## Srientific enmerian.

ESTABLISHED 1845
MUNN \& CO.
Editors and Proprietors.
published weekly at
No. 361 BROADWAY, - - NEW YORK.
TERMS FOR THE SCIENTIFIC AMERICAN. (Established 1845.)
 Remit by postal or express money order, or by bank draft or check.
mUNN \& CO., 361 Broadway, corner Franklin Street, New Yo
The scientific American supplement
(Established 1876)
is a distinct paper from the Scientific a merican. THE SUPPLEMENT is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT
is issued weekly. Every number contains 16 octavo pages, uniform in size
 $\$ 5.00$ a year for the U.S.. Canada or Mexico. *6.00 a year, or $£ 14 \mathrm{~s}$. Sd., to foreign countries belonging to the Postal Union.
Sold by all newsdealers throughout the country.
Combined Rates.-The Scientific American and Supplement
will be sent for one year, to one address in U. S., Canada or Mexico, on Will be sent for one year, to one address in L.S., Canada or Mexico, on
receipt of seven doluars. To foreign countries, eight dollars and difty cents receipt of seven doluars. To foreign co
$a$ year, or $£ 1$ 14s. 11d., postage prepaid.

Building Edition of Scientific American
(Established 1585.)
The bulding edition of the Scientific American is a large and splendidyly illustrated periodical, issued monthly, containing floor plans and perspective views pertaining to modern architecture. Each number
is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To architects, builders, andall woo contemplate building this work is invaluable.


 Combined rate for BuILMING EDITION, SCIENTIFIC AMERICAN, and
SUPPLEMENT, *3.w a year. To foreign countries, 11.09 a year, or $z^{2}$ Ss. 2 d ., Supplement, 33.1
postage prepaid.

Export Edition of the Scientifle American (Established 1878)
with which is incorporated "La america Cientifica e industrial,"
or Spanish edition of the Scientific American. published monthen or Spanish edition of the ScIENTIFIC AMEICAN. published monthyl,
uniform in size and typography with the ScIENTIFIC AMERICAN. Every uniform in size and typography with the Scientific American. Every number contains about 100 pages, profusely illustrated. It is the fnest
scientific industrial export paper published. It circulates throughout It circulates throughout
Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions-wherever the Spanish language is spoken. ThE
Scientific American Expert EpTION has a large guaranted circulaSCIENTIFIC American Expert Eniten has a large guaranteed circula se 12s.4d., postpaid to any part of the world. Single copies, 25 cents. MUNN \& CO., Publishers, 361 Broadway, New York. LTV The safest way to remit is by postal order. express money order,
draft or bank check. Make all remittances payable to order of MUNN draft or
$\pm \mathbf{C o}$.
Readers are specially requested to notify the publishers in case of
any failure, delay, or irregularity in receipt of papers.
NEW YORK, SATURDAY, MAY 7, 1898


TABLE OF CONTENTS OF
Scientific American Supplement

## No. 1 1 Ge.

For the Week Ending May 7, 1898.
Price 10 cents. For sale by all nemsdealers.

1I. ARCHITECTURE.-The Palace of Justice in Budapest.- 1 illus.
III. bacteriology -alloohol in Relation to Mierobial Diseases.
IV. BIOGRAPHY.-The Jubile of Henrik Ibsen.-1 illustration.... 18860
v. ELECTRICITY.-The Working of Long Submarine Cables.-By Vi. Marine architecture--How a ship is Built-10 illustra.

VII MECHANICAL ENGINEERING.-Compressed Air Machinery.

 IX. MISCELLANEOUS: Ennineering $N$ Notes.
Electrical
x. Natural Historit-The. Horned Raven in the Zoological 186 xi. Patents and Trade Marks.-The Protection of Indus.
trial Property.
By $\mathbf{x I I}$ PSYCHOLOGY. The Psychology of Invention. - By Prof. XIII. SANITARY ENGINEERING.-The New Portable Filter.-3
 xv. Warfare.-Spanish Naval Education.-By Henry halk..... 186

## NAVAL APPROPRIATION BILL.

The liberal appropriation of $\$ 57.000,000$ for the increase of the navy which has been agreed upon and re for the purpose. The bill calls for the expenditure of $\$ 32,000,000$ more than the appropriation for the current year and $\$ 19,000,000$ above the sum voted by the House, most of the amendments made by the Senate being adopted by the conferees.
The bill calls for the construction of three first-class sea-going battleships, to carry the heaviest guns and armor, the cost of each ship, exclusive of armor and armament, to be $\$ 3,000,000$. It also provides for four coast defense monitors, each to cost $\$ 1,250,000$ : sixteen torpedo boat destroyers and twelve torpedo boats to cost $\$ 6,900,000$ and one gunboat for service on the Great Lakes to cost $\$ 260,000$. Fully as important as the construction of warships is the matter of dry docks, and we are glad to note that four first-class docks, to cost $\$ 825$, 000 each, are to be built, one each at Portsmouth, Bos ton, League Island and Mare Island. In addition to these a steel floating and graving dock is to be built at Algiers, La. The Senate amendment calling for $\$ 1,000$, 000 for the construction of new buildings for the An napolis Naval Academy was agreed to by the conferees.
Taken altogether, the programme of new construction is an excellent one and, with one important exception, it meets the more pressing needs of the navy. The exception is to be found in the fact that there is no provision for building any more of those invaluable armored vessels, like the "New York" and the "Brooklyn," which combine the fighting qualities of the bat tleship with the speed of the cruiser, and are known as armored cruisers.
The armored cruiser carries sufficiently heavy armor and guns and has sufficient speed to enable it to fight or a void almost any type of warship afloat in the world to-day. Our own "Brooklyn" can catch all but a very few of the fast cruisers afloat, and her battery is so powerful that she would stand more than an even chance of silencing any but two or three of the latest ships of her type. With these exceptions, she could sink or capture any kind of vessel outside of a battleship and there are many of this type that would be badly used up in a duel with either the "New York" or the "Brooklyn."
Now it is the lack of mobility or the power to move swiftly from place to place that severely handicaps the battleship or monitor in its attempt to protect a long stretch of coast line, such as we possess. The Spanish fleet, which is reported to have sailed for the west, has a speed of 20 knots, none of the vessels be ing slower than that. Such a fleet could cruise in the same waters as a fleet of 15 or 16 -knot battleships for months, without the latter being able to bring it to an engagement. Nor would it be prudent to dispatch our swift protected cruisers, like the "Columbia" and "Minneapolis," "San Francisco" and "New Or leans," against the Spanish boats with their 12 -inch armor and 11-inch armor-piercing guns.
We must oppose armor to armor-piercing guns, and armor-piercing guns to 12 -inch steel belts, and must have speed to match speed, if we are to bring such a fleet to battle and make sure of sinking it.
It is true we have the before mentioned "Brooklyn" and""New York," and, ship for ship, they would be a match for the Spanish cruisers: but not even our sublimest faith in the excellence of our gun crews would make us trust these two ships to the concentrated fire of four or six ships of the same class.
We speak of course with reference to the future; for even if armored cruisers were ordered, they would not be ailable for service until long after the present war is finished. At the same time it is evident to any one who armored warships is rapidly increasing. The "Yoshino," 12,320 ton battleship, built for the Japanese navy, has a speed of $191 / 2 \mathrm{knots}$, the 13,860 ton battleship "Sardegna," of the Italian navy, can steam 20 knots, and armored vessels such as the "O'Higgins," 8,500 tons, and "Esmeralda," 7,000 tons, of theChilean navy, will steam $21 \frac{1}{2}$ and 23 knots respectively.
Superior speed is to the modern warship what the weather gage was to the sailing frigate. It enables the faster vessel to fight or not, as she pleases, and enables her to place herself at whatever fighting range is best suited to her capacity. The ability of a warship to protect an exposed coast line is largely in the ratio of her speed, and, for quick concentration at strategic points. speed is obviously of the greatest value.
We think that if two swift and armored cruisers of the type of the Brooklyn were substituted for one of the battleships and one of the coast defense monitors, we should be so much the better prepared to meet the possible ravages of high speed armored craft in the future.

Travelon the Bulawayo Railroad is exciting The Shashi River rose recently four feet above the bridge tracks, so that engines could not cross. A train was made up as long as the width of theriver, pushed across by one engine, and taken up on the other side by another. Soon after the bridge was washed away.

## the philippine islands

During the last few days attention has been directed toward the Philippine Islands, the objective point of the United States Asiatic squadron, which sailed from Hong-Kong on April 27, to engage the Spanish fleet The Philippine Islands are an archipelago southeast of Asia. They extend almost due north and south from Formosa to Borneo, and they separate the South China Sea from the Pacific Ocean. The number of island in the Philippines is variously estimated from 1,200 to 1,400 , and it was not until the last few years that some of the larger islands were explored sufficiently to enable their area to be accurately computed. According to Domann's map (1882) the area of the islands was 114,356 square miles. The two largest islands are Luzon (area, 40,024 ) and Mindanao. Their aggregate area is 52,650 square miles.
The islands were discovered by Magellan in 1521, and Manila, the capital, was founded by Legaspi in 1571, and since that time they have been under the dominion of Spain. Their conquest and retention was in marked contrast to the usual Spanish methods of dealing with conquered people, methods of which Cortez and Pizarro are the chief exponents. Legaspi with six Augustinians and a handful of soldiers accomplished the wonderful work of conquest. Without greed for gold and without any exhibition of cruelty or persecution, these devoted men labored among the docile people until they won their confidence, so that the islands were seiz ed with little bloodshed and no massacre or depopulation. The name "Islas Filipas" was given by Le gaspi in 1567. Contests with frontier rebellious tribes, attacks by pirates, earthquakes and typhoons serve to break up the monotony of an otherwise uneventful history.
Manila was captured by the English under Draper and Cornish in 1762, and ransomed for $\$ 5,000,000$, but was restored in 1764. The present insurrections in the islands were put down with an iron hand and many atrocities were committed, so that it is little wonder that many of the inhabitants look upon the arrival of the Americans as a deliverance.
While none of the islands have very high mountains (the highest, Apo, in Mindanao, being over 9,000 feet), still all the islands may be described in general as mountainous and hilly. Volcanic forces have had a large share in shaping the archipelago, but few of the peaks are now volcanic. In 1814 a terrible eruption destroyed 12,000 people at Camalig, Budiao, Albay, Guinobatan and Daraga. In 1867 the same district was risited with another eruption. The Philippines are also notorious for terrible typhoons. In 1876 one of the storms burst over Luzon, pouring down the sides of the mountain Mayon, bringing destruction to a number of cities, completely ruining 6,000 houses Typhoons on the coast are also common. The third great evil to which the islands are treated are the earthquakes, which visit them so frequently that they affect the style adopted in the erection of buildings. The most violent earthquake occurred in 1880, destroy ing an in
The Philippine Islands are peculiar in having three seasons-a cold, a hot and a wet. The first extends from November to February or March. The winds are northerly and woolen clothing and a fire are desirable the sky is clear and the air bracing, and Europeans in this strange clime consider it the pleasantest time of the year. The hot season lasts from March to June and the heat becomes oppressive and thunderstorms of terrific violence are frequent. During July, August, September and October, the rain comes down in torrents and large tracts of the lower country are flooded. The population of the Philippines is $7,670,000$, the capital, Manila, having 154,062 inhabitants. There is a small Spanish resident population and about 100,000 Chinese, in whose hands are the principal industries. The native inhabitants are mostly of the Malayan ace. The government is administered by a governor general and a captain-general, and the forty-three provinces are ruled by governors, alcades or commandants, according to their importance or position. The estimated revenue of the islands in $1894-95$ was $\$ 13,500,000$ and the expenditure $\$ 13,200,000$. There is an export duty on tobacco and nearly every article imported is taxed. The chief products are sugar hemp, coffee and indigo, and there are large coal fields which are now being opened, so that it is expected that 5,000 tons of coal per month may be mined. The imports in 1896 were about $\$ 12,000,000$ and the exports $\$ 20,500,000$. There are 70 miles of railway on the islands and 720 miles of telegraph.
Manila lies on the western side of the island of Luzon and is about 600 miles from Hong-Kong. It has one of the most spacious and beautiful harbors in the world. The shores are low and inland can be seen the outline of mountains. The city of Manila resem bles a dilapidated fortress surrounded by stone walls 300 years old. There is also a wide, shallow moat. The gates are never closed and it is doubtful if the city could make any defense. There is also an old fort Several creeks branch off from the landlocked bay and afford a means of communication with the suburbs.

These creeks are crossed by innumerable bridges, and canoes thread their way through these narrow water-
ways, which somewhat resemble it tropical Venice. ways, which somewhat resemble it tropical Venice. Around the walls and the edge of the bay is a fashiona ble drive lined with almond trees. It is here that the well-to-do inhabitants walk, drive and meet their friends. Of nearly 300,000 people in the province there are not inore than 5,000 Spaniards. One of the most curious sights to the traveler who comes from China are the large two-wheel drays drawn by so-called water buffaloes. They are guided by a ring through their nose to which is attached a cord leading back to the driver, who either mounts on his back or rides on the shafts. The weight of the load is borne on the neck by means of a yoke. The beasts are docile and their chief delight seems to be to wallow in the mud and to submerge themselves so that only the nose is out of the water. The water buffalo is particularly valuable to the inhabitants as a beast of burden, as it can drag a plow and can walk while knee deep in mud. The milk of the female is very generally used instead of cow's milk, but its meat is unfit for food.
In the two best streets of Manila there are excellent stores in which goods of all kinds can be purchased at moderate prices, many of the merchants heing Chinese. The churches must have been imposing buildings years ago before they were shaken and in some cases wrecked by earthquakes. They contain no works of art of any value. The inhabitants are very faithful to their church and the archbishop possesses almost unlimited influence with the inhabitants. It has often been said, if the priests were taken away, the natives would be ungovernable. The dwelling houses in Manila are constructed with a view of shatting out the intense heat of the summer. The houses are rarely more than two stories in height, owing to the ravages of earthquakes. Glass is of course unknown, as the earthquakes would shiver every pane. There is coal in abundance in the Philippine Islands, as already stated, and the streets of Manila would undoubtedly be lighted with coal 'gas if it were not for the fact that gas pipes would be destroyed in the unstable soil. Of course, accidents are of frequent occurrence with kerosene, but as the natives' houses are very inexpensive, their loss by fire is easily made good.
Strange to say, life in the old city does not present many points of interest to the traveler, for the streets are narrow and the houses solid and gloomy. It is a marked contrast to the businesslike cities of South America. The Spaniards born in the Iberian Penin sula look down upon those born in the islands, so that class distinctions are very closely drawn. This has re sulted in the failure to make political combinations. Hatred and jealousy of the foreigner are carried to ex treme limits, the Chinese coming in for a large share of their disfavor. The theaters are poor, concerts are rare and there is no library and their amusements are mostly limited to hearing the band play, attending balls on Sundays and cock fights. The cockpits are licensed by the government, and, though the betting is limited by law, the citizens will not hold to it. The revenues of the islands are furnished by direct taxes on every Indian, half-breed and Chinese, and the export and import duties have already been referred to The dress of the natives is exceedingly picturesque and is never adopted by the Spanish. Cigar makers in and around the city of Manila number 22,000 and they are allgirls and women with the exception of 1,500 men They presenta picturesque appearance with their native costume and huge hats intended to protect them from the rays of the sun. They make their cigars squatting on their heels or sitting on bamboo stools two inches high. They frequently come from considerable distances, going back and forth in boats. Tobacco has always been and probably will continue to be the most important product of the Philippines; and, accord ing to the old laws, the Indians were compelled to raise tobacco in certain regions which were not adapted to growing it, even to the exclusion of other crops, but in 1883 thelaws were repealed and the result was the secur ing of finer tobacco and better cigars, for they are now made at a higher rate. The wants of the natives are few and are easily supplied. They live along th banks of the rivers in huts made of bamboo and cane suburbs of Manila are enchanting

## AMERICAN TRADE WITH CENTRAL AND SOUTH

 AMERICAN COUNTRIESIt is thought by many that our war with Spain wil interfere seriously with our trade with the countries of Central and South America and Mexico, but this is not the case. The fact is, that, barring contraband of war, goods may be sent to all of the countries in Central and South America, but, unfortunately, they are pre ferably carried in foreign bottoms. It is a satisfaction to know our splendid export trade with these countries will not be crippled. No gunpowder, blasting powder cartridges, firearms, guns or gun carriages, or any
article liable to be considered contraband of war will article liable to be considered contraband of war will
be received by any of the steamship lines trading between the United States and these countries.

With Mexico we have railway communication, and
the steamers of the Ward Line, which sail under the British flag, will carry goods to these ports. Goods for Guatemala, Honduras, San Salvador, Nicaragua and Costa Rica, may be sent by the Atlas Line, which also sails under the English flag. Venezuela is reached by the Royal Dutch West India Mail Service, which, of course, sails under the Dutch flag. Colombia may be reached by the Atlas Line, which sails under the English flag. Goods for Ecuador, Peru, Bolivia and Chile may be sent by the steamers of the Merchants' Line. which sail under the English flag. The vessels of this line are owned by the New York and Pacific Steamship Company, Limited, Messrs. W. R. Grace \& Company being the agents. Goods for Argentine Republic, Uruguay and Paraguay may be sent by either the Prince Line or the Norton Line, both of which sail under the protection of the British flag. San Domingo may be reached by American lines, as there is little danger, as the Gulf will be protected by our war fleet. Hayti may be reached by the French Line and the Atlas Line, which, as already stated, is under the protection of the English flag. It is not likely that trade will be interfered with in the slightest degree except as regards goods sent on consigmment, for in a circula of one of the lines we find the following: "No cargo can be received which belongs either in whole or in part to any citizen of the United States or to any subject of the Queen of Spain," but this does not interfere with legitimate trade transactions. We do not always realize the enormons importance of our trade with our southern neighbors. We give below the population of the various countries we have mentioned

| Mexico... | 12,58,881 |
| :---: | :---: |
| Guatemala | 1,470,000 |
| Honduras. | 450,000 |
| San Salvador. | 816,000 |
| Nicaragua. | 400,000 |
| Costa Rica. | 265,000 |
| Venezuela.. | 2,323,988 |
| Colombia | 4,600,000 |
| Ecuador. | 1,300,000 |
| Pera. | 2,80,000 |
| Bolivia. | 2,300,000 |
| cule. | 3,500,000 |
| Argentine Republic. | 4,042,990 |
| Uruguay. | 850,000 |
| Paraguay. | 476,000 |
| San Domingo. | 610,000 |
| Hayti. | 950,000 |
| Total | 39,732,839 |

## An Explosion Injures an Inventor

Julius Chien, a Russian inventor, who manufactures pyrotechnic toy called "How the 'Maine' was Blown Up," was badly injured by an explosion, a few days ago, in his laboratory in New York City, of several pounds of giant powder. The concussion wrecked the top floor, blew out the windows and se the place on fire. The flames were extinguished and the injured man was removed to the hospital. He was experimenting with some giant powder in connec tion with a toy relative to a naval engagement when in some way a cap fell into some six or seven pounds of giant powder, which was placed in the middle of th floor, resulting in an explosion. This accident is im portant as a warning to some of the readers of the Sci entific american. We have received many inquiries regarding the trick match which explodes when the flame has proceeded half way down the splint The manufacture and use of such matches is, in ou estimation, extremely dangerous, and our readers ar specially cautioned against experimenting in any way with even a small quantity of powerful detonating ex plosive, as the fulminates, giant powder, etc. The
trick "How the 'Maine" was Blown Up' consisted of trick "How the 'Maine" was Blown Up' consisted o
a piece of tissue paper with a view of the war vesse printed on it, and the shore, where a Spaniard is touch ing off a mine electrically. The paper was treated with some substance, probably niter, so that when the paper was lighted with a piece of burning string, the combustion followed only the line which had been stamped on the paper by the chemical. When, at last the warship is reached, a cap of giant powder on the back is exploded, tearing the tissue paper. The toy was not particularly dangerous, but there is always
danger in the manufacture of anything of this nature
D. R. Dom strongly recommends absorbent cotton as a filtering medium, the chief advantage claimed for it being its rapidity of action, which renders it of special value in filtering preparations containing volatile or readily oxidizable constituents. such as medi cated waters, spirits and ferrous preparations. The difference in viscosity of preparations requiring filtra tion must be allowed for by greater or less compression of the cotton plug. As a general rule, however, the cotton should be rolled into a cone-shaped plug, which is then to be pressed down carefully into the neek of the funnel in such a manner that the bulk of the cot ton remains in the body of the funnel. A glass rod is then pressed gently on the cotton and the liquid poured down the rod. In the case of fluid extracts and other preparations containing much suspended o
sedimentary matter. cotton is not suitable for filterin sedimentary matter. cotton is not
purposes - Bulletin of Pharmacy.

Mr. Charles Janet, whose work on the social Hymenoptera has been often mentioned in Natural Science, has published (Mém. Soc. Zool. France, x., 1897, pp. 302-323, pl. x.) full descriptions with figures of the artificial nests which he has used for his observations on the habits of ant colonies. He obtained the best results with blocks of plaster provided with suitable hollows covered with a sheet of glass. No earth is needed with this form of nest, and a proper degree of moisture is insured by pouring water into a tube sunk in one side of the plaster block.
T. Schloesing has devised an ingenious method of measuring the density of gases, which is based upon the balancing of two columns in an apparatus consist ing of two vertical tubes, each one meter long, com municating at their lower ends by a three-way tap Carbon dioxide or some other easily absorbed gas of known density is passed into one tube and the gas to be examined in the other; after allowing them to communicate by opening the tap, a state of equilibrium between the two gases and the air is set up in about four minutes, and the level of the invisible surfaces of separation is then determined by absorbing the car bon dioxide with potash.-Comp. Rend., exxvi., 476

Weighings made of the brains of negroes have given between 44 ounces and 45 ounces, a weight that corre sponds with European women'; while in the negress the mean weight is less than in the female sex in Europeans From the weighings which have been published of the brains of the orang and chimpanzee it would seem that the brain weight in these apes ranges from 1 ounces to 15 ounces, and the bran weight appears to be much about the same in the gorilla. These figures are greatly below those of the human brain, even in so degraded a people as the dwarf Bush race of South Africa. They closely approximate to the weight of newly born male infants, in whom the average weigh is $11 \cdot 6$ ounces.
There can be no doubt that the most perfect method of sterilization, where it can be applied, is by heat. Baking, however, is a more or less uncertain process while boiling is destructive to many substances Moreover, the boiling temperature is so little above that which is fatal to microbic life that a considerable length of exposure to such a temperature is necessary if one is to be sure that the process has been effectually carried out. Frying, however, is another matter Olive oil at a temperature of $160^{\circ}$ to $180^{\circ} \mathrm{C}$. acts very
quickly and with great power. Professor Wright, of quickly and with great power. Professor Wright, of
Netley, says that to obtain complete sterilization of an Netley, says that to obtain complete sterilization of an instrument it suffices to dip it for an instant into the hot oil, and that in the case of syinges it is sumfien The temperature of the heated oil may be determined by a thermometer; but it is often more convenient to adopt the rough and ready methods of the cook by the aid of a bit of bread crumb. "It will be found that the bread crumb will become brown and crisp a soon as a temperature of $160^{\circ}$ to $180^{\circ}$ is reached." Fo the sterilization of syringes all that is necessary is to heat a little oil in a spoon over a spirit lamp, testing it from time to time by bits of bread crumbs, and when the proper temperature has been attained, to fill the syringe twice with hot oil. All microbial in fection will then have been destroyed.-Hospital.
In the course of his lecture at the London Institution on "Insects at Work," Mr. F. Enock, after referring to the trapdoor and the garden spiders, spoke at some length on the leaf-cutting bee, probably the most re markable of all bees. The leaf-cutter, he said, had three eyes in the center of its head (a very thick one) and two compound eyes, occupying, respectively positions on each side of the others. In each of these compound eyes there were 11,000 reflectors, making total of 22,000 . That appeared strange; but he had proved it to be a fact by placing a locust in the lens, and then taking a photograph of the head, which showed a locust in every reflector. The photograph referred to was shown on the screen. Another peculiarity of this bee was that the tongue of the male was longer than that of the female; but this was counter balanced, perhaps, by the fact that the jaw of the lat er was very much stronger than that of the former In explanation of the title given to this bee, it was ex plained that its habit was first to burrow in a sand bank, making a sort of tube for its nest. Next the intelligent creature-which was really a capital archi ect-would proceed to a rose tree. It would there hght upon one of the leaves, and, with the tools it Which it worked, would cut a round piece out of in he it would carry to its nest, and ramit to agains piece, which it used to commence the side of a cell with; and so it would go on until it had constructed welve cells, in each of which it wonld deposit its col lections from the Canterbury bell, of which it was ver fond, and other flowers. An egg was laid in each o these cells, and in due time young bees appeared, and in their turn escaped from the cells and flew about, to carry on the same kind of work.

