

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Wednesday evening, the 1st inst., a meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the chairman (*pro tem.*) being John Johnson, Esq. During the hour for miscellaneous business, Mr. Garvey explained his *gyrometer*, for rendering the motion of the earth visible. Different opinions were expressed by the members regarding the possibility of obtaining correct results from it.

The chairman called for the pre-arranged subject of the evening's discussion—"Lead." No written report was presented, and therefore the members proceeded at once to the

DISCUSSION.

Mr. Seely:—"Lead was known in the time of Moses, and was in common use among all the more civilized nations of antiquity. It is said the Roman ladies used white lead as a cosmetic. The aborigines of America were well acquainted with the lead ore, and used it for ornaments; but they had not the cunning to discover the very simple process of changing it into metals; it is only necessary to throw the ore into the fire, and the lead runs out. This ignorance of lead is remarkable, as the Indians had some skill in working copper, having mined it to the depth of 50 feet. Lead is found in nature combined or associated with all other elements; but with the exception of the combination with sulphur, in quantities only about sufficient to supply the cabinets of mineralogists. The valuable ore is sulphide of lead or galena. Galena always contains silver. In England, and on the continent, nearly all the silver produced is from this source. In America, we have the true silver ore. Galena is found in nearly every State in the Union; and in nearly all the eastern and middle States lead-mining has been carried on, but unsuccessfully, from lack of skill or the poverty of the ore. Most of this mining originated in stock-jobbing speculations. The mines are now, with one or two exceptions, abandoned. There is an abundance of lead at the West, and especially in Wisconsin and Missouri. There are two methods of reducing galena: first, fusion with iron—the iron takes away the sulphur; second, by a judicious roasting, converting the sulphide into a mixture of oxyd, sulphide and sulphate, when, by raising the heat, the whole of the sulphur and oxygen pass off as sulphurous acid. The first plan is generally indicated by a silicious gangue. The second plan has many modifications. No metallurgical operation requires more chemical skill than the profitable smelting of lead."

Mr. Seely's remarks were illustrated by specimens from New York, Tennessee, Mexico and Arizona. Most of the observations following were elicited by inquiries from the various members; the speeches were brief and familiar.

Dr. Wetherbee:—"A writer in a recent medical journal states that he has observed all the effects of lead-poisoning from camphene alone, and that he believes many cases of lead-poisoning, so called, are due only to camphene."

Dr. Young:—"Nothing is better understood among physicians than that lead is a poison. Most danger is to be found from lead in warm weather. Heat always increases evaporation and solvent action. I recommend to the club the perusal of Metcalf's treatise on caloric."

Mr. Seely:—"Lead, as a metal, is not soluble in anything. Oxyd of lead, to a small extent, dissolves in pure water; if water contains chlorides or nitrates or free acids, of any kind, much more. There is little danger from water containing neutral carbonates or sulphates. Lead is volatile, especially when oxydating. Everything about smelting-works absorbs the lead—earth, plants and animals. Lead poisons a cat, but not a dog or a rat. Rats will play in white lead as they do in flour. Some men are not poisoned, however much exposed. The antidote for lead-poisoning is sulphur, internally or externally."

Dr. Wetherbee:—"Also iodine; various iodides are recommended. Iodide of lead is lately much used in the treatment of indolent ulcers. Compounds of lead are among our most useful medicines."

Dr. Geisenhainer:—"Lead wire is much used by horticulturists about their trees. It is cheap, easy to handle, and accommodates itself to the growth of the tree."

Major Serrell:—"The veins of galena, at the West, are scattered in branches, and are not very deep. Veins in New York are but a few inches in width. Mr. Chas. Chotan, of St. Louis, informed me that he discovered, in September last, near the head-waters of the Missouri, a mass of galena six miles in length, 10 to 30 feet wide, and protruding above the general level four to six feet. Mr. Chotan was one of the United States exploring party of engineers."

Mr. Fisher:—"Lead is used for the packing in iron joints. How are the metals affected?"

The Chairman:—"Lead is much used for the purpose. The iron suffers, especially near the joint. Wrought iron is most affected. Sulphur is sometimes used, and the iron is better preserved."

Mr. Fisher:—"How about steam joints?"

Major Serrell:—"Lead was once much used for steam joints, but good machinists now match joints so truly that packing is not needed."

Mr. Seely:—"Lead is an electro-negative towards iron; so when the metals are in contact, the iron must suffer. In the air or steam, the iron would be most affected near the lead; but immersed in water, the corrosion would take place in all parts. Lead paint is bad for iron; the lead is reduced and acts as an electro-negative—ochre or other mineral paint should be used."

The Chairman:—"The specific gravity of lead is not increased by hammering."

Mr. Fisher:—"Expands by heat, and on cooling does not contract to its original volume."

The Chairman:—"Lead pipes for hot water always lengthen and sink down; I have noticed it a hundred times. Tin pipe is worse; tinned lead pipe is not now used. The tin soon wears off. Some metals are transparent in the melted state, especially zinc."

Major Serrell:—"It was said in Brooklyn, when the inhabitants were getting their lead pipes, that new pipes were not so strong as old ones. New-drawn iron wire is not so strong as when it has lain at rest for some time."

Mr. Selleck (an iron-master):—"I think the reason is that the acid used in cleaning is not all removed. Acid remains in iron a long time, and it penetrates the iron."

Mr. Fisher:—"Would you use washed wire for a bridge?"

Major Serrell:—"No; I would avoid it. I do not approve of washing even castings with acid."

Mr. Babcock:—"Castings will retain a sensible amount of acid after a week's washing in running water."

The Chairman:—"Steel-workers lay by their ingots for six months before working them up."

Major Serrell:—"It is the general voice of iron men that iron increases in strength after drawing or rolling. This fact is established. Ulster iron assumes its maximum strength before the Pennsylvania iron."

Professor Hendricks:—"I think the explanation of the fact to be that the particles of the iron, being forced out of their natural position, require time to settle themselves."

Mr. Seely:—"Lead makes a mark on paper by virtue of its softness and lack of cohesion. Wax is softer, but makes no mark."

After a few more remarks of no special importance, the members adjourned.

BREAD AND ITS ADULTERATIONS.

On Thursday evening, the 9th inst., another meeting of the above-named association was held; the chairman being Professor C. Mason.

Mr. Grow introduced the subject for discussion—"The Adulterations of Wheat, Flour and Bread"—by reading a paper, the substance of which was as follows:—"Of the grain wheat he could not say anything, but the flour bearing the brands "extra" and "double extra" could not be characterized pure when proceeding from the manufacturers and inspectors; there should be government inspectors whom dollars could not bribe. Virginia alone bears the same high character as it did 50 years ago, and commands the highest market price for flour. Bread might be divided into leavened or loaf bread, and unleavened or ship bread, including the small crackers. Previous to the war of 1812, a general characteristic of the bread in this city was heavy, but never sour; if it was found wanting in weight or quality, the official inspector sent it the poor-house and fined the baker ten cents per loaf. The tariff of the price of flour was regulated each week. The flour of New York State con-

tained more gluten than that of Virginia and some other places, and, consequently, in its manufacture into bread, the bakers often made twelve pounds difference to their advantage in the hundred weight. Potatoes have been combined with the flour, and its effects are seen in stale bread, when broken, by elastic strings, and gives an odor not "resembling that of roses." He attributed sour and bad bread not so much to the flour as to carelessness and ignorance of its makers. Yeast bread is little more than half baked, which renders it indigestible. Unleavened or ship bread has had a great revolution in its mode of making by machinery within the last ten years, and its quality had become better; and he had seen bread baked in ten minutes, in 1845. The effect of plaster-of-Paris in bread is to make it elastic, and meal makes it clayey. Soda biscuit is both leavened and unleavened. A baker in Massachusetts one day, on returning home, found his bread had soured. He added some pearlsh to neutralize the acid, and baked them and sold them under the name of "Medford biscuit." They became popular soon after in Boston and other cities. He would say that almost every grocer was now selling that biscuit, which was poisonous.

Dr. Stevens said if ten pounds of sour dough were made into bread, in which was one ounce of saleratus to sweeten it, the carbonic acid, to raise it, would be separated, and the alkali (which is a poison) left in the bread. A person in traveling through the western and southern States, where they use an enormous quantity of potash in their corn bread and short cakes, and in the northwest, where they make "mille-risings" and use an inordinate quantity of soda and pearlsh, will find that it is the uniform experience of physicians that their patients suffer from some acute and chronic irritation of the mucus tissues of the bowels, and it is almost impossible to raise the patient unless some one can give them yeast bread.

Mr. Treadwell said notwithstanding the statement given by the gentleman who first spoke on this subject, he would state that what are termed soda bread or biscuit was not first made in Massachusetts. In 1820 he shipped soda crackers to South America and elsewhere, and they were popular in Philadelphia and New York. Their soda biscuit and butter crackers were made by yeast; but in 1822 a great cry was raised in Philadelphia that they were made of soda. Pearlsh and saleratus were used, but no soda. They were recommended by physicians, and became the more popular.

Dr. Young said that half-baked bread, though taken in moderation, is accumulative in its effect, and is a great agent for dyspepsia. Wholesome bread must dissolve rapidly in the stomach; it must be made a milky fluid, but half-baked dough will not allow the saliva to impregnate it sufficiently. The consequence is that the fermentative process goes on before the digestion is complete. On the other hand, a mouthful of stale bread gives a different impression to the taste to fresh bread, which will not dissolve so readily, and its effect is bad.

Dr. Stevens said that the tendency of the alkali was to make a pallid complexion, as he had noticed in the people of western countries.

Mr. Curtiss thought it might be the effect of too much calomel. (Laughter.)

Dr. Stevens said the evil effects of acids might be so neutralized that it would not be perceived for a time, as the coats of the stomach are adapted for it; but is a great abuse.

Mr. Seely:—"One of the oldest arts is bread-making; but it is not understood by the best chemists of the present day. The chemistry of it is that all the grains are nearly of the same constitution; they are mostly composed of gluten and starch, oil and vegetable albumen, and about one per cent of inorganic matter. The constituents which are most useful as nutriment for the body are the gluten and the starch, and it has been settled, lately, that the starch in it is for the respiratory system; the gluten is the true nutritious matter of bread. A mechanical mixture of water, starch and gluten, if baked without any other preparation, makes what is termed an unmalted or heavy bread; if you put in leaven you have fermented bread. The mass is just made larger, and the surface exposed to the air is larger. The only reason why leaven bread is more healthy than unleavened bread is that a greater surface is made for the action of the gastric solution. Take fresh bread; the glutenosity of the dough is not entirely lost, and by

pressing it together you reduce it into a putty state; the gastric juice cannot dissolve it so soon. It is just the difference between pulverized sugar and a lump of it. Take a crystal of rock salt and put it in water, and it takes a longer time to dissolve than if pulverized; and there is the same difference between leavened and unleavened bread. Almost within the last ten years there has been a revolution in making bread. The ancient leaven bread was made by the dough being left in a warm place till it began to ferment; and the chemical progress is the change of the starch first into the sugar, and the sugar into carbonic acid and alcohol; the carbonic acid and alcohol forming between the particles swells them up. But great care was required in the operation lest it be decomposed, and therefore the modern process by yeast is much more preferable. Within the past ten years, besides yeast in making bread, we have had 'baking powders' and 'self-raising flour,' and many others; and ninety-nine families in a hundred use some of these. The effect is the same as far as lightness is concerned, but foreign substances are added. Physicians know its pernicious and its dyspeptic tendencies. If the carbonate of soda were pure, there would be a great difference; but neither it nor the cream-of-tartar used are pure. Alum was used considerably in bread-making ten years ago, but not so much recently; its object is to whiten the bread. Baker's bread, generally, is lighter and whiter than home-made bread; the whiteness is produced by alum, and the poorest flour may be palmed off for superior brand. Mr. Hassen, in London, once made a thorough examination of this subject, and made a sensation almost as bad as swill milk in New York. He examined twenty specimens from different bakers, and found none that did not contain alum to an injurious extent. Besides alum, carbonate of ammonia is also used to raise the dough. Any kind of gas would answer the same purpose, even atmospheric air. But this gas, by means of heat, raises the bread in as good a way as any, but some of the carbonate is left in the system. The reason why potash is used to so great an extent in the West is the fact that there is so much wood; and there is such a demand for potash and pearlash that they manufacture these alkalis from the ashes of the wood."

Professor Hendricks, in illustrating the preceding remarks, said the sour substance in the dough is the acetic acid; it is not owing to the presence of the acid, but the change which the acid has made in the bread itself.

Dr. Stevens said it had been doubted whether plaster-of-Paris was added to flour; but it is true. Several officers of the United States Army had told him that, some years ago, a quantity of bread was sent to supply the garrison on the frontier; and upon opening the bags of bread they could smell the plaster-of-Paris. High authority in England had also found it. A foray should be made against the adulterations of tea and coffee, which have become indispensable; and so with spices; and so with fermented liquors, and especially wine, and other stimulants, which are always good in their place.

STABLE MANAGEMENT OF A HORSE.

It is one thing to own a horse, but it is another thing to know how to take care of him. The Woodstock (N. B.) Journal gives a few practical hints on this subject which are worth remembering. A stable horse needs special care and attention. His feeding must be as regular as the measurement of the hours. When a change of feed is made it must be done with great care—giving a small allowance at first until the stomach becomes used to the change. He must be cleaned every day; and when we say *cleaned*, we mean all that can be conveyed by that word. A good currycomb, brush, and an oiled woolen cloth, are the utensils necessary. First take the currycomb and begin at the top of the neck, back of the ears, working the hand both ways. Proceed in this way till you have gone over the entire body and legs. Then take both comb and brush, and every other stroke, draw the brush across the teeth of the comb to clean it. An experienced groom will do this instantly. This done, take your cloth and lay the coat and remove the dust which adheres to the outside. The face and ears must also feel the brush.

Few men know how to clean a horse properly. If the above directions are followed daily, your horses will enjoy good health generally. Stabled horses must be exercised daily. This is absolutely indispensable to good

health. If the feet of your horses are brittle and liable to break and crack, they must be well oiled once a week. A horse thus treated will always be ready to go when wanted, and you will not be ashamed either to ride or drive him.

Another thing quite as important is a clean and well ventilated stable. We cannot excuse any farmer or horse owner, who does not clean his stable twice a day. A stable should be so constructed as to have a wide passage way or floor in front to feed from. Above the manger a space should be left a foot or two in width clear, and the passage-way should be the avenue for the supply of fresh air to the nostrils of the horse.

A horse enjoys a good bed, and it should never be refused him. At night take your fork and make it up tight, and you will feel amply rewarded for the humane treatment you have given your beast.

DAMAGED HAY AS CATTLE FEED.

There is nothing more common among some of our farmers than moldy hay; and many—perhaps the most—of them do not seem to be aware of its bad qualities. It is chiefly caused by putting the hay into the barn before it is sufficiently dry; it then heats in the binn, and moldiness is the result. Blue mold has a musty smell, and cattle do not like it, but will eat it when they can get nothing else. Blue molds—*aspergillus glaucus* and *aspergillus montiferus*—belong to the fungi—a poisonous group of plants which feed upon the most nutritious part of hay, and convert it into unwholesome matter. We have known some careless farmers to feed large quantities of such hay to their cattle during winter, and they actually seemed to grow poorer under the infliction of increased quantities of such provender. Young cattle, especially, are much stunted in their growth by such feed; being more tender than old stagers, it does not seem to assimilate with their system, although they may consume large quantities of it when well salted. One tun of good sweet, well-cured hay is worth three tuns of musty stuff. Many of our farmers lose a number of young cattle every winter, simply from feeding them with musty hay; and they do not appear to be aware of the fact. At the present moment, we have no doubt, there are thousands who have great quantities of musty hay in their barns, and they are feeding it out, unconscious of its vitiated character. We have a little bit of advice to give all of them. Do what you may with such hay; you cannot restore it to a good condition; still, you may partly remove its disagreeable taste to cattle, and thereby render it more palatable to them, and they will thrive better upon it. Steam all such hay (for food) in a kettle, for about an hour, and feed it out with some turnips, boiled oats, potatoes, or—what is better—Indian corn meal. In no case feed such hay exclusively to cattle.

THE SCIENTIFIC AMERICAN AND THE HON. JUDGE MASON.—From a glance at the weekly report of the doings in the Patent Office at Washington, one is astonished at the march of invention and improvement in the useful arts of the present day. The patents issued for various useful improvements in the United States amount to several thousands annually. The country is largely indebted to the SCIENTIFIC AMERICAN, and the Patent Agency of Messrs. Munn & Co., the publishers, for the light and encouragement extended by them to the inventive spirit of the age. As a scientific and mechanical journal the SCIENTIFIC AMERICAN has no equal in any language; and the universal satisfaction given by the proprietors as agents in procuring patents has secured to them a large proportion of the entire business at the Patent Office. Besides their central office in New York, they have one in Washington, near the Patent Office, and they are also largely engaged in procuring patents in all foreign countries. So extensive has their business become, that we are pleased to see it announced that the Hon. Judge Mason, late Commissioner of Patents, has become associated with them in the business. The country could hardly have furnished a gentleman more competent for so important a position. No class of our citizens are reaping more largely the benefits of the inventions of the age than the farmers.

[We copy the above very friendly notice from the *Valley Farmer*, published at St. Louis, Mo. We recognize in it the hand of our old and esteemed friend, H. P. Byram, who is associated in the editorial management of that journal.—Eds.]

A COLUMN OF VARIETIES.

Scott Russell, in his report to the great ship company, says that Portland, in Canada, is open to her..... The cost of running the *Great Eastern* is \$10 per mile, including every expense; and if she could have regularly 2,000 passengers at \$30 a piece between here and England, she would pay a profit, on passengers alone, of \$30,000 a trip..... In China, so carefully is every material for manure husbanded, the barbers save the soap which they have used for shaving with the bits of beard and the hair taken from their customer..... It is said that linseed meal is a good food for hens, causing them to lay, especially in the winter, when it serves as a substitute for worms and other animal food. If mixed with scalded meal or shorts, or with sour milk, the hens will eat it readily..... All ground where melons are planted should be mulched before the vines begin to run. You may use old hay or straw, or even small bushes, if they will lie down flat..... Ten years ago, the average wages of plowmen in Aberdeen, Scotland, were \$80 a year, with board and lodging; now they are \$110..... If the iron manufacture of the United States continues to increase at its present rate, a very few years will suffice to stop all importation..... About the average velocity of the piston in a steam engine is 220 feet per minute; this is 2½ miles an hour..... One pound of the best coal is required to heat 5½ lbs. of water from the freezing point and convert it into steam..... In 1841 it took, on an average, from 11 to 13 lbs. of bituminous coal an hour to a horse-power. Some large engines now run with less than two pounds..... The difference of time between high water averages about 49 minutes each day..... The lightness of bread mixed with snow, in place of water, is produced by the gases which have been absorbed by the snow..... A Boston manufacturer produces annually, from grapes grown on Charles river, 20,000 gallons of wine. Connecticut makes 200,000 gallons of wine, and Ohio 80,000 gallons each year..... Strawberries have been produced at the rate of 160 bushels per acre, worth \$1,300..... There is a pear orchard in Mississippi containing 15,000 trees..... One gentleman at the South sends to the North, annually, from \$7,000 to \$10,000 worth of peaches..... The Bartlett pear is an old French variety—Bon Chrétien (Good Christian)..... The following varieties of apples are recommended by the American Pomological Society for general cultivation:—American Summer Pearmain, Autumn Bough, Baldwin, Benoni, Bullock's Pippin, Carolina June, Danvers Winter Sweet, Early Harvest, Early Strawberry, Fall Pippin, Fameuse, Gravenstein, Hawley, High Top Sweeting, Hubbardston Nonsuch, Jonathan, Lady Apple, Ladies' Sweet, Large Yellow Bough, Melon, Minister, Monmouth Pippin, Porter, Primate, Rambo, Red Astrachan, Rhode Island Greening, Roxbury Russet, Smith's Cider, Summer Rose, Swaar, Vanderveer, Wagner, William's Favorite, Wine Apple, Wine Sap..... A young orchard of 400 pear trees, owned by Mr. Chapin, produced in 1853, eight years from planting, \$450; and in 1854, \$1,000..... Judge Howell, of Canadaigua, has a Vergale pear tree 70 years old, which has not failed of a good crop for 40 years, averaging for the last 20 years 20 bushels a year, sold on the tree for \$60. This tree has produced for the New York market \$3,750 worth of pears..... When the peach crop is destroyed it is generally caused by the extreme cold in winter, about 18° below zero killing the blossom buds. It is easy to ascertain whether the buds are killed, by cutting them transversely through the middle, when, if they are alive they will be found to be green throughout; but if they are dead, a black speck will be seen in the heart..... It is estimated that the value of the tobacco crop in Connecticut averages \$300 per acre each year..... There are in France about 4,000,000 acres of land devoted to the cultivation of the grape, yielding in favorable seasons about \$140,000,000, equal to \$34 per acre..... The charter of the East India Company was signed by Queen Elizabeth on the last day of the 16th century, and this greatest of all commercial companies ceased to exist on Sept. 1, 1858..... The present is the 18th Imperial or 8th Reformed Parliament. The House of Lords consists of 462 members, the House of Commons of 654..... Europe is divided into 55 governments, 5 of which are republics and 5 absolute monarchies..... The salary of the Lord High Chancellor of England is \$50,000 per year. Lord Campbell is the present incumbent of this high office.