Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S. or Canada.....$3 00
One copy, six months, for the U. S. or Canada..... 1 50
One copy, one year, to any foreign country belonging to Postal Union, 4 00
Remit by postal or express money order.

Australia and New Zealand.—Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit £1 in current Colonial bank notes. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, 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, for U. S. and Canada. $6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S. or Canada, on receipt of *seven dollars*.

The safest way to remit is by draft, postal order, express money order, or registered letter.

Australia and New Zealand.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for a little over one year on receipt of £2 current Colonial bank notes.

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

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.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 3, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 609

For the Week Ending September 3, 1887.

Price 10 cents. For sale by all newsdealers.

ISTHMIAN SHIP TRANSIT.

The interesting question as to a means of ship transit across the American isthmus was discussed at the recent meeting of the American Association at Columbia College, this city. The most important paper on the subject was by Commander Taylor, U. S. Navy, who expressed himself strongly in favor of a canal at Nicaragua, which locality he has visited. His remarks upon the proposed ship railway at Tehuantepec show him to be less familiar with this project; his opinion thereon being directly opposed to that of experienced engineers who have devoted time and thought to the matter. He says the ship railway project at Tehuantepec promises to be as disastrous in its ending as that at Panama. Most engineers and ship builders, he says, doubt the practicability of the project, and fear the sinking of embankments and the racking of hulls of heavily loaded ships. He fears that the earnest belief in this project held by its promoter, the late Mr. Eads, and his past successes, would cause credulous persons to enter into the visionary project.

If Commander Taylor, or any other who may have similar doubts as to the practicability of the ship railway project, will take the trouble to inquire into its details, they will not discover any grounds for their fears. The principal objection to the ship railway scheme would seem to be its novelty. There was a like objection to the employment of a jetty system at the mouths of the Mississippi. The dredge had been used so long on this river that the engineering world had come to look on its use as almost statutory, and though it had never accomplished anything of lasting advantage, other means of clearing channelways, if not based upon dredging, were regarded as hazardous and visionary. Mr. Eads constructed his jetties on his own responsibility, and showed popular expert opinion to be founded in error by permanently deepening the channelways of the passes and making New Orleans once more a sea port.

Commander Taylor's objections to the ship railway scheme may be classed under two general heads: 1st, because of the method of handling ships while *in transitu;* and 2d, because, in his own words, "the cost of a railroad nobody can tell." Now, Commander Taylor, who is a skillful navigator, would not hesitate to put his ship into a floating dry dock, and would look on with complacency while the water was being pumped out of the pontoons and the structure, gradually rising out of the water, lifted her high and dry. He has forced his ship through driving seas without a qualm, as every other experienced sailor has. No one knows better than he that a well constructed ship is practically a girder, specially adapted to bear severe strain. A big steamer in a heavy seaway often rests upon two waves, one under her bows and the other under her stern, while the 'midship section has practically no support from the water; and, again, her bows will be almost out of water and her screw "racing." Her constructors prepared for this, and in putting her parts together they got unity out of multiety. It does not require a knowledge of navigation, neither of mathematics, to discover that a ship laboring in a heavy seaway is called upon to bear a far greater strain than she would be while being lifted out of water in a dry dock, into a cradle, and then wheeled over a level railway. This is so obvious as not to require any mathematical demonstration.

If there be any who do not think so, let them resort to figures. It is not enough to say a thing cannot be done or is impracticable. There ought to be some specific reason, some data or figures, to sustain the assertion. The big iron steamer Amerique ran up on to the New Jersey coast at Seabright some years ago, and after pounding her loaded hull on these sands for a fortnight, lay exposed to the buffeting of winter gales for nearly three months. The wooden ship Lornty, sunk in New York Bay, withstood all the wrenching of the chains passed around her bottom by the wreckers, and was finally brought to the surface unscathed, while the iron steamer Welles City, sunk in the North River, underwent similar treatment in a wrenching tideway, unharmed.

So far as the cost of the ship railway is concerned, it seems surprising that so well-informed a man as Commander Taylor should assert that a ship canal, which must be constructed, for at least a part of its way, through a river filled with rapids and falls, in a country annually visited by floods, may be estimated with more certainty than a railway. Ship canal construction is rare the world over, but so much has been done in the way of railroad building, that it has virtually become a science, and once a careful survey is made of a proposed line, a first-rate engineer will compute the amount of cutting and filling and ballasting and the cost of rails and rail laying with something approaching exactness. Commander Taylor very reasonably looks upon the geographical position of Nicaragua as superior to that of Panama, because ships following the most frequented tracks would save hundreds of miles by crossing the isthmus at the former. For the same reason, Tehuantepec is vastly more convenient than Nicaragua, being hundreds of miles further north; indeed, it is at the extreme upper end of the isthmus, while Nicaragua is not far distant from the lower end. Panama, he truly remarks, is in the zone of calms, in the doldrums, and Nicaragua in the "trades." So is Tehuantepec.

The question of harbors must take a principal part in any discussion of isthmian routes; and though Nicaragua once had a fine harbor at Greytown, it has filled up, and will cost millions to recover even in part, whereas the roadsteads of Tehuantepec call for no unusual skill, no extraordinary outlays, to make safe for ships to ride in.

DUPLICATION OF GOVERNMENT SCIENTIFIC WORK.

It appears that the government is now employing three different scientific corps to investigate and report on one and the same matter, namely, the characteristics of genuine butter and its imitations.

In the first instance, we have the division of microscopy of the agricultural department, represented by Dr. Thomas Taylor and his assistants; then we have the division of chemistry of the same department, represented by H. W. Wiley and his assistants; and lastly the office of commissioner of internal revenue, represented by a chemist and a microscopist, each lately appointed under the oleomargarine law, whose salaries amount to $5,000 a year, the two last being specially appointed for this special work.

Thus we find three distinct and separate corps of scientists, each with costly scientific apparatus, all employed on the same work, and each putting the country to the expense of printed illustrated reports, costing thousands of dollars.

Professor Wiley the chemist is first in the field with a printed report. It is bulletin No. 13 of the agricultural department, division of chemistry, and constitutes a book of 130 pages, and has 12 pages of photogravure illustrations. It is not our purpose now to pass it in critical review, but we may say that it substantially states that the chemical test is the only practical one for distinguishing butter from its imitations, but it admits that the microscope is useful as an adjunct in making the investigations, but he takes pains to belittle Dr. Taylor's microscopical work, by quoting authorities which state that "little dependence can be placed on *any* microscopical test;" and on the subject of the crystals formed by "the melting and slow cooling of butter," which was Dr. Taylor's discovery, and forms the groundwork of all Dr. Taylor's work, Professor Wiley says, "I consider it a much less valuable indication than the simple observation."

If Professor Wiley is correct in this statement, then all Dr. Taylor's work is void and his reports so much waste paper. And yet the government has in the press a costly printed report of Dr. Taylor's work, the Moss Engraving Company having just printed two million pages of photogravure plates to accompany the report, the edition being, we believe, over 400,000 copies.

All this report is devoted to the microscopical aspect of the question, upon which, as we have shown, one official of the same department claims "little dependence can be placed," and all based on a discovery which Professor Wiley says is "not valuable."

Such being the estimation of the work of Dr. Taylor by the chemical division, the public may be curious to know what the microscopical division think of Professor Wiley's report and scientific work.

Dr. Thomas Taylor says he "thinks it would be more creditable in the eyes of the public if Professor Wiley would stick to his own business. The bulletin, in my estimation, is *of no especial value* in its microscopical aspect, because Professor Wiley has not been careful to select types nor observed uniformity in his treatment of the fats."

So here we have two reports on the same subject issued from the same government department utterly at variance with each other, while both are condemned as worthless by the department which has ordered the work and the publication of the reports. We have offered no opinion on the merits of the two conflicting reports, but will endeavor to do so on another occasion. One of them must be false and deceptive, and we can only regret that many thousands of dollars have been wasted on their preparation and publication.

We have yet to hear from the chemist and microscopist of the internal revenue office. We presume that we may look to them for a report of their work on this subject. We hear informally that they are not working in the best of harmony, and that the microscopist first appointed resigned, and was replaced by another; but we trust they are doing good original work, and will arrive at some solution of the question which will be satisfactory to the public and those specially interested.

At the recent meeting of the American Association for the Advancement of Science, Dr. Taylor exhibited, in four large frames, the original photo-micrographs of the crystals of butter and fats, copies of which will appear in the annual report of the Department of Agriculture, now in the press. The crystals of the various fats examined are over a hundred in number, comprising butter derived from various breeds of cattle, under many kinds of feeds. The crystals of fats show specimens taken from many animals, birds, and even the human subject, both in health and disease. It is cer-