Correspondence.

How to Restore a Dry Cell.

To the Editor of the Scientific American:

I advise J. H. M., in query 5605, to restore his Dr. Gassner dry cell by the passage of the current of two Bunsen cells (in tension) for about an hour, in a direction contrary to that in which the dry cell yields, *i. e.*, connecting the zinc and carbon poles of the Bunsen cells with the zinc and carbon poles of the dry cell. In this case the dry cell acts like a secondary battery. This method saves the trouble of opening the cell, and, moreover, it regains more or less its original activity.

F. HAUSHAHN.

Propaganda, Rome, Italy.

Drawing in General Education.

D. R. AUGSBURG, SALT LAKE CITY, UTAH.

Language and number have heretofore been the beginning and end of education in the common schools.

Language is here taken as the general name for reading, spelling, and grammar, and number for mathematics. These two studies have been pursued with a persistence which has led to the popular belief that they were all in all, and that nothing more was needed to lay the foundation of a well rounded and complete educational training.

But modern education has kept pace with modern thought and ideas, until to-day training along these two lines alone is found to be insufficient; that with these two for a foundation the superstructure is one-sided and incomplete; that if the end sought is a harmonious and well rounded education, the foundation must be made broader and stronger.

Modern education recognizes three grand divisions of educational training: body training, mind training, and soul training. The harmonious development of these three is the sum total of education. Of these, mind training receives the most attention in the common schools. Four studies are at the basis of mind training. They are *number*, *language*, *drawing*, and *music*.

Drawing here is taken in the widest sense as representing the elements of both form and color. It is the mental process by which ideas are represented both pictorially and in solid form.

Of these four studies, drawing alone seems to be viewed by the masses with suspicion. Because it was not taught in their day, and they do not feel the need of it, they pronounce against it. By the same argument, the successful business man who has had no schooling in his early days pronounces all scholastic study humbug. It may be said of any department of knewledge, that one does not understand its importance until he enters into its domain himself, or sees another put it to practical use in the affairs of life. So those who have not learned drawing do not, in their own experience, know what they have lost.

But if number, language, drawing, and music are the fundamental studies, then all others are but branches, and these four studies are the elements of which they are composed. This is even so, for without a knowledge of these studies, it would be difficult to acquire a knowledge of other branches. For example, the elements that enter into the study of geography are number, language, and drawing. In other words, in order to understand geography one must have a knowledge of mathematics, language, and form, because these are the elements on which it is based.

In the same manner number, language, and drawing are the foundational aids in acquiring such branches as physiology, physics, geology, etc. The trades are almost entirely based on these three studies.

In proportion to the knowledge of and ability to use these four elements, the branches become easy and the time for their mastery is shortened.

Drawing is largely the basis of the trades. The stone cutter cuts a capital out of marble with chisels, the draughtsman draws it on paper with pencil; the manual process differs, but the mental process is the same. The blacksmith draws a horseshoe with a hammer, the draughtsman draws it with a pencil; the manual process differs, but the cerebral activity is the same. In like manner the painter draws with a brush, a carver with chisels, a tailor with shears, a mason with trowel, and the carpenter with various tools. The lathe is a machine for drawing different forms in iron and wood, the band saw for sawing out designs, the loom for drawing fabrics of all sorts. With all these machines, if a pattern is not used, the operator is the artist, and designs his own work. If a pattern is used, the one that designed it is the artist, and the operator is but a part of the machine. He is an artisan.

If a blacksmith can draw beautiful designs on paper, he can hammer them out of iron. If the draughtsman can draw a horseshoe on paper, he can hammer it out of iron as soon as he has overcome the technical difficulties. If a person can draw a design on paper, he can construct that design in any trade or department as soon as he has overcome the mechanical difficulties of that department.

Outside of the mechanical arts, drawing is the basis of a large number of branches. It is the basis of *the decorative arts*—frescoing, tapestry, embroidery, and lettering; *the plastic arts*—carving, moulding, modeling, and sculpture; *the reproductive arts*—etching, engraving, lithographing, printing, photography; *the productive arts*, which include original work in any department.

Drawing shortens the school course.—By cultivating the perceptive powers, the time is shortened in acquiring those branches that wholly or in part depend on observation. Trained perceptives add wonderfully to the powers of the imagination. A cultivated imagination enables the pupil to see a river in a rill, a mountain in a hillock of sand, or a lake in a pool of water; will enable him to journey with you in imagination across the trackless ocean, through the jungles and forests, up the rivers, over the plains, and across the mountains; will enable him to see forms beyond the range of vision, and compass magnitudes too vast for measurements. Imagination is the creating faculty.

Drawing is one of the surest means of acquiring knowledge.—To draw an object requires intelligence and close observation; to reproduce that object, a cultivated memory; to reproduce a modified form of that object, a trained imagination; and lastly, to represent an idea from that object requires knowledge, memory and imagination. For example, it requires close observation to draw a cat; an acute memory to recall the image, and reproduce it on the blackboard; a trained imagination to be able to represent the cat climbing a tree; and lastly a combination of these three to associate cats together, making a harmonious composition.

Drawing cultivates the hand and lays the foundation of technical education.—It is a study that seldom, if ever, becomes involuntary, like writing, but is always under the direct supervision of the mind. To draw even the most simple object requires the concentration of the mind in directing the hand for its reproduction. This constant working of the mind and hand in harmony with each other leads to great precision and accuracy in the use of the hand. The precision and accuracy may be utilized in any department of work.

Drawing is the basis of accurate observation.—To reproduce an object requires the closest scrutiny of that object, not only of the details, but of the whole form taken as a unit; not only the shape of the tree, but the character of its branching and foliage as well. Not only the form and color of a flower, but the number and arrangement of its petals, stamens, and pistil. A trained observation will see that a cat is similar to a tiger, a dog to a wolf, and a rat to a beaver; will see the similarity of an island to a lake, a strait to an isthmus, and a cape to a bay. Observation gives ideas.

Drawing is a study peculiarly adapted to children.—Children love drawing. The perceptive powers are the most active in childhood. Mental activity begins in the senses. A little child lives in his senses. He delights to see, hear and feel. His eyes are sharp, his ears acute, and his fingers are busy. He learns best by seeing and doing. Drawing is seeing and doing.

To the teacher drawing is a great help, not only in awakening interest, but in lessening her labor and making school more attractive. There is no limit to the resources which this subject places at her command. She can bring into the school room a lake, a mountain, or a river; all kinds of animals, birds, and reptiles; all kinds of trees, shrubs, and plants, fruits and flowers. She can show how the Eskimo lives in the frozen regions of the North, and the savage among the tropical forests of the South. She can bring into the school room the Pyramids of Egypt or a Chinese pagoda. She can use drawing in object lessons and for busy work. It can be used in the reading, number, and language classes; in the geography, history, and physiology classes; and as the handmaid of the sciences. She can illustrate what she sees, thinks, and imagines. She thus opens a new field, a new world, and makes life wider and broader and deeper.—*Education.*

What Our Contemporaries Think of It.

THE SCIENTIFIC AMERICAN is—by all odds—the most interesting of all the many publications which come to our office. It claims the largest circulation of any scientific paper in the world, and we don't doubt it. It is finely illustrated and its articles are so written that even a child can follow them understandingly. It is a great educator. Its publishers, Munn & Co., New York City, are patent solicitors, and are ranked among the best. Every patent taken out by them receives a free notice in the SCIENTIFIC AMERICAN.—This gives the article a good "send off."—*Varnish, Philadelphia.*

THE SCIENTIFIC AMERICAN.—We note with pleasure the addition of the SCIENTIFC AMERICAN to our exchange list. This paper has stood for the last forty years at the head of its class of publications—it has no superior. As a scientific and mechanical journal it cannot be excelled. The patent agency of Munn & Co., connected with it, is one of the few strictly reliable agencies in the United States. Those of our readers who desire to obtain a patent, and wish to have their interests well attended to, cannot do better than to address Munn & Co., New York, for their pamphlet containing full information about patents, caveats, etc.—*The Texas Courier-Record, Dallas, Texas.*

THE MOST POPULAR SCIENTIFIC PAPER.—The SCIENTIFIC AMERICAN, of New York, an unrivaled periodical now in its forty-ninth year, continues to maintain its high reputation for excellence, and enjoys the largest circulation ever attained by any scientific publication. Every number contains sixteen large pages, beautifully printed, elegantly illustrated. It presents in popular style a descriptive record of the most novel, interesting, and important advances in all the principal departments of science and the useful arts, embracing biology, geology, mineralogy, natural history, geography, archæology, astronomy, chemistry, electricity, light, heat, mechanical engineering, steam and railway engineering, mining, ship building, marine engineering, photography, technology, manufacturing industries, sanitary engineering, agriculture, horticulture, domestic economy, biography, medicine, etc. A vast amount of fresh and valuable information pertaining to these and allied subjects is given, the whole profusely illustrated with engravings. The most important engineering works, mechanisms, and manufactures, at home and abroad, are represented and described in this instructive periodical. The publishers of this journal, Munn & Company, are the well known patent attorneys, and those desiring to procure information pertaining to the securing of patents should not hesitate to consult them, as they have had nearly fifty years' experience at this business and are capable of obtaining patents quickly.—*Army and Navy Register, Washington.*

To Measure a Room for Wall Paper.

To determine the number of rolls of paper to cover the walls of a room, measure the circumference, from which deduct the widths of doors and windows and divide the remainder by 3.

Example.—Let us suppose a room 12 × 16 feet, which has two doors and two windows, which average 4 feet wide:

$12 \times 12 \times 16 \times 16 = 56$, circumference.
$4 \times 4 = 16$, doors and windows.

56
16
3)40
13⅓, or say 14 rolls.

This rule is calculated for a room of not less than 10 or more than 12 feet in height. For a room under 10 feet high, having a frieze, say of 6 inches, we will proceed as before with the measurement of the room, deducting the widths of doors and windows. But in this case multiply the remainder by 2 and divide by 15; for this reason, that we can cut 5 lengths out of a double roll, which, placed side by side on the wall, cover a space 7 feet 6 inches from the ceiling, and instead of multiplying by 7 feet 6 inches, we multiply both by 2.

Example.—Take a room 14 × 14, with two doors and windows:

Circumference of room	56
Less for doors and windows	12
	44
	2
15)	88
	5⅔

Say 6 double rolls, or 12 pieces. Of course if a dado is required its width will determine how much paper will have to be deducted.—*The Carpet and Upholstery Trade Review.*

Duroline.

Duroline is a translucent, waterproof, pliable material, recommended and used as a substitute for glass for roofing large buildings, etc. It has for its basis a web of fine iron wire with warp and weft threads, and is covered with a thick translucent varnish. It is easily bent, can be cut with strong scissors, and is said to be weather and heat proof. Samples of it were sent to Kew in October last by the manufacturers, inviting "attention to the special applicability of our patent unbreakable glazing material duroline for the glazing of Wardian cases, in which plants are sent and received from abroad. We believe much damage and annoyance results from the breakage of glass in these cases."

Six Wardian cases were, therefore, "glazed" with this material, and were dispatched filled with plants to Ceylon, Australia, Jamaica and Lagos during the summer. In every case they were favorably reported upon, and some of them have been returned to Kew filled with plants which reached us in good condition. The only drawback we have found in duroline as a substitute for glass in Wardian cases is its stickiness inside after it has passed through the tropics, and the consequent gluing to it of the plants where they touch. This stickiness is due to the moisture and warmth inside the case. The manufacturers say "the more duroline is exposed to weather, the harder it becomes." On the whole, we can report favorably upon duroline for Wardian cases. We also think it might be used for many purposes in the roofing of sheds and plant structures in tropical countries.—*Kew Bulletin.*