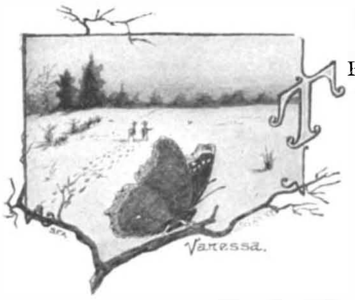

INSECTS IN WINTER.

BY S. FRANK AARON.

THE winter torpidity of insects and of other cold-blooded animals is a subject of considerable interest, about which we know very little. Writers have for the most part taken it up in a general way or have given it little mention. The student becomes at once impressed with the wide difference between torpidity and the hibernation of warm-blooded animals. He finds the latter only a prolonged and more profound sleep, the former a living death which may be quickly thrown off and as quickly resumed with the changes of temperature.

Insects in the preparatory stages—the egg, the larva and the pupa—are entirely immune to cold. They have little or no internal heat to counteract it. The same is true of those in the imago or perfect stage, so long as their sexual functions have not been completed. I have proved by repeated experiments that insects may be subjected to extremely low natural or artificial temperatures, so stiffly frozen that their legs and wings can be snapped off as in the dried specimens; yet after a few minutes' exposure to external heat their vital activity was thoroughly restored.

When, however, my experiments were made with those that had mated and females that had laid their eggs, the attempt to restore them often failed, because such specimens had exhausted their vital forces and would soon have died in any temperature. When a number of ants are artificially frozen and then warmed by external heat, some of them will return to life and activity, while the rest are found to have been killed. The same results follow in experiments on insects of all orders and of all sizes.

When, therefore, insects in the perfect stage seek hidden retreats in which to pass the winter, under loose bark or protecting leaves, or in the crevices of wood, their object is not to find shelter from extreme cold, but from the crushing effects of ice and snow, and especially from the prying search of birds and other enemies. There would be far less chance for these refugees to survive till spring if most of the birds had not migrated southward. But we still have with us during the season of frost and storm the quail and the grouse, scratching for insect food in the loose earth and among the leaves; the woodpecker and the nuthatch, exploring with their sharp bills and sharper eyes the crevices of wood and hiding places under bark; the jay, the chickadee, the purple finch and the winter wren, searching everywhere.

CHRYSALIS OF GRAPTA.

A ray of winter sunshine and a breeze that tempers the frosty air often call forth the long-dormant insects from their snug retreats. When we wander afield on a bright winter day we sometimes see those gay rovers, the Vanessa antiopa butterfly, the Grapta, the Atalanta or the yellow Colias sunning themselves on rocks and logs, or flitting through the leafless woods. Let but a chill wind spring up or a passing cloud obscure the sun, and they vanish as quickly as they came, seeking the nearest friendly shelter. When at last spring fairly returns they are ready for mating, ere long to die when the chief object of their existence has been accomplished.

In houses warmed by wood fires, an occasional stick or log laid near the stove is seen to be swarming with ants which were not visible when the wood box was replenished. These little fellows had been hibernating in crevices of the wood made by the borings of beetle larvæ, and they have now come forth in answer to the genial warmth. House flies, too, are occasionally revived by heat; but generally they perish early in the fall from a white fungus growth peculiar to them, leaving only a few to linger in their familiar haunts during the early winter.

Some of the seemingly feeblest and most perishable forms of insect life surprise the observer by their ability to hibernate and to thaw out quickly under the influence of genial rays. The gnats and midges, those merry dancers in the sunlight, come forth to greet the winter's sun, not only in our milder latitude, but even in the long winters of the far and frozen North.

GNATS AND MIDGES IN THE SUNSHINE OF A WINTER'S DAY.

Centenary of the British Steamship.

Few centenaries are better deserving of commemoration within the United Kingdom than the centenary of steam navigation. And it was just in the close of March, 1802, that the "Charlotte Dundas," the first steamer ever employed for practical purposes, began to tow barges on the Forth and Clyde Canal. Steam vessels had been tried on Dalswinton Loch with success as early as 1788, but they were not intended for use, only for experiment. There were only one or two dreamers, like William Symington, the engineer of the "Charlotte Dundas," and Henry Bell, who built the "Comet" in 1812, who had any idea that steam navigation could ever be turned to practical use.

The owners of the Clyde and Forth Canal promptly took steps to stop the running of the "Charlotte Dundas," lest her wash should injure the banks of the canal, and it is even on record that James Watt, the true inventor of the steam engine, threatened William Symington with legal penalties if his engine should prove a success. So the first application of steam to the conveyance of cargo by water ended in financial ruin to the man who had invested his all in it.

WASPS WINTERING UNDER BARK.

The first passenger steamer was not much more successful from a financial point of view than the first steam tug. Henry Bell applied for aid to the government of the day in order that his idea that warships could be driven by steam might be practically tested. It was in 1800, when a steam battleship in the hands of Nelson might have done much. But no help came from the government. Nor did private capitalists think that there was anything to be made by applying steam to the transport of passenger vessels. So Henry Bell struggled on as best he could, and in 1812 the first passenger steamer appeared on the Clyde. She took her name, the "Comet," from the great comet of 1811. She proved that steam navigation was possible for passenger boats, but she ruined her owner, who died impoverished at Helensburgh, on the Clyde, in 1830.

BREAKING UP 15-INCH CAST-IRON GUNS.

A few months ago a considerable number of old cannon were sold at the Mare Island navy yard, the largest being 15-inch, smooth-bore Dahlgrens. They were made of cast iron for use in the civil war. The problem of reducing these guns to fragments of convenient size to be marketed was a difficult one. At last the contractors devised an ingenious scheme. Rows of holes were drilled longitudinally by a gang-drill, as shown in our engraving. The guns were jacked up on roller bearings, so that they could be easily turned to drill the next row of holes. The holes were one inch in diameter and about 7 inches deep; fifteen were drilled at once. After drilling one set of holes, the drill was shifted endwise about 4 inches, and the second set of holes was drilled. The holes were 4 inches apart, and the rows 8 inches apart. A 30 horse power electric motor was used to operate the drill. After drilling, the guns were split open with steel wedges. Two men were able to open one gun in a day. As each gun weighed 42,000 pounds, the problem of reducing it to smaller pieces had also to be met. A barricade was built over the pieces, and under this the segments were broken into small fragments. Sticks of nitroglycerine powder were inserted in the holes and fired. In this way the guns were broken into quite small pieces.

BREAKING UP 15-INCH CAST-IRON GUNS.

Austria's Canal Scheme.

Of exceptional importance is a measure for a new system of canals which has just been adopted in Austria. According to Mr. Carl B. Hurst, United States Consul General at Vienna, "this undertaking will do more than anything yet enacted in Austria to promote the commerce of the country. It will not only bring the various provinces into closer touch, but will also afford the cheapest freight connections with Germany and Russia."

The measure provides, first, for a canal from the Danube to the Oder; second, for a canal from the Danube to the Moldau, near Budweis; third, for a canal from the Danube-Oder canal to the upper Elbe, and fourth, for a canal from the Danube-Oder canal to the Vistula and to some navigable portion of the Dniester. There will be about one thousand miles of navigable waterways, which will be constructed by the State with the co-operation of the provinces, districts and towns, and especially of Vienna and Prague. The contributions of the municipalities and provincial authorities can be made either by single payment or in annual installments, or through the erection of certain works, such as harbors, docks or streets leading to them, or through the cession of land or water rights.

The work of construction will begin at the latest during 1904, and the entire system will be finished within twenty years. The cost of construction, in so far as it will not be covered by contributions, is to be met by an issue of four per cent tax free government bonds, redeemable within ninety years. The government is empowered to issue these bonds to an amount not exceeding $50,750,000 during the period of construction, from the year 1904 to 1912, and the money thus raised shall be used only in building the designated waterways. For the expense after 1912 due provision will be made by law. The entire cost of construction is estimated at $152,150,000, and the canals will be designed to admit boats up to six hundred tons burden.

Only the girls in a telephone exchange in New York city and the officials of the telephone company know what a vast amount of business is transacted in the American metropolis by telephone. In New York and its suburbs about 120,000 telephones are in use, more than in all France. These 120,000 telephones are used in ringing up the central stations about 426,000 times a day.