

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included. \$3 20
One copy, six months, postage included 1 60
Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid. Remit by postal order. Address

MUNN & CO., 37 Park Row, New York.

The Scientific American Supplement

Is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 19 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired. The safest way to remit is by draft postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost. The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, APRIL 16, 1881.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as American industries, Arctic research, Berthelot, Sabino, Breath, the temperature of, Car brake decision, Stevens, Cement for rubber, Circular saw, Reese, Disk, fusion, Reese, Earl of Caithness, the, Electrical-machine, Holtz, Embroidering frame, new, English skylark, the, Exhibition of Electricity, inter, Exhibition, inter, another, Expedition, search, Jeannette, Fish culturists' Convention, Flax refuse, utilizing, Fusion disk, Reese, Gas engines, Grain charges for handling, Heat in mines, causes of, Holtz electrical machine, Hydraulic hoisting machine, Inventions, mechanical, Inventions, miscellaneous, Inventions, recent, Knowledge, utilization of, Lightning from telephone, Locomotive, passenger, new, Machinery, powerful, Mechanical inventions, Performing machine, new, Pigs and babies, Protoplasm, Reception, Professor Bell's, Refrigerator, improved, Roberts, E. A., Colonel, Saw, circular, Reese, Ship canal, Panama, Ship railway, the, Isthmus, Silhouettes, app. for taking, Sky, blue, the, Soap, an improved, Stanley—where he is, Steamer, excursion, fireproof, Substance, complicated, Telephone, sensitiveness of the, Temperature of the breath, Trichinosis, Vaccine lymph, artificial, Velocipede hand car, Waypansht, Carl, Wheat, transportation of.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 276.

For the Week ending April 16, 1881.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement, including sections on Engineering and Mechanics, Technology and Chemistry, and Natural History, Agriculture, etc.

THE UTILIZATION OF KNOWLEDGE.

It is a suggestive circumstance—suggestive to young inventors at least, and encouraging withal—that the very first manifestation of electric action observed by men, namely, the attraction which an electrified body has for light objects, is the last to be signally utilized in the arts; and that, too, not in some new or original art by some learned investigator in electrical science, but by a couple of boys, and in an industry which is as old as civilization.

The development of what is called frictional electricity by lightly rubbing a poor conductor, like amber, wax, glass, or hard rubber, by another like silk or fur, is and long has been an initial experiment in all courses of electrical instruction. It is the earliest experiment made by or for the student; and one of the substances commonly mentioned as well suited to exhibit the phenomena of electrical attraction and repulsion is bran.

The desirability of some more effective means of separating bran from flour has been recognized by millers, doubtless, from time immemorial. Latterly the desire has been very strongly felt. As shown in last week's issue of this paper, frictional electricity satisfies the requirements of the case absolutely and with singular economy and simplicity of apparatus. That its availability should have waited so long for recognition is little less than marvelous, since multitudes of millers have been as familiar with the property of electricity now utilized as with the needs of the flour mill.

Why was the electrical bran separator never invented before?

While it may not be possible to give a specific answer to this question, it is still possible to discover causes which must have contributed materially to keep the now so obvious application of electricity from being made earlier. Chief of these, it is safe to say, is the non-suggestiveness of familiar knowledge. Men are apt always to overlook the means which lie nearest at hand and seek assistance from afar. When a new discovery is made in science scores of practical men stand ready to consider whether it can be put to useful purpose.

The possibilities of any old truth they are apt to assume to have been already explored, forgetting that it is but a little while since the utilization of knowledge became the occupation of any considerable class of men, and that new developments in the arts are now constantly opening up opportunities for applying old knowledge—often knowledge which previously gave no promise of utility.

Thus, while the newly discovered phases of electrical action—electro-magnetism, thermic electricity, galvanic action, dynamo-electric energy, and the rest—have become influential factors in the arts, frictional electricity has lain neglected, every one tacitly assuming that its possible utilizations must already have been worked out.

The moral to the young investigator, who would like to be an inventor, is plain. Do not wait to acquire a large store of knowledge before you begin to seek original applications for it. As each new fact or phenomenon comes within the range of your investigation be sure to consider its possible utilization. Think how it may be practically applied. Use it as a factor of invention, and follow it, if you can, through the range of its present applications. You will find again and again that your inventions have been anticipated by others; but that should not be a source of discouragement. Invention is the best school for the inventor. The ability to invent grows with the practice. Great inventions are never the first fruits of a mind unpracticed in the art, and our greatest inventors have achieved their most valuable results only after years of more or less successful effort. The young man who invented the electric purifier is no exception to this rule. The habit of inventing is a long-established one with him, early developed and urged on by an inherited tendency to invent, his family being gifted in that direction.

His knowledge of electricity was limited, but he had been in the habit of applying his learning as he got it, and that habit brought him the opportunity to make the invention referred to. One of the great mistakes of students, fostered unfortunately by the conventional methods of instruction, lies in making education acquisitive mainly. The idea is to get knowledge, much knowledge, and then, if possible, apply it, forgetting that the mental habit acquired by the search for knowledge for its own sake is rather calculated to make the man an intellectual miser, a hoarder of information, than a practical user of knowledge. Much less information, coupled with a habit of turning information to use, is worth infinitely more to the possessor and to society.

Knowledge acquired as an end in itself is a delusion, a source of weakness rather than power. It is apt, also, to be of a shadow elusive sort, in no way to be compared with the real knowledge which remains after each fact or idea has been worked over, tested, weighed, and measured by practical application.

And the student who aims to become something more than a learner, namely, a doer, possibly a creator, must never allow himself to think that the possibilities of any fact or phenomenon have been exhausted, so far, we mean, as its utilization is concerned. The habit of inventing in other words, seeking novel and useful applications for the knowledge gained, should go hand in hand with acquisition. The apparent progress will not be so rapid, may be, as by the method of cramming, but it will be real and not liable to backslidings, while the possible profit of it will be incomparably greater.

THE AMERICAN FISH CULTURISTS' CONVENTION.

The tenth annual meeting of the American Fish Culturists' Association was held in this city during the last days of March. A large number of the representative students of the finny tribes, fish breeders, and dealers, were present, and several valuable papers were read.

The first communication was from the vice-president of the association, Mr. George Shepard Page, now in England, with special reference to the possible introduction of American shad in English waters. The present head of the British Fish Commission, Professor Huxley, is much interested in the project.

A practical paper on fish culture in this State, by the Superintendent of the New York State Hatchery, Mr. Seth Green, discussed at some length the question of hybridization. An account was given of experiments in that direction made at Caledonia, particularly with brook trout and California salmon, the results being very encouraging.

A paper by Mr. H. D. McGovern, of Brooklyn, recounted experiments on carp in New York waters, dwelling at some length upon the capacity of these fish to endure cold weather in shallow water. Professor Goode stated in the subsequent discussion that carp are best adapted to Southern waters.

A valuable paper, by Dr. T. H. Bean, was entitled "A Contribution to the Biography of the Commercial Cod of Alaska." The true cod, tomcod, polar cod, pollock, and halibut, are found in profusion, and of good size, near many parts of the Alaska shores, and are sure to become of great commercial value.

In "Epochs in the History of Fish Culture," Professor Goode gave a chronological record of the changes and discoveries in fish culture from its beginning in Germany in 1741. Fish culture began in France in 1820; in England in 1832; in the United States in 1853.

Thursday's work comprised the reading and discussion of several important papers and the election of officers, as follows: President, Robert B. Roosevelt; Vice-president, George Shepard Page; Treasurer, Eugene G. Blackford; Corresponding Secretary, Barnet Phillips; Recording Secretary, James Annin, Jr.; Executive Committee: Frederick Mather, of Newark; Professor G. Browne Goode, of Washington; Samuel Wilmot, of Ottawa, Ont.; Benjamin West, of New York; Thomas B. Ferguson, of Baltimore; James Benkart, of New York; and John B. Morgan, of Brooklyn.

A statement, compiled by G. M. Lamphare, gave the amount of the various kinds of fish received in the wholesale markets of New York from March 1, 1880, to January 1, 1881. The value of last year's supply of fish in this city was given at \$3,339,827.

Papers were read by Mr. Frederick Mather on "Fish Living in both Fresh and Salt Water," and by James Annin, Jr., giving his experience with "Poachers," at the Caledonia trout ponds, the most mischievous being kingfishers, herons, bitterns, muskrats, and minks. A paper by Professor Goode, entitled "Light in Europe on the Eel Question," led to a considerable discussion of the spawning habits of European and American eels, which appear to differ materially. The last paper was an elaborate one by Professor W. O. Atwater, on "Food Properties of Fish," the more important facts of which will be given elsewhere.

PIGS AND BABIES.

It is a pity that babies have no market value.

For some years the Agricultural Department has been trying to impress upon the western hog raisers the need of more carefully guarding against contagious diseases among swine, and to prove the need of such care, the department has taken pains to gather much statistical information with regard to the losses entailed by hog cholera and other swinish diseases.

For some reasons unexplained certain foreign commercial agents in this country have become greatly exercised over the untimely death of so many pigs, and have misused the information furnished by our statistical authorities to create something like a panic among pork dealers abroad, the ostensible fear being that public health may be grievously endangered by the use of American pork, the real fear obviously being the loss of trade and profit through American competition.

The result is that pigs have risen to the dignity of being the subject of international diplomatic correspondence.

The annual loss of from six to sixteen per cent of the swine of a great State like Illinois is unquestionably a sad thing to contemplate, especially as the average weight of the dead animal appears, from the official tables, to be about 100 pounds, showing that the most of the untimely dead are pigs, and too small for the pork barrel.

Doubtless this swinish death rate might be, and ought to be, materially reduced. Doubtless, too, it will be reduced; for pigs have a market value and will grow to be salable hogs if kept in health, on the average, a year or so longer.

When we think how much the pigs of the future will have cause to be thankful for the present flurry in pork, and among pork dealers and statesmen, tracing thereto the greater care taken of their health and comfort, we can not but wish that it were possible to raise a corresponding excitement about the physical wellbeing of babies.

Last year there died in this city nearly 15,000 children under five years of age—human pigs, so to speak. To make the comparison strictly fair it would be necessary to take the deaths of children under twelve or fifteen years of age. The percentage, however, is excessive enough when we take