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., Canada or Mexico.....$3 00
One copy, six months, for the U. S., Canada or Mexico..... 1 50
One copy, one year, to any foreign country belonging to Postal Union. 4 00
Remit by postal or express money order, or by bank draft or check.
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 the U. S., Canada or Mexico. $6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of *seven dollars*. To foreign countries within Postal Union, *eight dollars and fifty cents a year.*

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign Postal Union countries, $3.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, $5.00 a year. To foreign Postal Union countries, $6.50 a year. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN and SUPPLEMENT, $9.00 a year. To foreign Postal Union countries, $11.00 a year.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of *La America* is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. $3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO., Publishers,
361 Broadway, New York.

☞ The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

☞ Readers are specially requested to notify the publishers in case of any failure delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, JULY 28, 1894.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 969.

For the Week Ending July 28, 1894.

Price 10 cents. For sale by all newsdealers.

NAVY SPEED TRIALS.

The interest felt by mankind in anything of the nature of racing has been recently fostered by speed trials in various branches of sport and engineering. In England the American yacht Vigilant has been repeatedly beaten by narrow margins by the English yacht Britannia. The admirers of the American boat find their consolation in hopes for the future, and in the fact that in one fair trial, devoid of calms and uncertainties, the Vigilant came out ahead. In cycling races are recorded as won by six inches, which is about the one-eightieth part of a second.

But while the sporting world is provided with its requisite pabulum and is given something to be interested in, a more serious field of competition has also occupied the public attention. The new ships of war built for the United States navy have been given speed trials which in the methods and in their execution may be considered an advance on anything of the kind hitherto carried out. For the government is no longer satisfied with a trial over a measured mile in smooth water.

The ship is taken to sea and is given a run of several hours' duration. The course is accurately measured or logged before the trial, and vessels are anchored along it to define it for the competing ship. The builders of the ship are given very large premiums for excess of speed over that contracted for, and the trial is carried out with every refinement that ingenuity can suggest to improve the ship's record. A perfectly clean bottom, selected coal, a special crew, the deck obstructed with as few objects on it as possible to avoid developing air resistance, all conjoin to get the last fraction of a knot out of the ship. In her after career she may never approach her trial record, on which her price was based.

This sounds unsatisfactory. If all ships, both here and abroad, were tried under identical conditions, then at least a comparative series of data would be obtained. But they are not. The English men-of-war have, when new, been tested in various ways, over different courses, and no standard can be appealed to for them. The same is the case here. While the present sea trial may be the most satisfactory yet developed, its value and interest is impaired by the very circumstance that it is a development. It does not afford a standard of comparison for any but the most recent ships.

Leaving aside purely naval ships, we come to merchant vessels. Such ships as the Minneapolis are supposed to be commerce destroyers. They will have to compete in speed with such ships as the Servia, Paris, New York, Lucania, Majestic, Teutonic, Columbia, Normannia, Furst Bismarck, ships which year after year ply on the Atlantic route with the utmost regularity and maintenance of the highest speed. These ships, too, have their speed trials, not over a short course, or of four hours' duration, but over nearly three thousand miles, and their speed trials may be said to be constant. What the Lucania would do on a four hours' trial is a matter of no interest to her owners. They want her to keep up her record over the ocean course, and her achievements there have a direct influence on her earnings.

As our war ships of the faster type may have to compete with such vessels as these, either in battle or in the *role* of commerce destroyers, it would seem proper that they should be tried under identical conditions. They should be fully equipped as if for war, and should then be sent over the much-traveled ocean lane between Sandy Hook and Queenstown. A run across, with the return run, would give new factors of speed, and would give data now quite unobtainable as to the real value of the new ships. Not the cleverest mathematician can determine from a four hours' run of a stripped ship what the same vessel would do with her guns, boats, and deck equipment in place and with ten days' coal on board over the ocean course.

It is much to be desired that the ocean course might be selected. The ship would then have a chance to develop any structural weaknesses in boilers or engines, and her coal and crew would represent a more just average than is given on the shorter trials.

Australia's Gold Fields.

Some big stories are current of the richness of the Coolgardie gold fields in Western Australia, and particularly of one mine in the district discovered by two young adventurers named Bailey and Ford. The former, while prospecting, found a 45-ounce nugget sticking out from a reef in a big mountain of quartz. As quickly a possible a claim was staked out, but, in spite of all precautions, much valuable surface ore was stolen before a proper guard could be established.

The monthly output from the mine now amounts to 2,000 ounces. From 30 tons of ore picked from a bulk of 1,400 tons, 18,000 ounces of gold was obtained, and the remainder of the stone is expected to yield from five to six ounces to the ton. Out of 650 tons raised from a depth of 15 feet, 12 tons were picked, giving 8,500 ounces of smelted gold. From another part of the mine four tons selected out of 100 tons of ore yielded 1,600 ounces of gold. Some of the other returns of picked stone were: Five tons from 250 tons for 2,000 ounces, two tons from 70 tons for 900 ounces, four tons for 1,000 ounces, and 35 hundredweight for 800 ounces. Some of the surface "is so rich in gold that ounces can sometimes be picked out in a few minutes." Down to the 50-foot level only it is estimated that gold to the amount of 40,000 ounces is now in sight. It is as yet too soon to speak about the prospects of other claims which have been pegged out in and around Coolgardie. Very few of them have got beyond the rudimentary stage of prospecting claims, although reports have been received of some valuable finds, among which may be cited a reef carrying ten ounces to the ton, and the discovery of nuggets of fifty-two ounce weight on a field forty five miles distant. The population of the place amounted to about 1,500 some weeks ago, but since then has diminished in consequence of the terrible hardships which must be encountered there, owing to the climate.

Fifty Millions in Silver.

The huge vault at the mint known as vault C, in which has been sealed up for nearly four years 50,000,000 of standard silver dollars, was opened a few days ago, and the long and laborious task of counting this big amount of money was begun. As the occasion was deemed one of importance, says the Philadelphia *Times*, there was observed some little formality. Dr. Caleb Whitehead had come on from Washington to represent the mint bureau; Frank Sartori represented Superintendent Townsend; and W. L. Bosbyshell, Col. Bosbyshell's son, represented the former superintendent. William E. Morgan, United States Treasury examiner, was also present. United States Treasurer Daniel N. Morgan, who, with his son, happened to be in this city, and accompanied by Major Worman, witnessed the breaking of the seal and afterward made a tour of inspection of the mint.

Major C. H. Townsend, cashier of the mint, having been given the combination of the vault, proceeded to open the door. This was easily accomplished, but when the inner door was reached some difficulty was experienced, as even after the combination lock was manipulated, the door refused to open, the bolts from long disuse sticking fast.

This was soon overcome, however, entrance was finally effected, and the assembled officials stepped within the inclosure where lay piled up millions. On the inside door, fastened by sealing wax, was a sheet of foolscap paper containing the statement that $33,000,000 had been placed there on February 7, 1890, with Major Meline, of the treasury; B. F. Butler, of the mint bureau, and James C. Eyster, of the mint, present, and that further, $17,000,000 more had been sealed up on May 26, 1891.

The vault emitted a damp, musty odor when opened. Under the glare of the electric light the great wealth of stored silver was visible. There it lay in bags just as it had been placed. There were 50,000 bags, each containing $1,000 in shining coin. These bags were piled up one on top of the other, the topmost almost reaching the arched ceiling of the vault, nearly nine feet high. The whole mass had been arranged in different stacks. The first stack was thirteen bags high and eight across. Just in the rear of this was a second stack, while still further back loomed up a third. This, though, represents only one section of the vault. Altogether there are nine. The weight of this great amount of silver is 2,850,000 pounds avoirdupois, and the tremendous pressure of the upper bags upon the lower had caused a number of the latter to burst, causing their glistening contents to spread out upon the floor.

Inoculation for Cholera.

According to the *British Medical Journal*, three further remarkable instances of the success of Prof. Haffkine's system of anticholera inoculation are reported from Calcutta. In the first case, four out of the six members of a family were inoculated last March. The cholera appeared in the neighborhood lately, and the disease attacked one of the two who had not been inoculated, while the inoculated remained free. In the second case, five members of a family consisting of eleven persons were inoculated in March. The cholera lately attacked one of the six who had not been inoculated. In the third case, six out of a family of nine were inoculated. When the cholera prevailed in the neighborhood a few days later, the disease attacked one of the three not inoculated. It is stated that the corporation of Madras has passed a resolution inviting Prof. Haffkine to visit that city and introduce his system.

Laundry Glaze.

French chalk	35 pounds.
Barilla ash soap	2 "
Borax	½ pound.
Resin	¼ "
Water	15 pounds.

This mixture is dried and powdered, or made into a paste, if desired.

The Poultry Industry in China.

The breeding and rearing of fowls is an important industry in China, as they form a very considerable portion of the daily food of the better class of the people. The United States consul at Chin-kiang says that the varieties of fowls are few in number. The principal are the Yangchow fowl, a large bird of good flavor, which weighs from four to six pounds. This variety is a good layer and sitter, the eggs being of brownish tinge and good size. It lays, during eight or nine months of the year, about 200 eggs, ceasing only in the hot summer months. This description is kept more for the table than for laying purposes, as its flesh is particularly good. The Langshan fowl is a distinct and fairly pure breed from the Yangtze River region, just below Chin-kiang. It is a large, heavy, handsome bird, weighing from seven to eight pounds. The eggs are of darkish brown, and of good size. The Black Bone or Typhoon chicken is a distinct fancy breed. In color it is white, and its skin, legs, bones, flesh and comb are very dark. The flesh of this fowl is much esteemed, and, boiled down into soup, it is prescribed by physicians for certain diseases. The Chow is another variety. This breed is small, weighing generally from two to three pounds. A pure white cock of this breed is always carried on the coffin at a native funeral *cortege*, and is sacrificed at the grave. Also on native boats a cock bird is killed on the Chinese New Year's day, and the blood sprinkled on the bow to propitiate evil spirits, and to insure good luck during the year. Ducks are reared in great quantities, and are largely used as food, both fresh and salted. They are all artificially hatched, as the duck is an uncertain sitter. The common duck is a good sized bird, weighing, when dressed for the table, three or four pounds, and is much esteemed for the excellence of its flavor. After fledging, the birds are driven about in vast flocks through canals, and from pond to pond, where they find their food. They are brought under strict discipline, and obey their keeper's call with extraordinary intelligence. The Mandarin duck is smaller than the common duck, and is a beautiful bird, with diversified and brilliant plumage. It is reared chiefly for its beauty. In the grounds of the wealthy there is always an artificial lake, where the Mandarin duck is kept. They are considered as emblems of conjugal fidelity, and a pair of them usually form a part of wedding processions. Preserved ducks' eggs are considered a delicacy, and always form an important part of a mandarin dinner. The process of preserving them is as follows: A lye of beanstalk and lime is made by burning these to powder. This is put in water, black tea leaves and salt in certain proportions being added. The boiling is continued until all the water has evaporated, and the residue becomes caked and hard. This is powdered fine, and the fresh eggs are placed therein one by one with a little rice husk. They remain in this preparation one hundred days, when they are ready for use. The preserved eggs will keep for several years. When ready for use they have the appearance of hard boiled eggs. The shell is taken off, and they are put on the table cut into small slices and eaten as *hors d'œuvres*. The goose is generally of pure white plumage, very striking in appearance, of great size and majestic carriage, much resembling the swan. The turkey has long been introduced into China, and is reared at Canton and Tien-Tsin entirely for foreign markets, that is, for the foreigners at the treaty ports. The peacock is reared in many parts of China, and has long been known to the people, though it is not a native of the country. Its tail feathers are used by the mandarins in their caps to designate official rank.

The gold and silver pheasants of China may be called domesticated birds, as they are now so extensively reared that it is doubtful if they are found wild. There is a bird in China—the cormorant—which is domesticated, trained to wonderful intelligence, and employed in catching fish. These birds are reared and trained with great care. A pair costs from five to six dollars. They are taken out on the lakes and rivers in a small boat; one man to every ten or twelve cormorants. The birds stand perched on the sides of the boat, and, at a word from the man, they scatter on the water and begin to look for fish. They dive for the fish and then rise to the surface with the fish in their bills, when they are called back to the boat by the fisherman. As docile as dogs, they swim to their master and are taken into the boat, when they lay down their prey and again resume their labor. The use of incubators in hatching eggs has been known and practiced in China for several hundred years. It is a large and profitable industry, but the apparatus used is of a very primitive description. The hatching house is usually a long shed built of bamboo, the walls plastered with mud and thickly thatched with straw. Along the ends and down one side of the building are a number of round straw baskets plastered with mud to prevent them from taking fire. A tile forms the bottom of each basket. Upon this the heat acts, a small fireplace being below each basket. Upon the top of the basket there is a straw cover, which fits closely, and is kept shut during the process. When the eggs are brought they are put in the baskets, the fire is lighted beneath them, and a uniform heat maintained. In four or five days after the eggs have been subjected to this temperature, they are taken carefully out, one by one, to a door, in which are a number of holes nearly the size of the eggs. They are held against these holes, and the attendants, looking through them, are able to tell whether they are good or not. In nine or ten days after this, that is, about fourteen days from the commencement, the eggs are taken from the baskets and spread out on shelves. Here no fire heat is applied, but they are covered over with cotton and a kind of blanket, under which they remain about fourteen days more, when the young chickens break their shells and come forth. The natives engaged in this business know exactly the day when the young chickens or ducks will come forth, and are ready for their arrival. They are generally sold two or three days after they are hatched.

The Pullman Strike.

It is to be regretted that the people of the United States should have to recover the use of their ordinary highways at the point of the bayonet, but it is better to recover and hold them in that way than to give up the control of them, even for a moment, to people so reckless and malicious, or so unutterably base, as those who have managed the great railroad strikes for the past ten years. The example of the Pullman strike shows how false and dangerous are the doctrines in regard to workingmen which have gained so much credit and wrought so much misery within the present generation. According to those doctrines, a man who works with his hands is not a man, but a babe, who must be provided with a clean house, not through the process of cleaning it with his own hands, but by having philanthropic people get up a subscription to hire some one to clean it for him; who must be amused with lectures, picture shows, and other distractions, at the expense of the public, or of amiable private persons, and whom it was right to encourage in every way to think that thrift, industry, sobriety, and self-denial were no longer necessary to one so favored, and that yelling and kicking, if longenough continued, were sure to bring him everything to which he might take a fancy. The lesson has not been lost: the babe of the nineteenth century, trained by the lullabies of the political economists, the dandling of the politicians, and the patient indulgence of the more rational part of the community, to combine the greedy helplessness of the infant with the strength and malice of the man, claws every day more viciously at what does not belong to him, and tramples more recklessly on the rights of other people. In the end, these rights must assert themselves, or perish in the worst of tyrannies; but a part of the harsh lesson by which they are defended should be reserved for the moonstruck philosophers and sentimentalists who have taught ignorant people that, instead of relying on their own exertions for improving their condition, looking out only to preserve and extend their freedom to use those exertions, they were entitled to trample on the freedom of others in order to get what they wanted.—*American Architect.*

The Great Sea Mammals.

Captain Scoresby relates how one of his harpooners, having struck a young whale in order to secure the mother, saw her instantly rise, wrap her clippers round her young one, and descend, dragging about 600 feet of line out of the boat, with marvelous force and velocity. Again she rose to the surface, darted furiously to and fro, frequently stopped short, or suddenly changed her direction, giving every possible intimation of agony. The boats continued to pursue her closely for a length of time, while she, poor creature, seemed utterly regardless of the dangers which surrounded her. At last one of the boats approached so near that a harpoon was thrown at her, then a second harpoon, and a third; still she did not attempt to escape, but allowed the other boats to approach, so that more harpoons were attached, till in the course of an hour the poor animal was killed. Though there was something painful in the deliberate destruction of a creature evincing such heroic affection for her offspring, yet this feeling of compassion quickly gave way to the object of the adventure, the value of the prize, and the exciting joy of the capture. The fidelity of the male and female whale to each other exceeds that of most animals. Anderson, in his "History of Greenland," mentions that some fishermen, having struck one of two whales, a male and female that were in company together, the wounded creature made a long and terrible resistance. With a single blow of its tail it upset a boat containing three men, by which they all went to the bottom. When another boat came up, the other whale still remained by its companion, and lent every assistance, till at last the wounded victim sank under the number and severity of its wounds, while its faithful partner, unable to survive its loss, stretched herself upon the dead body of her mate, and calmly shared its fate.

To the Greenlanders, as well as to the natives of southern climates, the whale is an animal of vast importance; and these people devote much of their time to fishing for it. When they set out upon their whale catching expedition they dress themselves in their best apparel, imagining that if they are not cleanly and neatly clothed, the whale, which detests a dirty slovenly garb, would certainly avoid them. In this manner about 50 persons, men and women, set out together in one of their large boats. The women take with them their needles, thread, and other implements, to mend their husbands' clothes, in case they should be torn, and to repair the boat if it should happen to receive any damage. When the men discover a whale they strike it with their harpoons, to which are fastened tubes two or three fathoms long, made of sealskin inflated with air. The huge animal, by means of this kind of bag, is in some degree compelled to keep near the surface of the water. When he is fatigued and rises, the men attack him with their spears until he is killed. They then put on their spring jackets, made all in one piece, of a dressed sealskin, with their boots, gloves, and caps, which are laced so tightly to each other that no water can penetrate them. Thus attired they plunge into the sea and begin to slice off the fat all round the animal's body, even from those parts that are under water, for, their jackets being full of air, the men do not sink, and are able to keep themselves upright, standing, as it were, in the sea.

At Vancouver's Isle the winter storms blowing directly from the North Pacific bring many whales which, getting out of their latitude and fatigued with fruitless struggles, are cast upon the coast; as the receding tide leaves the whales, they lash their tails, unable to regain deep water, and make a low guttural sound as they vainly try to spout. The native canoes, which are made of the trunk of a tree hollowed out by fire, are instantly launched. The only weapon used is a barbed spear, to which is tied a sealskin bag filled with air, and to this a rope made of seaweed is attached, acting as an anchor to the bladder or rope. A pole is fitted into a socket in the spear head, and so arranged that it can easily be withdrawn, leaving the head embedded in the body of the whale. Armed with both these primitive weapons, the natives set off in their fragile canoes and cast their spears, catching back the loose handles. In a short time the monster is covered with sealskin bags. When the tide begins to rise, the bladders prevent the whale from sinking sufficiently to use his full strength, keeping him on the surface of the water. As the canoe men pull to the shore the lines are tightened, and gradually the poor animal moves slowly and steadily to the land. His struggles to free himself are tremendous, but all in vain; struggling as a fish out of water, he is hopelessly in the power of his Liliputian foes. The inhabitants for miles around crowd to the shore, singing and beating drums made of the hollow bole of a tree over which is stretched the skin of a sea-lion. As soon as the whale is brought beyond low-water mark the work is done, and they have only to wait till the tide leaves it high and dry.—*Month.*

Phosphorescence.

Mr. Herbert Jackson, in a paper read before the Chemical Society, dealt first with the readiness with which the phenomena of phosphorescence may be studied by using a mechanical pump capable of very rapidly giving high vacua (Fleuss' pump). The author considers that in many cases the phosphorescence cannot be ascribed to impurities, but that a presumably pure substance yields in several instances phosphorescence of different colors. The main portion of the paper is occupied with an attempt to show that the phenomena of fluorescence, phosphorescence in air on exposure to light, and phosphorescence of substances in a vacuum under the influence of the electric discharge, are of the same nature, viz., a response on the part of the substances to the operation of radiant energy propagated after the manner of light in undulations of short length. These undulations proceed from the electrode, and to them the gas in the tube responds, giving rise to the visible light in the gas. To this light some phosphorescent bodies respond, but others require to be affected by the very short undulations to which air is opaque. Such substances, therefore, only phosphoresce in high vacua. These conclusions are based on experiments made with a "jar spark" in air acting upon phosphorescent substances placed in the appropriate foci of a quartz lens; on the study of the behavior of such substances outside a vacuum tube provided with a quartz window, and also on their behavior inside the vacuum tube. The results of a very large number of experiments seem to indicate a close connection between the phenomena of phosphorescence of air and in a vacuum, broken only when the opacity of quartz to some undulations and of air to others interferes.

CERTAIN species of ants make slaves of others. If a colony of slave making ants is changing the nest, a matter which is left to the discretion of the slaves, the latter carry their mistresses to their new home. One kind of slave making ants has become so dependent on slaves, that even if provided with food they will die of hunger unless there are slaves to put it in their mouths.