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.

Address 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, JULY 2, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 600,

For the Week Ending July 2, 1887.

Price 10 cents. For sale by all newsdealers.

CORSETS AND CONSUMPTION.

The mechanism of breathing may be effected by two separate and distinct sorts of nerves and muscles. The upper portion of the body, including the ribs and thorax generally, may expand, and thereby draw air into the lungs. This is termed costal breathing, literally rib breathing. On the other hand, the muscles of the abdomen may come into play, and by depressing the diaphragm, may thus increase the chest cavity. In this type, termed abdominal or diaphragmatic breathing, the muscles of the upper part of the body remain inactive. Boerhaave, in 1744, observed a radical difference in male and female breathing. The masculine type is abdominal, the female is costal. On these premises Dr. Thomas J. Mays, of Philadelphia, has based an interesting investigation. It appears highly probable that the reason of the costal breathing of women is that they compress the diaphragmatic region with corsets, so as to suppress all but costal breathing, and so as to develop the latter highly. Dr. Mays subjected a number of Indian women to examination. He used a modification of Paul Bert's pneumograph. By this apparatus a trace indicative of the extent of chest and of abdominal movement was produced so as to show in graphic form the relative proportions of the two types of breathing in the same subject. The result was that he found the majority of Indian women to breathe almost entirely with the diaphragm. Their pneumograph tracings corresponded closely with those of white men. As the Indian women do not wear corsets, this investigation tended to prove that corsets were the cause of costal breathing.

The most curious conclusion, however, is the possible influence of corsets on consumption. Admitting that they are the cause of costal breathing, and accepting the theory that costal breathing is a corrective of consumption, a plea for these articles of attire is at once established as preventives of the dreaded malady. The possibility of this benefit is increased by the consideration that men are, on the whole, more subject to it than women, and that Indians seem peculiarly its subjects. Yet the case is far from proved, and it would be rash to consider the corset side of the question as proved. Admitting even that corsets diminish consumption, the account against them, when used injudiciously, must be regarded as far from balanced by any good of this sort that may be attributed to them.

OUR SLOW NEW NAVY.

Naval authorities have differed as to the most efficient type of armored cruiser. One side inclines toward monster ships, with heavy sides and ponderous batteries, which, because of their necessarily limited speed, are little more than floating batteries, while the other has strenuously set forth the merits of light-armored, swift-footed commerce destroyers, carrying from one to three heavy guns. Up to quite a recent period, those favoring the first mentioned type were in the ascendency in England, or, if not the most numerous, possessed at least the most power; for as recently as last autumn, contracts were given out for two new big ships—the Nile and Trafalgar. Just now there seems to be a decided change of views on this subject; the naval staff and the military press protesting loudly against any further waste of money and time on ships that cannot overhaul a merchant steamer of even ordinary speed on the high seas, and when they approach the coast are likely, because of their sluggishness, to fall easy prey to the crafty and winged torpedo boat.

The English naval constructors, under direction of the Admiralty office, have for years been engaged in the construction of leviathans, with speeds varying from 12 to 16 knots. Now an earnest appeal is being made for fast and less costly constructions; the time, it is declared, having arrived when the younger blood of the navy should have something to say concerning the building of the fleet they will be called upon to command, and the aged warriors who still pin their faith to the old line-of-battle ship order of construction have exhausted the patience even of the most conservative.

Though the British naval constructors have for years furnished criteria for the rest of the world, there are those who, of late, have refused to follow them further to the lengths they would lead, though others, like the Italians, have outstripped them in a career of folly.

The defects of the heavy armored ship or floating battery have often been illustrated, and the point has been urged that a cruising ship, to be effective, should be at least as swift of foot as the merchantman she is looked to to capture or destroy. Our English contemporary, the *Broad Arrow*, in a recent article on this subject, argues the case from the same standpoint, and records a similar opinion as to the relative effectiveness of the two types. Referring to M. Gabriel Charmes' recently published essay on marine warfare, it quotes the following observation: "It is useless to continue the construction of armorclads, because they cannot be protected against torpedo attack either on the sea or when blockading a coast. Cruisers and fast gunboats should, however, be built, because the chief points of attack should be the commerce and unfortified towns of an enemy;" adding that though it does not regard this opinion as final, there is much truth in it. The construction of the Japanese light-armored cruiser Naniwah'kan, the Esmeralda for Chili, and a similar craft for Brazil, may be said to mark a distinct epoch and turning point in naval designing. In the performances of these craft is realized the hopes so often expressed by cool-headed naval authorities. With speeds nearly equal to the fastest merchant ships afloat, such craft, on occasion, might instantly become masters of the sea. Though pygmies when compared in armor and battery to the monster ships of the European powers, they would stand like giants in the path of commerce, having the power to catch and destroy, and yet to avoid capture themselves. They carry a fairish battery too; one of them, two ten inch and one eight inch gun *en barbette*, and another, two heavy guns in turret and a sweep of the circle.

When our new steel cruisers, the Dolphin, Atlanta, Boston, and Chicago, are compared with these admirable vessels, it is hard to understand how their designers could have made so fatal an error. Here we have four slow and unarmored ships, or, in other words, ships that can neither fight nor run away. Take the Chicago, the largest, and designed to be the fastest of the four. On her way from Chester, last week, she did not make quite 13 knots, though her engines had been working at the dock for several weeks. Of course, she will do better when these engines are worn smooth by attrition, but it is not likely she will do very much more than this, and even supposing she eventually logs "15 knots at sea," as is laid down in the contract, how could she hope to catch any of that great fleet of fast steamers that dot the seas? Like her sister ships, she is unarmored, for a skin of steel is no armor at all, and hence how could she defend herself with her eight inch guns against the armored modern ship with its powerful battery? So far as harbor defense is concerned, she would be of no value, because, if she cannot defend herself from assault on the high seas, she could not do so inclosed in a harbor. It seems evident that the designers of these craft, in attempting to get the good qualities of both the big fighting ship and the light cruiser, have signally failed because they have got neither.

A Wise Wasp.

While sitting, one summer day, at the side of the house on a platform which served as a piazza, but was roofed only by the branches of two large trees, something dropped upon my head and rolled into my lap, when I saw a large white bodied spider in the clutches of a small wasp. Hastily brushing these unceremonious visitors on to the floor, I watched to see if the wasp would succeed in flying away with his huge enemy. After a struggle the spider lay quiet, and the wasp ran around, seizing first one part, then another, but finally went away, as I supposed, for help. In about a quarter of an hour he returned, still alone, and began trying again, as I thought, to find some place by which he could seize the round body and carry it away. Again he departed without his spider. This time I watched him and saw him disappear at the edge of the lawn, under a pear tree, and, following, found him, after some searching, diligently at work with another wasp enlarging a hole in the ground, having already thrown out quite a little mound of earth. I was surprised, for I did not then know that any kind of wasp lived in the ground.

I returned to the piazza, and soon, when the wasp came back, I was convinced, by more careful watching, that he was measuring each part of the spider's body instead of trying to get hold of it. The antennæ seemed to be the organs mostly employed in this operation. When he went home again, I was before him, and saw him meet his co-worker, put his head close to his, and evidently informed him that the doorway was not yet big enough, for they fell busily at work enlarging it. Then more measuring, more digging, until, after three long hours, he returned, this time with his friend, and they carried away their prey and bestowed it in their underground home.

Question for studious Agassizites: How many kinds of wasps are there, and how many have adopted the metric system?—*The Owl.*

Distilling Turpentine.

A turpentine distillery was recently established at New Orleans, where a new process of distillation is followed, materially differing from that in use elsewhere. Under the new system, the pine wood is placed in iron retorts charged with superheated steam, and fired with wood from beneath. After six hours gas is evolved, and at the same time there begins to distill a mixture of crude turpentine and tar, from which the gas, being more volatile, separates. The liquid portion flows into a bath, from which it is pumped into the still. Here the crude turpentine is refined, and flows from the mouth of the still into barrels ready for shipment, while the tar is discharged from another opening.