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No. 107,
For the Week ending January 19, 1878.

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NATURAL HISTORY COLLECTIONS AS EDUCATORS.

The project of establishing a Zoölogical Garden in Central Park, in this city, on the model of that in Regent's Park, in London, England, is again being brought forward. A number of wealthy citizens have formed a Zoölogical Society and propose to start with a capital of over $100,000. The designated ground is a tract of 20 acres on the west side of the park, just above 96th street and near the new Natural History Building. The society will enclose the site, erect buildings, etc., and charge a small admission fee except on one free day per week.

The collection of living animals already in the park is now very meagre. Lack of funds at the disposal of the authorities have prevented its enlargement or even the erection of suitable edifices for its reception, and in fact, as the President of the Park Commission expresses it, the city keeps "a kind of hotel for menagerie animals," which belong to shows and circuses, and for which care and housing are provided, the owners paying only for food. The condition of these unfortunate brutes has of late been pitiable, and has elicited no small share of the attention of Mr. Bergh and his humane society. The public however continue to manifest great interest in the collection, and to this fact, coupled probably with the recent opening of the new Museum of Natural History, may be ascribed the renewing of the enterprise above noted.

It is perfectly obvious, we think, that collections of natural history specimens, whether the same be of living animals or of fossil remains, are valuable only in an educational regard; and if the same are intended for popular edification, then, unless they are so arranged as to carry the proper scientific instruction to unscientific intellects, they do not fulfill their purposes. This is a simple and very necessary requirement, yet it appears to be systematically neglected, with the result of substituting merely the transitory interest felt in looking at strange objects for the permanent one which might be aroused if their inter-connection and intrinsic peculiarities were more clearly set forth. The Aquarium, for example, in this city, established a year ago, contains a really remarkable collection of marine creatures and it is especially rich in curious connecting links. The visitor may begin with the animated plants, the zoöphytes, trace the development up to the tubellaria and gliding worms, and so on, through the eels and similar types to the true fish. Still advancing, he may find in the green maray perhaps the closest link between the fish and the serpent; in the proteus, the menopome and the axolotl, the links between the gill-breathing and the air-breathing animal; in the seals and sea lions the links between the warm-blooded land creatures and the cold-blooded inhabitants of the sea; in the flying foxes the link between birds and brutes; and thus he may continue tracing the chain of development as demonstrated by Haeckel and other evolutionists. In the kingyo and the other curious Japanese fish he may see the wonderful results of artificial selection carried on through a long number of years; in one fish he will find eyes developed until they look like small telescopes; in another tail and fins converted into films which resemble festoons of lace. This is the merest outline of some important lessons which might be learned by mere inspection if the opportunity were provided say by suitably arranging the collection and posting explanatory placards. Another lesson is taught in an admirable way by the plan on which the famous Berlin Aquarium is constructed. There the visitor descends from story to story, tanks always surrounding him, and the accessories being so arranged as to convey the idea that he is actually going down in the sea depths. In accordance with this plan, the fish are disposed so that in the upper story those creatures always found at or near the surface are met with, while in the lowest, the deep sea fishes and crustaceans are encountered, those dwelling in intermediate regions being between.

To return to the Zoölogical Garden plan, the above will convey a general notion of our idea of what the project should be. That is to say, the animals should be put in enclosures imitating as closely as possible their natural haunts; they should be allowed the utmost freedom of movement compatible with safety; their relative arrangement should be such as to indicate their relationships and descents in the clearest possible manner to the average intellect, and brief information regarding each specimen in simple language should be placed conspicuously upon its enclosure. Collections of fossils, shells, insects, stuffed animals, minerals, or other geological specimens, or herbariums should likewise be exhibited in the full meaning of that term, not merely ticketed with a Latin label and put in a glass case. It will require considerable ability and a full apprehension of what interests the public to carry out the ideas above indicated; but we believe that such naturalists as Professors Agassiz, Bickmore, Marsh, or Morse are fully equal to the task, and the result would be a Natural History Museum creditable alike to its founders and to the metropolis.

PREVENTING COLLISIONS AT SEA.

An invention of some sort is needed whereby a vessel may signal to other ships in her vicinity the course which she is steering, so that collisions may thus be avoided. The means at present used to this end are very inadequate, as is abundantly proved by the frequency with which collisions occur. The conditions to be considered are, first, those under which neither approaching vessel can see the other, as in the case of thick weather by day or night, and second, those always existing after nightfall when a ship's whereabouts is determined by the position of her lights. It will be evident that an invention of the kind needed must combine some sounding apparatus for fogs and some new method of signalling by lights for ordinary night use.

At the present time, sailing ships under way at night carry a green light on the starboard and a red light on the port side. These lanterns are so arranged as to throw their illumination over an arc of 90° to the fore and aft axis of the vessel. Steamers carry in addition a white mast head light. By the relative position of these lights the pilot of an approaching vessel determines which way to steer. If for example he sees a red light only, he knows the other vessel is crossing his bows and moving from right to left, if a green light she is moving in the opposite direction, if both lights are visible she is coming directly bows on. This however is very inaccurate, for the moment the coming vessel steers at a slight angle from direct approach, then one or the other of her side lights immediately becomes invisible. The approaching helmsman, then, has no way of telling at what angle the other vessel is moving, whether she be directly crossing his bow, or at 90° to his own keel, or at a very much smaller angle. In one case the chances of collision would be less than in the other.

During fogs steamers usually blow their whistles at intervals; they also blow one or two sharp blasts on approaching another vessel, according as they mean to go to one hand or the other. A sailing vessel during a fog sounds her bell or blows a fog horn, according as she is on one or the other tack.

It is clear that these very rough means of denoting position leave a great deal to the guess work or judgment of the helmsman, much more indeed than would be the case did a good system of signals exist, by which a vessel, by sound or by lights or by a combination of both, could indicate her course. One signal for each point of the compass would be needed, making 32 in all, and the requirements would be simplicity, clearness, and readiness in changing one signal for another. A really efficient set of such signals would probably be adopted by all maritime nations and would prove very remunerative to the inventor.

CARBON BURNED IN AN ELECTRO-CHEMICAL BATTERY.

It seems probable that when the discovery shall have been made of how to oxidize carbon in the galvanic battery, the cheapest source of electricity will have been attained. The most economical means of producing a current now known is by the magneto electric machine driven by a steam engine, the energy of the coal being converted into electricity with less proportionate waste than under any other circumstances.

M. Jablochkoff, the inventor of the electric candle, has lately been experimenting upon a battery wherein carbon is to be consumed. From the note describing the same, which he contributes to the French Academy of Sciences, he appears chiefly to have renewed the experiments of Crookes, and the results which he reports are, therefore, to be ascribed to the addition of certain metallic salts, which must exercise a potent effect toward increasing the power of his pile. Crookes' battery, in which carbon is oxidized, consists of an iron ladle, which serves both as a containing vessel and as the non-attackable electrode. In this he melts nitrate of potash, and into the liquid thus produced he plunges his carbon. The oxygen in the nitrate with the carbon produces carbonic acid, which unites with the remaining potash, forming carbonate of potash, and by the chemical action a current of electricity, which "affects the galvanometer," is liberated. A better current is obtained by a plate of platinum placed with the carbon in the fused salt.

Jablochkoff's new plan is essentially the same. He rejects the platinum in favor of iron alone, and suspends his carbon in a wire basket in the liquid; but he says by adding different metallic salts he is enabled to vary the power of the battery and the rapidity of expenditure of carbon, and with these salts there is received a galvano-plastic deposit of the metals on the non-attackable electrode.

The electro-motive force of the battery varies between 2 and 3 units, according to the nature of the metallic salts used, and is, therefore, superior to that of the Bunsen or Grenet elements. The Bunsen pile gives at maximum 1·8 units, and the Grenet 2, or under best conditions, 2·1 units. During the working of the battery, there is a large disengagement of carbonic acid and other gases, which M. Jablochkoff proposes to store up and use as motive power.

DRAWING ON THE BLACKBOARD.

The chalk used should be square in section, so that, when desired, a line of uniform width can be obtained, which is difficult, if not impossible, with conical-shaped pieces of chalk. A short wooden chalk or crayon holder with a bunch of wash-leather, chamois skin, or soft cloth, is a good device for keeping the fingers free from chalk, and erasing lines. Blackboard compasses and "straight edges" of different lengths prove useful to those inexpert in drawing circles, curves, and straight lines by the eye, but constant care and practice will, in course of time, enable the delineator to dispense with frequent use of them. They should be used as seldom as possible.

Vertical lines should be drawn from above downwards; the weight of the hand and arm should be allowed to fall naturally. The delineator should stand with his right shoulder opposite the vertical line to be drawn Horizontal lines are made with the greatest facility when a fixed and firm point has been made to the left, and the arm and body are moved with the hand from left to right, thus steadying

the hand and keeping its position relative to the body the same. In drawing curved lines, it is well to make a few dots in the path the curve has to traverse; not more than four or six for any curve, but enough to guide the eye and give confidence to the hand. Passing the chalk point over the place where the intended curve is to be, without marking, is also useful, as it accustoms the hand and arm to the motion and change of joint required by the curve. Rapid drawing will not be acquired at once; speed will increase with practice. Left curves should be drawn first; and when drawing the balancing forms on the right hand, the eye should take in not only the curve in process of formation, but that already made, and to which it is symmetrical. The delineator will find it is better to draw with the whole arm extended from the shoulder joint than from the elbow or wrist, the face not being nearer the board than a distance of two feet in a perpendicular line to its surface. Supposing the shoulder joint to be a center and the extended arm a radial one, circles can be drawn rapidly and with astonishing accuracy.

The diagram should not extend much above the delineator's head, for above the head the hand will lose its power; nor below the elbow when the arm hangs at the side, for to draw then brings the head close to the board, and prevents a clear view. If it be necessary that lines be made both above and below these points, the position of the body and head must be raised or lowered, so as to avoid stooping or straining, which prevents good work.

Drawing on the backboard without the aid of compasses or rule may be considered as the most perfect illustration of the expression "free-hand drawing;" and to acquire the art, the hand and arm should be quite free and supple in their motion, otherwise graceful curves and fine lines cannot be made.

Students should commence delineation on the blackboard by first drawing vertical, horizontal, and oblique lines, following this up with the shading of cylindrical, conical, and cubical forms, by means of lines of different widths at different distances. Colored chalks may be used when experience has been gained; and by the use of these, pleasing effects are obtained, delineations are made intelligible, and the subject more easily remembered. The relative position of the body to the blackboard and the manner of using arm and hand, as given above, should receive special attention and practice at the outset.

COAL DUST FUEL.

We are in receipt of several queries as to the best method of using coal dust as fuel under steam boilers. To these inquirers the following data, kindly sent us by Mr. C. J. Sanborn, of Quincy, Mass., will doubtless prove of interest. Mr. Sanborn states that he avoids dust by slightly dampening the screenings, and he regards plenty of boiler room as a prime necessity. His boiler is 4 feet in diameter by 14 feet in length, with 50 three inch tubes, 20 square feet of grate surface, and artificial draft produced by a blower. The engine is 14 by 36, cutting off at ⅓ stroke, piston speed 280 feet per minute. Power is supplied to six granite polishing machines, two large polishing lathes, large grindstone, pump and blower. Consumption of coal dust 1,000 pounds per day of 10 hours, with, say, 300 pounds of Cumberland coal. Cost of dust $2.50 per ton. The grate surface is composed of flat plates running the length of the furnace, with about 80 one half inch holes to the square foot. It should be added that in this case the feed water is delivered to the boiler nearly cold on account of the small size of the heater, and it is also charged with salts and lime, rendering frequent blowing-off necessary.

GOVERNMENT SCIENTIFIC WORK.

THE geological and geographical work conducted under the auspices of the United States Government during last year is divided by the Secretary of the Interior, in his late report, into two divisions. The first is that under the direction of Professor F. V. Hayden, and the second that commanded by Major Powell. The area surveyed by Prof. Hayden's parties begins at the northern line of the belt of country already explored and mapped in detail by the survey of the 40th parallel, and extends westward from the longitude of Fort Steele, Wyoming Territory, to that of Ogden, Utah, and northward to the Yellowstone National Park. The primary triangulation party established 26 main stations and surveyed 25,000 square miles, and the topographical and geological parties surveyed 28,000 square miles, and erected monuments at all the important geodetic stations. The regions suitable for arable, pastoral, or mining purposes have been carefully examined and classified, the volume of water in streams adapted to irrigation purposes has been measured, and studies made into the best methods for reclaiming barren lands. Special investigation of the doubtful points in the geological structure of the Rocky Mountain region has shown that, while certain of the groups of strata possess each certain peculiar characteristics, and are recognizable with satisfactory distinctness as general divisions, they really constitute a continuous series of strata, with no well-defined planes of demarkation, stratigraphical or paleontological. Another interesting result of the surveys is the probable determination of the ancient outlet of the great lake that filled the Salt Lake Basin. It is thought that the waters flowed northward, by way of Marsh Creek, into the Portneuf, thence into the Snake River, and thence into the Columbia River. The source of Marsh Creek is in the lowest pass between the drainage of the Great Basin and that of Snake River. The publications of the survey have been exceedingly voluminous.

Major Powell's party has worked within the Territory of Utah, surveying volcanic plateaux, classifying lands, examining large areas of pine timber, and locating important and valuable coal fields. It is stated that the area of the territory that can be redeemed by irrigation through the utilization of all the streams, but without the construction of reservoirs, is about 1,250,000 acres. The ethnological work of Major Powell's party has been very extensive.

A commission composed of Professors C. V. Riley, Cyrus Thomas, and A. S. Packard have been engaged in the study of the Rocky Mountain locust. Professor Riley's determinations relative to this insect we have already placed before our readers. The work of this commission has been of great value, as it has laid the way for future investigations which will result in the probable abatement of the evil.

With regard to the Yellowstone Park, Secretary Schurz states that nothing has been done, and he recommends appropriations for the laying out of roads and support of other measures calculated to render the natural wonders of the region attractive and accessible.

Microscopic Masons.

The *Melicerta ringens* is a microscopic organism which possesses a building apparatus, by the aid of which it manufactures infinitesimal pellets, specific in shape and in situation, and in altitude when placed in position. The gathering members resemble a series of cog wheels which, by rotating rapidly in different directions, produce a stream, which passes by a special organ which selects from its current those particles suitable either for eating or building purposes, by dividing the main stream into four smaller ones. One stream glances off a kind of cushion and is deflected as food to the eating apparatus, another carries off the waste, and the third and fourth go to the pellet or brick making organ.

This last is of cup shape, and moulds the pellet in the form of a Minié bullet, mixing it with glutinous material and rolling it just as a boy makes a snowball. It then passes to another wonderfully delicate little member, which converts the ball into a cylinder, and the brick which is to take its place in the wall is made. In an inconceivably short space of time the particle is grasped, turned, and fixed in position in the row of other pellets which are laid with wonderful neatness and regularity.

While the *melicerta ringens* is a brick maker and brick layer, the *Limnias annulatus* is a plasterer. Mr. F. A. Bedwell, in the *Monthly Microscopical Journal*, says that it secretes fluids and rough particles, and with these it rough-casts its tube on the outside and then stuccoes it smoothly on the the inside, and finally smooths down the exterior surface exactly as a bricklayer smooths his stucco with his flat trowel.

The Centripetal Railway System.

The New York Board of Trade and Transportation has issued a pamphlet describing the Centripetal Railway system devised by Mr. Albert G. Buzby. This consists essentially of a substantial permanent way, composed of a center or bearing rail and two outer or steadying rails, combined with distance or brace pieces so as to form one continuous structure. The cars and locomotives have double-flanged bearing wheels adapted to the center rail, and side steadying wheels without flanges adapted to the outer rails. Each set of wheels has a separate and independent axle, and all are arranged so as to have a swinging and lateral as well as perpendicular motion, each independent of the other. It is claimed that the load is mainly carried on the center rail, and that there is no grinding action in passing over curves. The center rail may have a face of any width, and thus the adhesion of the locomotive wheels is materially augmented, admitting of the use of heavy gradients. Curves of fifty feet radius are claimed to be possible under the system, and the inventor suggests its adaptation for elevated rapid transit roads, the arrangement proposed being three iron I beams, combined with longitudinal timbers and brace pieces.

What's in a Name?

Trials of the Bell telephone were recently conducted before the Emperor of Germany at the palace in Berlin. His Majesty manifested the liveliest interest in the invention, and deigned to inquire its name, whereupon a high Post Office functionary coined the title, "Fernsprecher," which means "Far talker," and which the Emperor at once approved, so that it is now a part of the German language. The acquisition of an Imperial godfather for his device may perhaps console Professor Bell for this remarkable change in the baptismal title of his offspring, although he will probably agree with us in failing to see the improvement. Still, when he remembers that the name emanates from the nation which inflicts suffering chemistry with "anisdibenzhydroxylamene" and a host of like jaw wrenchers, he may be grateful that the infant telephone is not smothered under the usual Teutonic avalanche of syllables.

Habits of Moths.

A correspondent of *Nature* describes some interesting experiments upon moths to test their sense of smell and hearing. Certain moths when captured feign death. While they are thus motionless, if a sharp sound be made such as is produced by striking a piece of glass, they will be suddenly roused and will attempt to fly. On the other hand, a strong solution of ammonia, uncorked close to moths, has no effect in driving them away; they do not seem to smell it and only move away from the fumes slowly when oppressed by them. The latter experiment must occasion surprise, because it was believed that moths possessed an unusually effective sense of smell, since the males of certain species will come from great distances to visit a female kept in captivity, and it has been hitherto supposed that they were guided in their quest by the olfactory sense.

Endemic Tetanus in Long Island.

In the eastern portion of Long Island there has existed for many years an endemic tetanus of both the spontaneous and traumatic varieties. Cases of the disease are known to have occurred in one in about every 200 wounds, or about 150 times as frequently as it happens in New York city. Again, it seems to be confined to a particular county, the southern and central parts of which are exposed to ocean air, salt air from bays, and to the mingling of fresh and salt water. The disease is also most fatal in the months of July, August, and September.

Dr. George M. Beard has recently investigated the phenomena of the malady, and he comes to the conclusion that it is in no wise owing to the large amount of decaying fish about the vicinity, but is due to the dampness of the ocean air, combined with the local dampness of the soil. He holds the pathology of the disease to be in general a cold in the spinal cord, which has been made irritable by irritation propagated from some form of peripheral injury. The remedies recommended are Calabar bean and application of ice to the spine.

A 502 Dollar Rooster.

That famous $50,000 cow which was so much talked about in this country a few years ago, has found a rival in point of proportionate pecuniary worth in a $502 chicken. The *English Agricultural Gazette* says that a game cock was recently sold for the above excessive price, and suggests that in the future the raising of such chickens would prove a very lucrative source of income. The same journal, we notice, says that over $13,000,000 worth of eggs were imported into England in 1876, and yet the supply was short of the demand. Here is an opening for poultrymen, and a wider field for inventors of egg-preserving processes and egg-carrying devices.

The Telephone and the Telegraph.

We have received several letters from correspondents narrating instances of the telephone's reporting messages from neighboring telegraph wires. In answer to numerous queries as to the cause of this, we would say that it is occasioned by the inductive effect of the electric currents on wires near and parallel with the main line with which the telephone is connected. The use of two wires for the telephone (parallel and near together) would be very apt to neutralize this effect of other wires, by causing it to act in opposite directions, through the spool wire in the telephone, which would of course have its two terminal wires connected direct with the two line wires and be independent of any earth connection.

TO OUR SUBSCRIBERS.

In accordance with our usual custom, at the beginning of this new year we turned over a new leaf in our subscription book, placing thereon only the names of those whose subscriptions have been renewed, or that have not expired.

All whose papers have ceased to come may know that their subscriptions have expired; and we hope they will be prompt in sending the money, $3.20, for renewal for one year, or $1.60 for six months. We will supply the back numbers, commencing with the year.

Remarkable Marksmanship.

Captain Bogardus, a well known marksman, recently accomplished in this city the remarkable feat of breaking 5,000 glass balls inside of as many consecutive minutes, the missiles being shot from a double barreled gun. The balls were thrown up from spring traps and were shattered in the air. The feat was accomplished with a margin of 19 minutes and 25 seconds to spare. It is stated that the weapon, weighing 10 pounds, was lifted and aimed 5,300 times, which work is equivalent to 318 foot pounds per minute, accomplished by the arms alone and continued for over 8 hours. This must be added to the brain work involved in aiming the gun, in order to perceive the nature of the remarkable skill and endurance of the marksman.

A Great Oil Pipe Line.

A new oil pipe, known as the seaboard pipe line, is soon to be laid from Butler county, Pa., to Baltimore, a distance of 230 miles. The transporting capacity will be 6,000 barrels of oil per day, and the flow will be incessant. It is expected to bring into Baltimore annually about two million barrels of crude oil, about equal to the quantity now carried there by two railroads.

THE Boston *Journal* says that the shipbuilding tonnage of Maine for 1877 has reached 76,308 tons, showing an increase over that of 1876 of 2,734, and over that of 1875 of 1,247 tons.