

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at
No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico \$3.00
One copy, one year, to any foreign country, postage prepaid, £0 18s. 5d. 4.00
THE SCIENTIFIC AMERICAN PUBLICATIONS.Scientific American (Established 1845) \$3.00 a year
Scientific American Supplement (Established 1876) 5.00
Scientific American Building Monthly (Established 1885) 2.50
Scientific American Export Edition (Established 1878) 3.00
The combined subscription rates and rates to foreign countries will be furnished upon application.

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, FEBRUARY 20, 1904.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE MAN BEHIND THE GUN.

The crushing blow delivered by the Japanese at Port Arthur against the Russian fleet affords another proof of the fact that, after we have made a most careful comparison of the fleets of the two contending nations, it is impossible to say whether this one or that possesses the most efficient navy, until we know something about the quality of the officers and the crews. On paper, as we have shown in the present and the preceding issue of this journal, the Russian and Japanese fleets in the Pacific were approximately equal, the two extra battleships possessed by Russia fairly offsetting the superiority of Japan in armored and protected cruisers. At the close of our article we suggested that the question of supremacy might depend entirely upon the personnel; and in the short interval of a few days that question has been decided in a most emphatic manner. The ships attacked by the Japanese fleet in Port Arthur were among the very finest afloat, one of them, the "Czarevitch," being provided with internal bulkheads of armor plate, designed to limit the destruction of a torpedo, while at and above the waterline she carried two complete belts, one above the other, where the ordinary battleship carries only one. Moreover, in arming the Russian warships, particular attention has been paid to the repelling of torpedo-boat attack, and all of the ships carry an exceptionally numerous battery of 6 and 12-pounder rapid-fire guns. Yet, in spite of unusual offensive and defensive protection, the Russian ships apparently fell easy victims to the torpedo at the very first attack. The fault lies certainly not in the ships, and just as certainly it must lie with the officers and crew. It is evident that the Japanese, immediately upon the rupture of diplomatic relations, moved swiftly upon a well-considered plan. They knew the location of every Russian ship, and they were quick to seize the tempting opportunity offered by the assembly in the outer harbor of Port Arthur of the very flower of the Russian navy. The comparative ease with which torpedo boats secured their victims proves either that the Russians were extremely careless and neglected the most ordinary precautions, or that the effectiveness of torpedo-boat warfare has been greatly underrated.

In the first two or three days of the war the Japanese have crippled the Russian Pacific fleet by the destruction or disablement of eleven Russian warships, aggregating about 72,000 tons displacement, or over fifty per cent more than was put out of action by the United States ships in the whole Spanish war. What makes the loss so overwhelmingly disastrous for Russia is that these eleven are the very pick of her fleet. The "Czarevitch" is the latest and finest of the Russian battleships, the model upon which all her later vessels have been laid down; the "Retvizan," built by the Cramps, was considered also to be one of the best warships afloat, while the "Poltava" is a battleship of about the size and effectiveness of our own "Iowa." Next in importance are four splendid cruisers, among the very fastest in the world, the "Variag," "Pallada," "Askold," and "Diana," vessels of 6,500 tons, 23 knots speed or over, with a heavy modern armament. Then there is the cruiser "Boyarin," a crack vessel of 22½ knots speed, just out of her builders' hands, and the "Novik," of 3,000 tons, which has the distinction of being the fastest cruiser in the world, her speed being 26 knots an hour. In addition to these are the two gun-boats "Korietz" and "Mandju." Of these vessels, the sister ships "Variag" and "Pallada" are sunk, the one by gun fire, the other by torpedo, and for the present at least may be stricken off the list. The other vessels have been struck below the waterline by gun fire, and with the very limited repair facilities at Port Arthur, it will be months before they are again on the active list. The balance of naval power has passed to Japan, and her superiority appears to grow steadily as the days pass by. Having the command of the sea, she can pour the whole of her troops into Korea; for the fear of invasion being now removed, the troops that were necessary for home defense are liberated for service

on the mainland. It is trivial to talk of sending out the Baltic fleet, for the ships are generally old and of doubtful value, and they would undoubtedly be intercepted and sunk by the Japanese before they reached the scene of hostilities. The Black Sea fleet is shut up by treaty obligations. With her navy crippled and blockaded, Russia must now depend upon her land forces to retrieve her reputation. Port Arthur will be cut off and besieged, and the war will probably be a repetition on a large scale of the siege and relief of Ladysmith, South Africa. The ultimate issue will in this case, as in that, depend upon the staying power of the besieging and relieving forces.

WINTER INSECTS.

The first chill days of autumn send a thrill all through the barren woods and fields. Foliage begins that magic change of color which glorifies the landscape of our American autumns; tender, sensitive plants of garden and fields shrink and shrivel up before the chilling blast, and tens of thousands of insects cease their hum and grow sluggish and voiceless. Wild animals and reptiles lift up their heads in mute appeal to the lingering rays of a still warm sun, but retreat to their homes in holes and burrows as night falls around. A mystic silence creeps over the country, and a period of rest for all nature follows. It is harvest time for man, and he garners his grain and fruits, replenishing his storehouses with food to last another season.

It is the final end for great multitudes of insects, which live but a summer, and then pass into the eternal silence of death. To them the few months of warm weather have been a lifetime—the beginning and end of all existence. The days and weeks have been years and decades to them—the completion of the cycle of youth, maturity, and old age. They have lived their allotted time—performed their work—and died. But they have perpetuated their species in the eggs and cocoons which they have securely buried in plants and trees, where neither frost nor ice can injure them. They may yield up their individual life; but their race continues forever.

For others the end of summer merely portends the beginning of that strange period of rest which we term hibernation. Life's activities and functions are merely suspended. Sleep—long, deep, dreamless sleep—broods over the earth, and beneath the crackling frost and ice, beneath the shroud of white snow and frozen earth, the dumb creatures of the woods and fields are slumbering. Occasionally a warm day of mid-winter penetrates to their hidden homes, and they move restlessly.

If the naturalist knows the secrets of nature, it is not difficult to find studies of animal and insect life in the woods and fields these cold days. Every tree and plant is the home of some creature, and beneath every sod and trunk there is reposing some hibernating insect or four-footed beast. Nature's signs are invisible to the uninitiated, but to those who know, they are scattered around plentifully, suggesting experiences that will amply justify the inconvenience of a day's trip to the woods. But one can find all the signs of a teeming population without stirring beyond the orchard of the country home or park of the city. Tens of thousands of hibernating creatures and embryonic insects are comfortably passing their winter in the trees and plants which adorn our city parks. An acre of trees may contain a population greater than that of all the registered voters of New York or Boston.

Eggs there are everywhere—eggs which have been so carefully deposited and hidden that the severest storms and cold waves of winter are unable to touch or injure. Those which are sensitive to frost and rain are buried at the bottom of deep holes in the trees, which were drilled with such care and labor by parent insects before the frost of autumn sounded their own doom. Tiny rolls of sawdust may mark the opening of one of these drilled holes, or a slight mound of sticky substance which the mother drew over the opening. An inch or two deep in the bark and wood of the tree the eggs snugly rest until the warmth of spring hatches them. The varnish-like substance which covers the entrance sheds the snow and rain so that no moisture can penetrate to the winter home of the future insect host.

The anxious orchardist goes forth in autumn and winter to find the eggs of the insects, and in trees and vines he uncovers their hiding place. A long wire thrust down the hole exterminates eggs or hiding grub. Experienced in his work, the hunter examines the bark of a tree, and uncovers the roots of the trunk. Somewhere the trail of some sleeping grub attracts his attention, and he cuts and digs away until the hibernating creature is found. Twigs of small trees and plants yield their full quota of insect eggs. These belong to the non-perishable order—the hardened creatures which have no fear of frost or snow. With fine disdain of the cold the clusters of eggs are merely glued to bark, stones, and twigs. They are proof against wind, storm, rain, and cold. Only man can destroy them, with his

implements of destruction which never fail to reach their homes. The clusters of eggs are swept and scraped from their supports and thrown into the fire.

While cold and rain will not injure these eggs and cocoons, the alternate action of frost and a warm sun may accomplish the dreaded results. Exposed to the sun's wintry rays, the cocoons and clusters of insect eggs on twigs and bark soon become more sensitive to the elements. Life is actually started therein. Death may thus follow. But the wise mothers have provided against any such contingency, and with an instinct that is marvelous every cluster of eggs is placed on the shady side of limb or tree so that the rays of the sun can never reach them. Some are placed on the north side of buildings where they are amply protected, and a few are half buried under leaves and dried grasses. Wherever located they are protected from the direct rays of the sun so that no harm can come from premature hatching.

Many insects lay their eggs in the ground, burying them just beneath the surface of the soil where they are frozen solid until spring. The site selected for such hatching grounds is always in the shade, away from any sunny exposure. Beneath stones and boards, under leaves and mold, they breed, choosing their site with a fine knowledge of all future dangers. Close to them are comfortably curled up in small bundles hibernating bugs, beetles, and worms. Some of these have crawled far down below the frost line, where they remain impassive in their slumber at an absolutely uniform temperature, and they are not disturbed until the April sun has penetrated down to their home. Then they awaken from their winter sleep, and crawl up to sunlight and life again to pass through another cycle of their existence.

Most of the earth-worms and destructive grubs penetrate to a distance of a foot or more beneath the surface of the earth, and to reach them the soil must be plowed or thrown up with a spade. Only a little work is needed to expose scores of different varieties of bugs and worms to view, while the mere lifting of a board on the shady side of a building will reveal many others which have not crawled in the earth for protection.

FORCING PLANTS BY FIRE.

A curious phenomenon connected with the forcing of flowers under somewhat exceptional circumstances was observed not long ago by M. J. Jolly.

On the second of September last, a large fire broke out in the village of Chaussée-sur-Marne, between Châlons and Vitry-le-François, and destroyed a large part of the village. The fire, urged by the wind, spread as far as it was possible, and consumed the last houses on the side toward the country. It also attacked the neighboring trees forming part of a large pear and apple orchard, and reduced the two first rows entirely to ashes. The three following rows, protected by the first, and the distance, remained standing, although considerably damaged and badly scorched. The injury done to the sixth row was naturally not so great. A goodly number of branches, nevertheless, were scorched and unable to resist the heat, while the remainder subsequently exhibited a peculiar phenomenon, viz., a second flowering. This began at the end of September, and in October all the branches of the trees except those that had been scorched were covered with blossoms, as in the month of May, the ones most heavily laden with flowers being those that had been most exposed to the action of heat. That is not all. In another direction the fire had ceased in the vicinity of some lilac bushes, and these, as well as some plum trees, flowered anew, the lilacs in particular being covered with blossoms.

It is to be remarked that the conflagration lasted but four hours at the most, and there is therefore nothing here that resembles an ordinary forcing. All the species that blossomed are those whose buds for the following year are formed in the month of August. Now the facts gathered by M. Jolly, an eye witness, seem to show that it is possible for a momentary but strong action of heat to produce a second flowering. Does this exert a local influence, a certain desiccation of the organs of the trees? It is possible; and we have seen that a previous desiccation is necessary for forcing, just as it is, according to Géard, for the parthenogenetic development of certain eggs. At all events, the fact might and ought to serve as a starting point for experiments from which might be derived practical hints for the forcing of fruits and flowers. With early varieties, it might be possible to obtain two crops, the regular one in the spring and a supplementary one in the fall, provided strong heat were employed, although for a short time, as soon as the buds are formed. This would be more economical than the present methods, since the heat necessary for the development of the flowers and fruit would be furnished, not by coal, but by Dame Nature. Some horticulturist or amateur would do well to make the experiment.