A B C OF THE SWEDISH SYSTEM OF EDUCATIONAL GYMNASTICS. By Hartvig Nissen. Philadelphia and London: F. A. Davis. 1891. Pp. vii, 107. Illustrated. Price 75 cents.

This manual opens with a short treatise in question and answer form, upon the end and objects of this simple system of calisthenics. The meanings of the different words of command are included also. Then come five days' order of work, designed to be so repeated as to cover a course of thirty-three weeks. Numerous illustrations of the positions are given. The work is intended for school use, but it is obvious that there is room in the household for such work.

ANNUAL REPORT OF THE NEW YORK FOREST COMMISSION FOR THE YEAR ENDING DEC. 31, 1890. Albany. 1891. Pp. 324.

To those interested in forestry and the preservation of our woods, and notably of the Adirondack forest, this report will be very welcome. It contains, besides the interesting general report of the commission, notes of court decisions and a catalogue of land papers in general, referring to forest preserves of the State of New York.

TABLES FOR THE DETERMINATION OF MINERALS BY PHYSICAL PROPERTIES, ASCERTAINABLE WITH THE AID OF A FEW FIELD INSTRUMENTS. By Persifor Frazer. Philadelphia: J. B. Lippincott Co. Pp. ix, 115. Price $2.

These tables are based upon Prof. Dr. Abin Weisbach's system of determinative mineralogy. The minerals are classified into three groups: I. Those with metallic luster, II. those with submetallic and non-metallic luster, but colored streak, and III. those with non-metallic luster and white or lightgraystreak. These are next subdivided by color of mineral, color of streak, and hardness, and the final distinctions are based, in addition to the above, on hardness, tenacity, crystalline system, etc. The general blowpipe and acid tests of each mineral are given in concise form. The work will be of use and interest to many students of this fascinating science.

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Notes & Queries

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Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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Minerals sent for examination should be distinctly marked or labeled.

(3940) M. R. C. asks: Will any article that will float placed in a running stream travel any faster than the water it is placed in, provided there is nothing to impede the travel of either? A. The water does not move with the same velocity in all parts of its section, in a running stream, the central portion always running the fastest. This produces a whirling or rolling motion, caused by friction on the bottom and sides, that extends to the surface and center. This inequality of motion may accelerate or retard any particles of matter floating upon the surface, according to their location from the center of the stream, but will generally have a less velocity than the mean velocity of the stream, although apparently moving faster than the water nearer the sides. If the article sets deep in the water, it will move faster than the surface water, being pushed ahead by the greater velocity of the water beneath.

(3941) F. C. F. asks: What form of boiler is best adapted with ordinary firing to burn (pine) cord wood, boiler 35 horse power? Is electricity considered more economical as a power conveyor than other methods where the bulk of power will be used not further than 500 feet from stations? What is next in economy? A. A flue boiler or one with very large tubes is best for wood fire. From a power plant already in operation a wire rope cable is the cheapest method of transmission for 500 feet. Electric transmission is the cheapest for long distance, and is also cheapest where a plant is to be located for transmission only, and is so used to a considerable extent for the utilization of water power otherwise not available.

(3942) J. D. asks: 1. In building a dynamo or motor, is it necessary to have the iron disks of the armature insulated from the shaft if they are insulated from each other? A. They should be insulated from the shaft. 2. Are not some dynamo armature cores made by running the disks on a thread on the shaft? A. We think not.

(3943) W. S. writes: I have a resistance column similar to the one described in SCIENTIFIC AMERICAN of September 14, 1889. I now want to make a galvanometer like the one described in SCIENTIFIC AMERICAN of September 21, 1889. Now I wish to know if I could wind it with two coils, one of no resistance and one of ten ohms, and use the resistance column with it if more resistance be required. A. Galvanometers are frequently made and used in the way mentioned.

(3944) Ring Temper says: Can you tell of any method to test the heat of lead used for tempering small steel rings? The best way to heat the lead kettle so as to get uniform heat, said kettle about 14 inches diameter and 16 inches deep? A good practical treatise on case-hardening and tempering? (I already have Brandt's.) A. A pyrometer may be used, but, for the temperature required for hardening, it is less reliable than the eye. For best work with the eye, the furnace should be placed in a moderately dark place, or so shaded that the eye can judge with uniformity of the degree of heat required. The lead pot should be set in brick work in a recess so as to exclude any light from the furnace coming to the eyes. Furnace should be large enough to insure a uniformity of heat without frequent disturbance of the fire by redressing. Have no special work on lead bath.

(3945) J. H. J. asks: How is phosphoric acid H_3PO_4 made? How is sulphurous anhydride SO_2 in a liquid state best prepared? If crystallized boracic acid H_3BO_3 be heated, boracic anhydride B_2O_3 will be obtained. What is the reaction? Can you tell me how blackboard crayons for school use are prepared? A. Phosphoric acid is prepared by burning phosphorus in a current of air, dissolving the phosphoric oxide in water and evaporating to dryness. Liquid sulphurous oxide is made by pumping the perfectly dry gas into a receiver. It liquefies also at 0° F., at the atmospheric pressure. The reaction you ask for is this: $2\ (H_3BO_3) = B_2O_3 + 3\ H_2O$. For blackboard slating use 1 gallon alcohol (95 per cent), 1 pound shellac, 8 ounces ivory black, 5 ounces flour emery, 4 ounces ultramarine blue. Make perfect solution of the alcohol and shellac before adding the other articles. Shake thoroughly. Apply rapidly. Three coats.

(3946) L. O. W. asks: What is the kallitype developer, its composition? I have a receipt for the production of the kallitype process of photography, but it is, however (to my mental conception), very obscure. The developer given is such: No. 1 arg. nitr.—Natrium. cit.—Potassa bichrom., water ammo.

No. 2. Kallitype developer	℥ ss
Natrium. cit	ʒ jj
Water	℥ xx

The printed paper is to be developed in solution No. 1. What, then, is No. 2 for? Then again a third solution is applied, *i. e.*:

Sodæ citr	ʒ j
Aqua ammon	ʒ jj
Water	♁ jj

A. No. 1 is the silver developing solution, No. 2 is a clearing solution, to dissolve out the iron salts unacted upon by light. No. 3 is used also as a clearing solution to dissolve out the unacted upon silver salts. The process has been modified by combining in the sensitizing solution the silver salt and developing the image with a solution of borax and water. See particulars in SCIENTIFIC AMERICAN SUPPLEMENT, No. 615, page 13022.

(3947) J. C. A. asks whether more coal will be required to heat a greenhouse 245 feet long, by steam, with the boiler at one end than if it is at the center of house. A. There should be no difference as to the gross amount of heat imparted to the greenhouse, but it might make a great difference in the uniformity of distribution of the heat. The position of the greenhouse in regard to the direction of the cold winds, in a house as long as stated, will make a great difference in reference to the position of the boiler, which, for best effect, should be placed at the end most exposed to cold winds. Otherwise a central position on the northerly side is the best practice.

(3948) D. D. D. asks: Is bituminous coal or anthracite penetrable by air under heavy pressure? If so, under what pressure? Will air under pressure escape through where hydrogen gas will? What rocks and minerals are airproof under very heavy pressure, say one to two thousand pounds to the square inch, and what natural or chemical preparations or compounds, such as paints and varnishes, are impervious to air under very heavy pressure? A. There are very few rocks or minerals that if solid, are not practically impervious. The solid coal beds hold gas and water. The sandstone and limestones pass air and water under various pressures. Even cast iron is not gas proof under 2,000 pounds pressure per square inch. Rubber and varnishes will go far to render the surface of porous stone impervious to air, gases and water, but will finally flow into the stone and become porous under great pressure.

(3949) J. R. S. asks: What is the best material to use in repairing fire boxes of locomotive boilers, copper or steel plate, where the fire box is made of steel? Please tell me which is the best to use and your reasons, also what is the idea in putting copper liners under the tubes in the fire box. Would they not do as well without copper liners? A. Always use the same material that the boiler is made from for patches. Soft steel plate is the best. The difference in expansion and contraction by change of temperature will make copper patches leaky. Copper ferules or liners are but little used. They were supposed to make a more perfect joint and preserve the end of the tube from burning out by their better conductivity of heat from the end of the tube to the water inside.

(3950) W. C. G. writes: 1. I am trying to coat corks to make them acid proof. What can I use in liquid form that will penetrate enough and will not be removed when putting in the bottle. Must not be injurious or poisonous. A. Heat the corks in melted paraffin wax. The only objection to this process is that it makes them slippery, and if the neck of the bottle is not cylindrical, they will sometimes rise and fall out. 2. Also how can I make a cheap hard grease-proof article resembling marble, or earthenware, not requiring heat, to mould in forms? Must be a cheap composition and have a smooth surface. A. Hydraulic cement and water, plaster of Paris and water, or a mixture of oxide of zinc and strong solution of zinc chloride might answer your purpose.

(3951) E. T. S. asks how to clean wall paper. I have a large hall that I wish to clean. The hall is 100 by 50 feet. The paper is in good shape, only soiled by dust. A. There is no better way of cleaning papered walls than to wipe them down with soft cotton cloths, better by hand, but can be done with a long handled brush to remove the loose dust and then go over with a cloth tied over the brush. For stains use fresh bread crumbs.

(3952) J. B. M. asks: Can you give any information respecting the manufacture of aerated bread? I believe it is a patent process, if so, could you give the address of the patentee? A. Aerated bread was made by a patented process, but the patent has expired. It consisted in charging the dough with carbonic acid gas under pressure and then baking. The use of yeast or ferment was thus avoided.

(3953) C. W. C. says: I have heard it argued considerably whether ice freezes from the top or bottom. Which is correct? Also where can I get a chemical motor with sufficient power to run a sewing machine, or better two of them. A. Ice commences to form on the surface always in still water. Anchor ice is sometimes formed on the rough bottom in swift running water, in very cold weather. We have no information of the manufacture or sale of chemical motors.

(3954) G. E. S. says: We have more or less cold water pipes (iron) throughout the mill, used for hydraulic pulp machines, we are annoyed by the sweat and drip from these pipes. What can they be coated with on the outside to keep them from sweating and dripping? A. The sweating and dripping from the pipes is caused by the contact of the moist warm air in mill with the cold pipe. The only remedy is protection by a non-conducting substance, and may be any of the felting material in use. Hair felt 1 inch thick, covered with thick paper, is very effective; or if thought cheaper, box the pipes and fill with sawdust. Make the boxes to have not less than 1 inch clearance on inside between box and pipe.

(3955) F. S. B. asks how the valve or link motion of the English locomotives is operated. They do not have any reversing lever, and how is it locomotive-makers in this country do not adopt the same systems? A. The English locomotives have the regular link valve gear, with various modifications and reversing lever. The Stephenson valve gear is much used in England and the United States. Our locomotive builders do not go backward. The best valve gears are found on American locomotives.

(3956) G.—The duty on lenses is 45 per cent of their invoiced value. Goods are sold cheaper in England, because the expense of labor is less. A lens may be imported as a tool of trade by a photographer, he carrying it with him, without paying duty.

(3957) J. A. H. writes: On page 386 of December 19 number of SCIENTIFIC AMERICAN there is an article headed "Intense Cold." What is the meaning of absolute zero? A. Absolute zero is the point at which the kinetic motion of the molecules of matter, to which is due what is ordinarily termed heat, ceases, and when the molecules come into permanent contact with each other. It is placed at −273° C. or −459° F.

(3958) T. V. M. asks: 1. Could a submarine torpedo boat (100×20, cigar shape) be run 42 hours by an electric storage battery, there being fluid to fill the cells on board the ship? A. The boat could be run 42 hours with a sufficient number of cells. Extra fluid would not be required, as there is no sensible waste of the fluid. 2. What is the greatest speed and the longest time of an electric storage battery running a boat, and also what is the expense? A. We have no record of the longest time and greatest speed. The possible time would depend on the carrying capacity of the boat, while the speed would be subject to the same limitations as those of steam-propelled boats. The expense depends on the method of using the power, the cost of running the prime motor, and other conditions.

(3959) S. W. T. says: I have a steam gauge that comes back to the pin when steam is down, and when it is exposed to frost and a fire is started, the hand will gradually rise, sometimes to 20 lb., sometimes to 60 lb. Then in a few minutes after the frost is all gone the hand will come back to the pin, and start up all right when steam is up. Please give me a good arithmetical rule by which I can determine the distance apart for screwed stay bolts, and the diameter of stay bolts. A. The pipe connections to a steam gauge should never be allowed to freeze or have water in them when exposed to frost. When water is frozen in the connecting pipe, the gauge hand will move by the expansion of the air above or next to the diaphragm by the change of temperature in the boiler room before steam is made, and when the ice melts in the pipe the hand will move back as described. Sometimes when the water has accumulated to too great an amount, the gauge diaphragm or spring (if a Bourdon) will burst. An air cock should always be placed so as to draw off all water from the gauge when liable to freeze. The usual practice for water leg stay bolts is, for distance, 6 in. to 5 in., according to the pressure and thickness of the iron. For the size of the bolt, square of the distance multiplied by the pressure, and product divided by 4,000 equals the area of the bolt, and for a given sized bolt $\sqrt{\frac{4{,}000 \text{ by area}}{\text{pressure}}}$ = distance apart center to center.

(3960) E. S. writes: 1. I wish to wind the dynamo described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 600, as a shunt machine. What size and how much should be used on F. M. to give the proper resistance? A. Consult the description of the Edison dynamo in SCIENTIFIC AMERICAN, vol. lxv., page 66, for points on shunt-wound machines. The field magnet should have 14 times the resistance of the armature. 2. Is not the core of iron wire more efficient than the one of iron washers? A. There is little or no difference. 3. To settle an argument, the meaning of the term ampere hour? A. A current of 1 ampere for 1 hour; ½ ampere