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Contents:

(Illustrated articles are marked with an asterisk.)

CLOSE OF THE TWENTY-SIXTH YEAR OF THE SCIENTIFIC AMERICAN.

Our readers will pardon us if we display in this article the natural gratification we feel in the continual and increasing prosperity of the SCIENTIFIC AMERICAN. This number closes its twenty-sixth year of existence. So long a connection with the publication of a single paper as we have had almost identifies it with our daily existence. The pride we feel in it redounds to the good of our readers, for our ambition will never consent to see our journal deteriorate either in quantity or in quality of matter.

Our editorial labors during the past six months have been arduous. These months have not been prolific in discoveries or inventions of such a nature as to furnish fertile subjects for discussion or numerous items of interest. Yet, we have, we think, succeeded in rendering our paper even more interesting and profitable than in preceding volumes. We have full evidence of this in the steady healthy growth of our subscription list, in the encouragement constantly received from correspondents, and in the increasing patronage in every department of our business.

The conviction we feel that our paper exerts one of the most important educating influences in the world, and tha its record may be scrutinized in vain to find in it anything that has not been salutary to mental and moral progress, gives us courage to urge upon all to help us in widening its circle of readers. We are not content to have the largest circulation of any paper of the kind now published. We wish to reach others who have not as yet learned, by long perusal, the real value of such a publication.

You, OLD FRIEND, whose long acquaintance with its merits has deepened your respect and regard for the SCIENTIFIC AMERICAN, and who feel and write that you have been our patron for more than a quarter of a century and would not be without the paper if obliged to dispense with one meal a day, say those kind words not to us only, but tell the same thing to your neighbor and shop mate. Tell him to send for a copy if he wants one to see how he likes it, and induce him to try it for six months or a year. When the SCIENTIFIC AMERICAN visits a house for six months, it generally finds a permanent home there.

As will be seen by our prospectus, we offer special inducements to those who aid us in getting new subscribers.

We have no solicitude about the old patrons renewing; we simply ask that they will do so promptly that we may not miscalculate the quantity of paper to print at the commencing of the volume.

THE GREAT EXHIBITION AT VIENNA, 1873.

We published, on October 28th of the present year, the announcement of the appointment, by the Emperor of Austria, of a commission to arrange for holding an international exhibition at Vienna, in 1873; and on November 18th our readers were given some further information on the subject, and some suggestions, for organizing a proper representation of American genius and industry, based on our experience gathered in Paris, London, and elsewhere. The Austrian scheme is gradually getting into shape, the form and dimensions of the building having been decided upon. A building 3,000 feet in length and 660 in width is to be erected; this structure will be crowned with a cupola, about 330 feet in diameter. This will be finished by October 1, 1872. A separate building will be provided for exhibiting machinery in motion, and another for the works of art. The novel features in the arrangements have been submitted by us to public approval, and it now remains for the manufacturers, inventors, and scientists of the United States to decide upon their course of action.

Constructors and patentees who have introduced their inventions in European countries have suffered grievous ill-treatment at the hands of the Austrian authorities, whose regulations on the subject of patents are, to say the least, not formed for the protection and reward of foreign talent and ingenuity. One most vexatious rule is that which invalidates a patent unless the article be manufactured *in the realm*, within twelve months from the date of issue. Now as patents are, in a measure, characterized by the locality in which they take rise, and are generally most economically worked in the country in which they originate, it is almost equivalent to prohibition to enact that the locomotive engines of Great Britain, the telegraph instruments of the United States, and the printed muslins of France shall be manufactured on Austrian soil within a year from securing the patent, and is a preposterous requirement, which ill comports with our liberal system of granting patents to their subjects.

But worse remains to be told. An American gentleman, having a manufactory at Vienna, was enabled to comply with this obnoxious rule; but he recently had a taste of Austrian legal administration. He had obtained a patent and commenced the manufacture of the article almost simultaneously; and two trustworthy and credible witnesses were produced to prove this fact, but the officials deemed their affidavits insufficient, and the manufacturer has been summoned before a court of justice to prove the introduction. Such hindrance of the rights of foreigners gives rise to an uncomfortable suspicion that the value of Austrian patents, issued to Americans and other foreigners, can be easily escheated to the benefit of the Austrian public. The inventor in question even goes farther, and intimates that his production, being used by the Imperial government, was specially and purposely hindered from its proper protection, that the authorities might more readily convey it to their own use without reward to the patentee.

Under such laws, it would be well for the Austrians to consider whether their invitation to the nations is not likely to meet with a contumelious refusal. Here, as elsewhere, experience is valuable, and we remember that when we sent to Europe in 1851, 1855, 1862 and 1867, we took our inventions and processes to an open market. Neither in London nor in Paris was there any room for suspicion that our specimen machines and productions were there for Europeans to avail themselves of, the American being allowed a courteous protection of his invention while the exhibition lasted; but we do not learn that Austria proposes any such protection. The result of this most erroneous and destructive policy will easily be foreseen.

LYCEUM OF NATURAL HISTORY---DISCUSSION ON MILK AND DISINFECTANTS.

At the meeting of the chemical section of the Lyceum of Natural History, on Monday evening, December 11, two important papers were read, one on "Milk," by Dr. Schweitzer, Assistant Professor in the School of Mines of Columbia College, and the other on "Disinfectants," by Dr. Endemann, Assistant Chemist to the Board of Health.

Dr. Schweitzer has had occasion to analyse a very large number of specimens of milk, gathered by the sanitary inspectors of the Board of Health, and it was a satisfaction to hear him say that he had never found any other adulteration than water. The popular impression, that chalk, calves' brains, and similar unappetizing impurities are added by milk dealers, appears to be erroneous. The chief results obtained by Dr. Schweitzer were as follows: Normal milk has the specific gravity of 1·029, and contains from 12½ to 13 per cent solid constituents. Two, out of numerous analyses, afforded:

Water	87·81	87·23
Butter	3·23	3·81
Casein (cheese)	3·57	3·71
Sugar	4·69	4·46
Ash	0·70	0·79

The best specimens of condensed milk gave: water, 53·54; butter, 13·12; casein, 14·44; sugar, 16·30; ash, 2·60. In the preparation of the condensed milk, 430 quarts were condensed to 100, and the solid constituents increased from 12·55 to 46·46 per cent. These results appeared to warrant the suspicion that 378 quarts had been reduced to 100; but by making the correction, called for by the fact that the quart was a measure of volume while all the determinations were made by weight, the company were found to have actually started with 430 quarts to make 100 of the condensed article. The ashes of milk are rich in phosphates and alkalies.

Dr. Schweitzer has added largely to our knowledge of the composition of milk, and it is to be hoped that his valuable paper will be published in full, in some technical journal.

Dr. Endemann, at the request of numerous members of the Lyceum, gave a sketch of experiments tried with various disinfectants, under the direction of the Board of Health, taking them up in the following order:

1. Metropolitan disinfecting fluid. This famous disinfectant is composed of 90 per cent of a saturated solution of sesquichloride of iron, and 10 per cent of carbolic acid. If it be entirely neutral, its operation is quite effective; but the chief difficulty encountered with it was in its acid character, which destroyed articles brought in contact with it, and often liberated bad gases.

2. Girondin disinfecting fluid is composed of zinc and copper salts, and can only be obtained on a large scale in countries where these salts are the incidental products in extensive chemical manufactures.

3. Chloralum had been subjected to a thorough trial, and found wanting. It is essentially composed of the hydrated sesquioxide of aluminum, and in its action has the tendency to liberate sulphuretted hydrogen instead of fixing it.

4. Bromo-chloralum is the preceding with a little bromine added to it; but as this bromine is in combination with alkaline bases, it is of no effect; and the disinfectant was found to be no better than it should be. The fact was brought out that forty years ago, M. Gannal, in France, proposed chloride of aluminum for the embalming of bodies, but did not seem to find acceptance, and was forgotten until Mr. Gamgee recently revived it for the preservation of meat. It appears to have disappointed the expectations that were raised in reference to it; and also as a disinfectant and antiseptic its value has been overrated.

5. Egyptian powder was declared to be only a little less disgusting than the bad odor it was intended to disinfect. The remedy was worse than the disease. It appears to be essentially clay, mixed with a few per cent of the carbolic acid contained in refuse tarry liquids, and was said to have a decidedly disagreeable smell.

6. Dry earth and peat. Dr. Endemann gave us the result of his experience, that for the disinfecting of night soil, there was nothing so valuable as dry earth and peat. Other disinfectants poisoned the rich soil and destroyed vegetation, but the simple earth prevented the growth of germs, and thus stopped the spread of disease and added to the growth of plants. We cannot dispense with disinfectants and antiseptics on all occasions, but there are many instances where dry earth could be more effective, while it is cheaper and more easily handled.

Professor Joy confirmed the observations of Dr. Endemann, and stated that he had tried the earth closet system for two years, and was convinced that it was destined to supersede all other methods of getting rid of the fecal matters, both in the city and in the country. He believed that it was better to stop the cause of disease at the outset, rather than to scatter it broadcast through our water closets and open privies, and then to try to prevent its further spread by the use of costly chemicals. The open country privy and the city water closet were declared to be the very hot bed for the germination of the worst forms of disease; and the sooner both are abolished the better for the welfare of the community. The ashes of hard coal, which the scavengers carry in enormous quantities from every house in the city, can be used as a substitute for dry earth. It is only necessary to run this through a tolerably fine seive, and to use it in the commode, and after use, to pass it into the garbage barrel, to be carried away in the carts.

All that any family requires is a hopper shaped reservoir for holding the sifted ashes, a galvanized iron hod, and a pull up similar to that which is provided in water closets. It is easy enough to try the experiment, as commodes of different patterns are now kept on sale. Such a use of fine coal cinders would be very valuable; and the material thus obtained from private houses would be highly prized by farmers. If the Board of Health would go to work energetically in this matter, they could do good work in introducing a much needed reform. We cannot expect to go on forever contaminating the rivers and bays with the contents of our sewers. A stop must be put to it some time, and the sooner the better. Who will put the earth closet system into such a practical shape as to drive water closets out of our city houses and banish the unsightly temples from country houses? We trust that the time is not far distant when this result will be accomplished.

THE MYSTERIES OF FLIGHT.

Perhaps in the whole range of animated nature there is no greater mechanical mystery than the flight of birds. We publish in this issue a well authenticated account of a most remarkable flight of some carrier pigeons, one flying at a rate of 196 miles per hour through a distance of 1,004 miles and another, 202 miles an hour for a distance of 1,596 miles. The article referred to gives accounts of other remarkable flights which, as we do not deem them well attested, we shall not further refer to at this time.

The power necessary to propel a pigeon 200 miles per hour proves, upon computation, to be something astonishing. The shape of one of these birds is almost perfectly adapted to reduce cross-section resistance to a minimum; but we think we shall be considered as entirely within bounds when we assume that such resistance would be as great as that exerted upon one half a square inch of flat surface. The pressure upon this surface moving through air of ordinary density at the rate of one mile per hour is, according to Smeaton, 0·000017 of one pound. Though the air, at the hight at which pigeons fly, has less than the ordinary density close to the earth's surface, its rarity tells as much against the action of wings as it lessens resistance to advance, and may, therefore, be neglected in the computation. At a velocity of 200 miles per hour the resistance of air upon one half a square inch of flat surface would be 40,000 times that at a speed of one mile per hour, or 0·68 of a pound. The bird to fly three and a third miles per minute would, therefore, be be obliged to overcome 11,968 foot pounds per minute, or to exert a force of over one third of a horse power.

It is impossible to believe this can have been the case with the pigeons in question. We are rather inclined to believe that they availed themselves of the aid afforded by air currents flowing in the direction of their flight. Though the wind might appear blowing against them when released, it is well known that at different altitudes currents of air may be rapidly flowing in opposite directions, and thus we have good ground for our supposition.

We last week commenced the publication of an article, which is concluded in our present number, entitled "Notes on Flying and Flying Machines," which contains much interesting information. Mention is made therein of many kinds of bird and insects; but we believe that the flight of sea