

USEFUL SPIDERS.

BY S. FRANK AARON.

We should all try to understand the economy of nature. The time will surely come when we shall learn to regard all common forms of matter in their true character, when we shall realize that everything has its place in the great scheme, and when this understanding will fully influence our attitude toward creatures great or small, to us ill-favored or beautiful, beneficial or injurious. There is now much ignorance, often indifferent to truth, still oftener influenced by mere sentiment, concerning those creatures that have, often unaccountably, become to us loathsome and disgusting.

Spiders for example, as with snakes and lizards, as well as many insects are objects of almost universal antipathy. They are popularly believed to be harmful, poisonous, worse than useless, fit only to be shunned, feared, or trodden on. Few, even of the most sensible people, take any interest in spiders except to inquire as to their venomous qualities.

It must be admitted, of course, that their appearance is not in their favor. Few animated objects are more repulsive to the sight than the so-called tarantula of the tropics, a huge member of the spider family, and when to its ugliness is added its supposed poisonous character, it becomes a proper object of aversion. The great hairy-legged spiders of temperate climes are almost equally unsightly, and the popular notion endows them with venomous power, whether they deserve it or not. Even their handiwork, their delicate and truly wonderful webs of gossamer, are unnoticed except to be trodden down on the lawn, or brushed from the walls by the broom.

But it can be readily proved that spiders are rarely, if ever, poisonous or even harmful, that certain species are really useful and beneficial, and that they all play an important part in the great scheme of nature. Their chief service to man lies in their destruction of noxious insects. "To be sure," says the reader, "spiders kill flies, and flies are a nuisance." True, and flies are not only a nuisance; they are carriers of disease, spreaders of pollution. Spiders also kill mosquitoes, moths and other flying and crawling pests that stray into their webs.

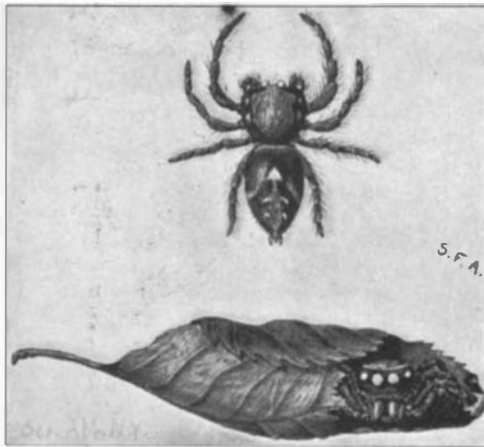
The grassy-bank spider, *Agelena nenia*, whose dew-spangled web is often seen on the lawn in the early summer morning, preys upon many kinds of noxious insects. A larger species of *Agelena*, common in woods and about stone piles and fences, makes larger and stronger webs, in which bigger insects, such as locusts, grasshoppers, and June-bugs, are often trapped. The webs of all the *Agelenas* lead down into dark and secret tunnels where the spider retreats when danger threatens. Even the sudden visit of a wasp or a bumble-bee will sometimes drive the owner of the web into this hiding place.

The jumping spiders (*Attus*) are also active fly-catchers and destroyers of noxious insects. They build no web except a very small receptacle in which to hide their eggs and to protect their young when hatched. They are the tigers of the insect world, springing upon their prey with true feline energy. The orb-weavers, *Epeira*, are equally useful to man, and their webs reach the highest development of mechanical skill.

It is worthy of note that insects injurious to man form the chief prey of the orb-weaving and grassy-bank spiders, as well as of the jumping species. It is true that beneficial insects, such as ichneumon flies, dragon flies and predaceous beetles, may stray into their nests, but the noxious flies, the caterpillars, grasshoppers and leaf-eating beetles are their far more numerous victims.

But the most useful of all our spiders are those which prey upon the caterpillars that infest our shade and fruit trees and destroy their foliage. Attached to the branches of trees, particularly to the cherry, apple, maple, elm, ash and linden, may often be seen large, unsightly webs or nests, sometimes covering a good-sized branch. These nests are constructed by the larvæ of several kinds of web-worms, and each nest is the home of a colony of the worms, hiding there by day, and crawling forth at night to devour the surrounding leaves. A single web often contains hundreds of these worms, and were it not for a few spiders that also inhabit the nest and suck the life-blood of the caterpillars, the latter would undoubtedly increase in such numbers as to strip our fruit and shade trees almost bare of foliage. The webs which protect the caterpillars from birds also enable the spiders to feed in safety upon their prey. No web-worm's nest is free from its spider parasites.

The willow web-worm, a closely allied species, found not only on willows but also on our common silver poplars, folding the leaves together in a smaller web, also has its spider parasites. But these intruders are by no means all of the same species. Some webs contain *Attus* spiders only; others harbor a spider with longer legs resembling the *Epeira*; and still others are infested by a spider of greater size. I have even seen all these various kinds living in the same



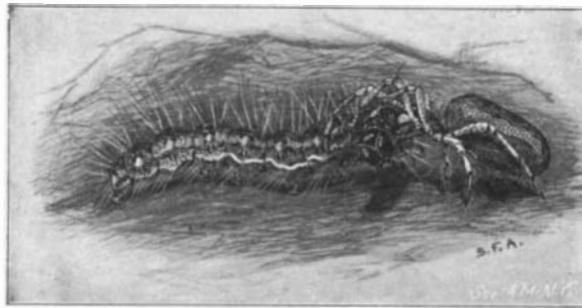
COMMON BLACK JUMPING SPIDER.—THE SAME IN POPLAR LEAF WEB OF WILLOW WEBWORM.

nest and devouring the unfortunate caterpillars at their leisure. This would seem an exception to the rule that "two of a trade can never agree."

The actual number of individual spiders in any one nest is never large, seldom more than four or five. It is remarkable that so few spiders can destroy so many caterpillars. They begin when the latter are very small, sucking their juices rapidly one after another and always leaving their bodies to dry up. It is probable that when a spider attacks a full-grown caterpillar, it absorbs only a part of the vital fluid—enough, however, to cause death. In many cases, the few spiders in such a nest manage to destroy every



A COMMON WEBWORM SPIDER.



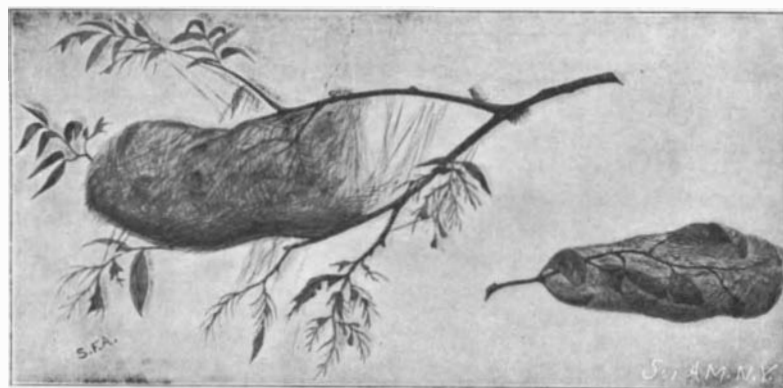
A WEBWORM SPIDER KILLING A WEBWORM.

worm in the colony, leaving not one survivor.

May we not then realize that spiders can justly be classed among our most useful and beneficial forms of life? Too much can not be said in favor of protecting from destruction our insect-eating birds. But may not our humbler friends, the spiders, also enjoy our favor? Yet they can well protect themselves, and we can best promote our own interests by simply and fairly letting them alone.

The Population of the World.

Certain considerations arising from the great increase of population in Europe and North America



WEBWORM WEBS OF HYPHANTRIA CUNEA.

WEB OF FULL-GROWN CATERPILLARS IN WILD BLACK CHERRY AND OF YOUNG CATERPILLARS IN ELM.

During the last century formed the subject of Sir Robert Giffen's address to the Section of Economics and Statistics of the British Association for the Advancement of Science, says The London Standard. That increase has been enormous. France has grown from 25,000,000 to 40,000,000, Germany from 20,000,000 to 55,000,000, Russia (partly from annexation) from 40,000,000 to 135,000,000, the English population of the

British Empire from 15,000,000 to 55,000,000, and the United States from rather over 5,000,000 to nearly 80,000,000. Altogether the growth is, in round numbers, from 170,000,000 to 510,000,000, or the space which, at the beginning of the century, was occupied by one person must now accommodate three. The white race, then, as a whole, need not trouble itself about either a yellow or a black peril; while in regard to its several members, as France now seems to be stationary, we have to concern ourselves, as far as numerical growth is concerned, only with Germany, Russia and the United States.

Anxiety is often felt in this country about our food supplies, and it is true that of late years we have imported them more and more largely; but this is also true to a greater or less degree of other European countries, and especially Germany. Such a country might, then, be in a serious plight in case of war, for it cannot be assumed that overland importation would be always possible, so it might suffer much as we should from a blockade of our coasts. The president also calls attention to one point which is often overlooked in predicting the evil results of the present growth in population. New markets, no doubt, thus become necessary, but these; it must be remembered, are by no means the only outlet for new energies. To a great extent the additional people provide for themselves. They procure for themselves the major part of the requisite comforts and luxuries of life. The main exchanges of any country, as a rule, are, and must be, at home, and the foreign trade, however important, will always remain within limits and bear some proportion to the total exchanges of the country.

But during the latter part of the century, while the increase of population has been universal, it has been in a decreasing ratio—even in the United States it has declined from something like 35 per cent in the earlier part to only 21 per cent in the last decade. It has also diminished in England, though the figures have been in all cases smaller. Such increase, it must be remembered, depends not only on the birth rate, but also on diminution of the death rate. That is brought out by the present almost stationary condition of France; the birth rate, no doubt, is rather low, 219 per 10,000, but its death rate is 211. This means a very slow growth indeed, but if the latter were reduced to the English rate, 183 per 10,000, very substantial increase would speedily result. All these considerations show what important ideas were suggested by the most common statistics, and thus indicate the need of a better statistical and economic education for our public men.

New Process for Making Steel.

Trials have recently been completed at the Royal Technical High School, Berlin, of a new mode of steel manufacture, declared by experts as likely to have a revolutionary effect on the world's metal industry and progress. It is the invention of a Mecklenburg manufacturer named Giebel, and consists in imparting to all grades of iron a strength and hardness surpassing nearly double that of the best known Harvey, Krupp or Boehler steel, while cheapening production 50 per cent. Projectiles hurled at armor plate, treated by the Giebel process and 7½ millimeters thick, made an impression of only 1 millimeter, while Kruppized armor, 4 millimeters thicker, was completely punctured. Resistance experiments showed even more astonishing results. Attempts made by powerful machines proved the steel to possess a strength of 165 kilogrammes per square millimeter, when the testing apparatus collapsed.

Among the peculiar features of the process is the increasing strength accruing as the steel grows cold. It is claimed that the process permits the metal to be worked cold or hot. Blades of the new steel cut other steel or iron into splinters as ordinary steel cuts into wood.

The representatives of Herr Giebel will go to America with the intention of submitting the process to the great mills there.

At a rubber factory on the Continent a constant flow of fresh air is maintained in the spreading-room with the aid of an exhaustor fixed near the floor. The vulcanizing-room is especially constructed for the purpose and has the vulcanizers on a lattice support raised three or four feet from the ground. Below the platform, and right down to the floor, the brickwork of the structure is provided on all sides with numerous airholes. The laborers are only slightly inconvenienced by the carbon bisulphide vapors. Formerly they were obliged to work with respirators, but they do not now require them.