source of supply must be found for crude ammonia, as the demand from the producers of artificial ice will greatly increase. It is said that ammonia can be obtained in large quantities from shale, which is a kind of slate found in Pennsylvania, specimens of which are sometimes found mixed with coal. It is claimed, however, by those who are usually depended upon to supply concentrated ammonia, that with a winter supply of gas they will have little difficulty in meeting the demand, which is wholly phenomenal at this time, owing to the large number of ice-making machines which have recently been set up.

A SUMMER SCHOOL OF BIOLOGY.

On Monday, July 7, the summer school of biology connected with the Brooklyn Institute will hold its opening session at Cold Spring Harbor, L. I. Mr. Eugene G. Blackford, president of the New York State Fish Commission, and Mr. Fred. Mather, the well known fish culturist, have co-operated with the gentlemen of the Brooklyn Institute in organizing this school for biological research, which is about to be inaugurated under most favorable auspices.

Cold Spring Harbor is on the north shore of Long Island, thirty-two miles from New York, and has many features which are specially favorable for the student in natural history. The building which will be used as a laboratory is located at the head of the harbor or bay, which is particularly rich in marine life. In the immediate vicinity of the laboratory are a series of ponds, which are fed by inexhaustible springs, which also abound in forms of fresh water life.

The surrounding country is high and rolling, having abundant forest glens and small streams, which abound in attractive subjects for the student. The laboratory will be abundantly supplied with fresh water from springs in the immediate vicinity, which are used during the hatching season by the commissioners in propagating fish, and salt water will be obtained from the harbor near by, from which it will be pumped into a tank or reservoir.

There have been provided several row boats, a sail boat, and a steam launch, together with nets, hooks, and dredges for use in collecting and dredging. The steamer Fish Hawk, belonging to the United States Fish Commission, will spend the entire summer in Long Island Sound pursuing a series of investigations regarding the depredations of the star fish among the oyster beds and in other work, and the gentlemen composing the school of biology are to make several extended excursions on this vessel, when they will have the benefit of the dredging and other operations.

The following announcement is made regarding the course of study: "Students who pursue the general course of instruction during the summer and who have time for extra work will be given the facilities necessary to enable them to carry on courses of special investigation; while those students who have already gained the knowledge and experience which is provided by the general course will be permitted to give their entire time to special work. No special courses will be laid down in advance, but each student will be at liberty to arrange with the director of the laboratory for such a course as may be practicable. A general course will be open to each student at the laboratory, and will be under the direction of Dr. Bashford, Dean of the College of the City of New York, who is the director of the laboratory."

There will be an expert photographer provided, an expert in photomicrography, an artist for making drawings, and an expert in coloring drawings and photographs. The laboratory will be provided with compound microscopes, two Baker microtomes, a Minot microtome, photomicrographic apparatus, a general photographic outfit, together with other appliances and instruments. The sessions of the school will continue for eight weeks. The lecturers who have been announced, with their subjects, are as follows: Dr. William G. Farlow, Harvard University, who will speak on "Algæ;" Dr. William K. Brooks, Johns Hopkins University, whose subject will be "Molluska;" Prof. H. W. Conn, Wesleyan University, "Bacteriology;" Prof. William Stratford, College of City of New York, "Photomicrograph;" Col. Nicholas Pike, Brooklyn Institute, "Herpetology;" Dr. Nathaniel L. Britton, Columbia College, "Systematic Botany;" Prof. John B. Smith, Brooklyn Institute, "Coleoptera;" Dr. Bashford, Dean College City of New York, "Comparative Zoology;" Dr. Byron D. Halstead, Rutgers College, "Fungi;" Prof. Franklin W. Hooper, Brooklyn Institute, "Comparative Osteology;" Prof. John Mickleborough, "Crustacea;" Dr. Geo. T. Kemp, Hoagland Laboratory, "Comparative Physiology;" Dr. H. Hensoldt, Columbia College, "Echinoderms;" Mr. Ludwig Riederer, Brooklyn Institute, lecturer and demonstrator on the cutting of microscopic sections of tissues; Mr. John Ketchum, Brooklyn Institute, lecturer and demonstrator on the photomicrography of fresh tissues.

Professor Albert R. Leeds, of the Stevens Institute, and four assistants will carry on a series of investigations into the causes of the diseases of fresh water fishes, and also as to the origin of the odors arising from standing water. There is every indication that the courses of the new summer school of biology will be marked by earnest and conscientious work, and that valuable contributions will be made to the store of scientific knowledge.

THE CHICAGO WORLD'S FAIR.

A splendid site chosen. The long contest in respect to the site for the great exhibition has been definitely settled. On the 2d inst. the World's Fair National Commission formally accepted the joint site, consisting of the lake front and Jackson Park, as the location for the Columbian exposition, by a vote of 78 to 11. This is an admirable location for the fair, gives general satisfaction, and assures the success of the grand undertaking.

Raised Figures on Soft Wood.

Ordinary moulding and stamped work and the papier mache and pressed sawdust embossed work have been on the market for a long time, and but few people mistake them now for hand work. Basswood can be compressed to a very large extent, and will swell out again to its original proportions upon being steamed. This property is utilized in the following manner. A piece of the wood is subjected to great pressure under a die or stamp. This stamp presses down parts of the soft wood, in a more or less elaborate pattern, lower than the rest of the surface. This process can be quickly performed, and the piece of wood is then passed to a planing machine, which in a twinkling planes down the surface of the wood just even with the top of the compressed pattern. The piece is then taken over to the steamer, where the warm, damp vapor soon swells the compressed parts back to their original size. Thus a handsome raised pattern is produced on the planed surface of the wood, which can hardly be distinguished from genuine hand-carved work.

A NEW method of obtaining stained glass is done by a process of printing. The design is embossed on an iron plate, on which a lump of hot glass is rolled until it takes the form of the plate on which the pattern is cast. The sunken lines are then filled with enamel and the whole plate is fired. This process obviously does away with the use of leads, is rapid in its execution, and has the additional advantage that the design may be repeated as often as it may be required.

A Large Girder.

The Keystone Bridge Co. has just completed a girder for the new City Hall of San Francisco which is the largest ever made in the United States, so far as the members of the firm know. It is 105 feet long, and weighs 70 tons. A contract for two girders was given to the company last November, and they have been working on it ever since. The materials for the second one are now being prepared. The girders are intended for the ground floor of the building.

The great problem now is to transport it to the Pacific coast. The Chicago & Northwestern and Union Pacific roads have undertaken the job. The long monster recently was lying on three of the largest freight cars obtainable on the Allegheny tracks. Mr. E. H. Utley, the freight agent for Carnegie, Phipps & Co., stated that it was necessary to put in additional trusses to distribute the weight evenly on the three cars. As the cars are constructed, the weight of the girder fell on the centers, and the cars would hardly stand the strain. Mr. Utley thinks that the way it is placed in the cars will allow it to go around the curves all right. The usual plan for shipping girders is to carry them in pieces and have the plates riveted together at the place of destination. The company was afraid they didn't have the facilities on the Pacific coast to do the riveting The second one will not be built until they see whether or not it can be transported. The average car in the West will carry about 15 tons, and Mr. Utley says that should anything happen to either of the three cars the road would have some trouble to replace them. —*Pittsburg Dispatch.*

Why Thunder Storms Affect Milk.

During electrical disturbances it seems that cream and milk are put into a condition to sour easily. The probable cause of this, the editor of the *Cultivator* (Albany) explains as follows: The effect of an electrical discharge is to decompose a portion of the atmosphere, by which ozone is produced. This substance has peculiar properties from its intense activity as an oxide of oxygen, and its action is often believed to be, and may be, the cause of the souring of milk, beer, and fresh wine during what are known as thunder storms. The ozone is diffused through the air, and is believed to be the cause of the strong acid odor which prevails after the storm is passed. No doubt if the milk is submerged in water, and access of air is prevented, no result of the kind need be apprehended; and as the more milk is exposed to the air the more it will be affected by the ozone, the milk in open shallow pans will be acidified more readily than that in deep pails, although these may be open. In our long experience, however, the writer adds, we have never had any milk affected in this way, either in shallow pans or deep pails, and are of opinion that the heat of the air preceding thunder storms is more directly the agent in the souring of the milk than the ozone that may exist in the air after the storm is passed. Carefulness to maintain a proper temperature, by closing dairy houses and cellars against the outer atmosphere, will be a means of safety.

The Inhabitants of Cheese.

Mr. Adametz has just made some microscopic researches upon the microscopic organisms that inhabit cheese. From an examination of Emmenthal, a soft variety of Gruyere cheese, he has obtained the following results: In each gramme of the cheese, when fresh, from 90,000 to 140,000 microbes are found. This number increases with time. Thus, a cheese 71 days old contains 800,000 bacteria per gramme. The population of a soft cheese 25 days old and much denser than the preceding is 1 200,000, and that of a cheese 45 days old is 2,000,000 microbes per gramme. But the population of a cheese is not everywhere distributed the same in it. The center is but moderately inhabited with respect to the exterior portion. The population of a soft cheese, near the periphery, is from 3,600,000 to 5,600,000 microbes. According to the mean of these two figures, there are as many living organisms in 360 grammes of such a cheese as there are people upon the earth.—*La Nature.*

A Waterproof Whitewash.

Resenschek, of Munich, mixes together the powder from three parts of silicious rock (quartz), three parts of broken marble and sandstone, also two parts of burned porcelain clay, with two parts of freshly slaked lime, still warm. In this way a wash is made which forms a silicate if often wetted, and becomes, after a time, almost like stone. The four constituents, mixed together, give the ground color, to which any pigment that can be used with lime is added. It is applied quite thickly to the wall or other surface, let dry one day, and the next day frequently covered with water, which makes it waterproof. This wash can be cleansed with water without losing any of its color; on the contrary, each time it gets harder, so that it can even be brushed, while its porosity makes it look soft. The wash, or calcimine, can be used for ordinary purposes, as well as for the finest painting. A so-called fresco surface can be prepared with it in the dry way.

TRADE MARK DECISIONS.

U. S. Circuit Court—Northern District of Illinois.

SINGER MANUFACTURING COMPANY *vs.* JUNE MANUFACTURING COMPANY.

Blodgett, J.

That the patentee, Singer, and his successors, have manufactured sewing machines publicly known as "Singer Sewing Machines," and the name "Singer" has come to identify the special kinds of machines made by them, does not, after the expiration of the patent, give them the exclusive right to the use of the term "Singer" as applied to sewing machines.

After the expiration of the patent the public may manufacture machines having the same form of construction, and even ornamentation, used by the patentee.

A trade mark consisting of an oval plate attached to the machine, stamped in the center with a shuttle and two crossed needles, whose threads form an "S," and around the edge with the words "Singer Sewing Machine Co.," and a wreath of leaves, is not, in the absence of a right to the plate itself as a trade mark, infringed by a similar plate with the words "Improved Singer" in the border and the monogram "J. M. Co." in the center.

A manufacturer has the right to buy old machines of another make, and to repair, repaint, and sell them again without removing the trade mark put on them by their manufacturer.

The Nitrifying Process and Its Specific Ferment.*

The process of nitrification has been practically studied for centuries, but it was first in the year 1878 that it was shown by Schloesing and Muntz to be dependent upon the presence of certain minute forms of life, or micro-organisms, or, in other words, to be a fermentation change.

The authors have been engaged during the last three years in endeavoring to isolate the nitrifying organism, and the present memoir gives in detail an account of the numerous experiments which were made in this direction.

Nitrification, having been in the first instance induced in a particular ammoniacal solution by means of a small quantity of garden soil, was carried on through twenty-four generations, a minute quantity on the point of a sterilized needle being introduced from one nitrifying solution to the other. From several of these generations gelatin plates were poured, and the resulting colonies inoculated into identical ammoniacal solutions, to see if nitrification would ensue; but although these experiments were repeated many times, on no occasion were they successful.

It appeared, therefore, that the nitrifying organism either refused to grow in gelatin or that the authors had failed to find it, or that, growing in gelatin, it refused to nitrify after being passed through this medium.

Experiments were, therefore, commenced to endeavor to isolate the organism by the dilution method. For this purpose a number of series of dilutions were made by the addition, to sterilized distilled water, of a very small quantity of an ammoniacal solution which had nitrified. It was hoped that the attenuation would be so perfect that ultimately the nitrifying organism alone would be introduced.

After a very large number of experiments had been made in this direction, the authors at length succeeded in obtaining an attenuation consisting of about $\frac{1}{1000000}$ of the original nitrifying solution employed, which not only nitrified, but on inoculation into gelatin peptone refused to grow, and was seen under the microscope to consist of numerous characteristic bacilli hardly longer than broad, which may be described as bacillo-cocci.

These results are the more striking, for, in the case of the two other bottles similarly diluted, one had not nitrified, but, on inoculation into gelatin peptone, produced a growth already on the second day, while the remaining bottle not only produced a growth, but had also nitrified, thus clearly showing that the number of organisms had been reduced to two, *i. e.*, one which nitrified and did not grow in gelatin and another which had nothing to do with nitrification, but which grew in gelatin. In the case where nitrification took place and a growth also appeared in the gelatin tube, it was obvious that both the nitrifying and non-nitrifying organisms were present. These inoculation tests, together with the microscopical appearances, were confirmed by repeated experiments, with invariably the same results.

It is, however, very remarkable that, although this bacillo-coccus obstinately refuses to grow in gelatin when inoculated from these dilute media, yet in broth it produces a very characteristic growth, which although slow in commencing, often requiring three weeks before it makes its appearance, is very luxuriant.

The authors have, moreover, been successful in inducing nitrification in ammoniacal solutions inoculated from such broth cultivations, the extent of which has been quantitatively determined.

Although microscopically its form differs slightly when grown in broth and the ammoniacal solution respectively, yet its identity was established beyond question by its returning to its characteristic bacillo-coccus form when grown again in the ammoniacal solution.

The authors have also been able to induce its tardy growth in gelatin peptone by passing it first through broth cultivations.

The paper is accompanied by carefully executed drawings of the nitrifying organism when grown in the various media employed.

* Abstract of a paper read before the Royal Society, March 13, 1890. By Percy F. Frankland, Ph.D., B.Sc. (Lond.), A.R.S.M., etc., Professor of Chemistry in University College, Dundee, and Grace C. Frankland.

Relative Costs of Transmission of Power.

The following comparisons of cost of transmission of power by various methods appeared in the *Revue Universelle des Mines:*

1. Comparative cost on 10 horse power transmitted 1,093 yards: By cables, 1·77 per effective horse power per hour; by electricity, 2·21; by hydraulics, 2·90; by compressed air, 2·98.

2. Comparative cost on 50 horse power transmitted 1,093 yards: By cables, 1·35 per effective horse power per hour; by hydraulics, 1·87; by electricity, 2·07; by compressed air, 2·29.

3. Comparative cost on 10 effective horse power transmitted 5,465 yards: By electricity, 2·64 per effective horse power per hour; by compressed air, 4·66; by cables, 4·69; by hydraulics, 5·29.

4. Comparative cost on 50 effective horse power transmitted 5,465 yards: By electricity, 2·37 per effective horse power per hour; by cables, 2·65; by compressed air, 2·99; by hydraulics, 3·02.

Steam was the prime mover used in each of the above instances, and it appears that for long distances electricity takes the lead in economy over all other systems. It has also a great advantage in the facility with which the power may be subdivided, and there appears to be no doubt that, in future coal mining, electricity will be much used for coal cutting, tunneling, hauling, pumping, etc., as well as for lighting.

Elevator Sickness.

The elevator in modern big buildings has only one drawback—the sickness it causes when the car is suddenly stopped. To people of a delicate constitution this sickness is often such a serious matter that to them the elevator is a dangerous blessing. This sickness, says a contemporary, can be avoided by observing simple physical laws. Elevator sickness is caused by the same law that throws a person to the ground when he gets off a moving car in the wrong way. The stoppage of the elevator car brings a dizziness to the head and sometimes a nausea at the stomach. The internal organs seem to want to rise into the throat. All this comes from the fact that all parts of the body are not stopped at the same moment of time. The feet being next to the car floor stop with the car, while other portions of the body continue moving. If the body as a whole can be arrested at the same time with the feet, there will be no sickness. This can be done by placing the head and shoulders against the car frame. Then there will be no sickness, and, according to the *Scientific Press*, it is a sure preventive.

A Powerful Objective.

Dr. Van Heurck announces in the *Journal de Micrographie* that Zeiss, working from the formulæ of Professor Abbe, has succeeded in producing a 0·1 inch "apochromatic" objective with an aperture of 1·63, and so constructed that under suitable conditions the whole of this aperture can be utilized. The author states that with this objective he has resolved the entire frustule of *Amphipleura pellucida*, not merely into lines, but into pearls as distinct as he has ever seen on *Pleurosigma angulatum*. Repeated measurements show these pearls to be arranged in lines separated longitudinally by $\frac{1}{50000}$ part of a millimeter, while the transverse striations are separated by the $\frac{1}{30000}$ of a millimeter (about 0·00001 and 0·000014 inch respectively). Three of the new glasses have been made at a cost of $2,000 each.—*Microscopical Journal.*

Manufacture of Filtering Material.

The process consists essentially in reducing ferric oxide by heating it in contact with gaseous fuel. Small pieces of iron ore, preferably hematite, are packed into a retort heated externally, preferably by producer gas. When the charge is at a cherry red heat, gaseous fuel is admitted into the retort and brought into thorough contact with the ore. At the end of four or five hours, if the exit gas be inflammable, the process is finished and the charge raked out and allowed to cool. Ordinary coal gas or other gaseous fuel may be used instead of producer gas. The retorts may be oscillated, rocked, raked, etc., by machinery. The magnetic oxide so produced is available for filtering water, sewage, sugar sirups, alcoholic liquors, etc.

17,550,216 was the population of old Spain in 1887—the last census, now made known. It shows increase at the rate of half of one per cent per year.