As has been indicated, there is much still to learn regarding the life history of creeping bent—that is, just what is its normal behavior from the time the runners are planted to the time the original plants produced from them pass out of existence through old age. Some grasses produce two kinds of stems, one that makes heads normally and one that does not make heads normally. Timothy is such a grass. But in timothy it is known that certain methods of culture tend to increase the proportion of stems that produce seed heads, while on the other hand certain other methods tend to discourage seed production, or to produce an abnormally large proportion of stems without heads. They may do so in creeping bent planted in nursery rows. This is merely a suggestion that may be taken for what it is worth. One thing is sure. Seed stalks are of little, if any, value for planting of greens. While presumably they will do no harm if mixed with the stolons at the time of planting they can not be counted upon to do any good. Furthermore, while they are developing in the nursery rows the growth of the stolons seems to be at a standstill. This is really the important feature to be considered.

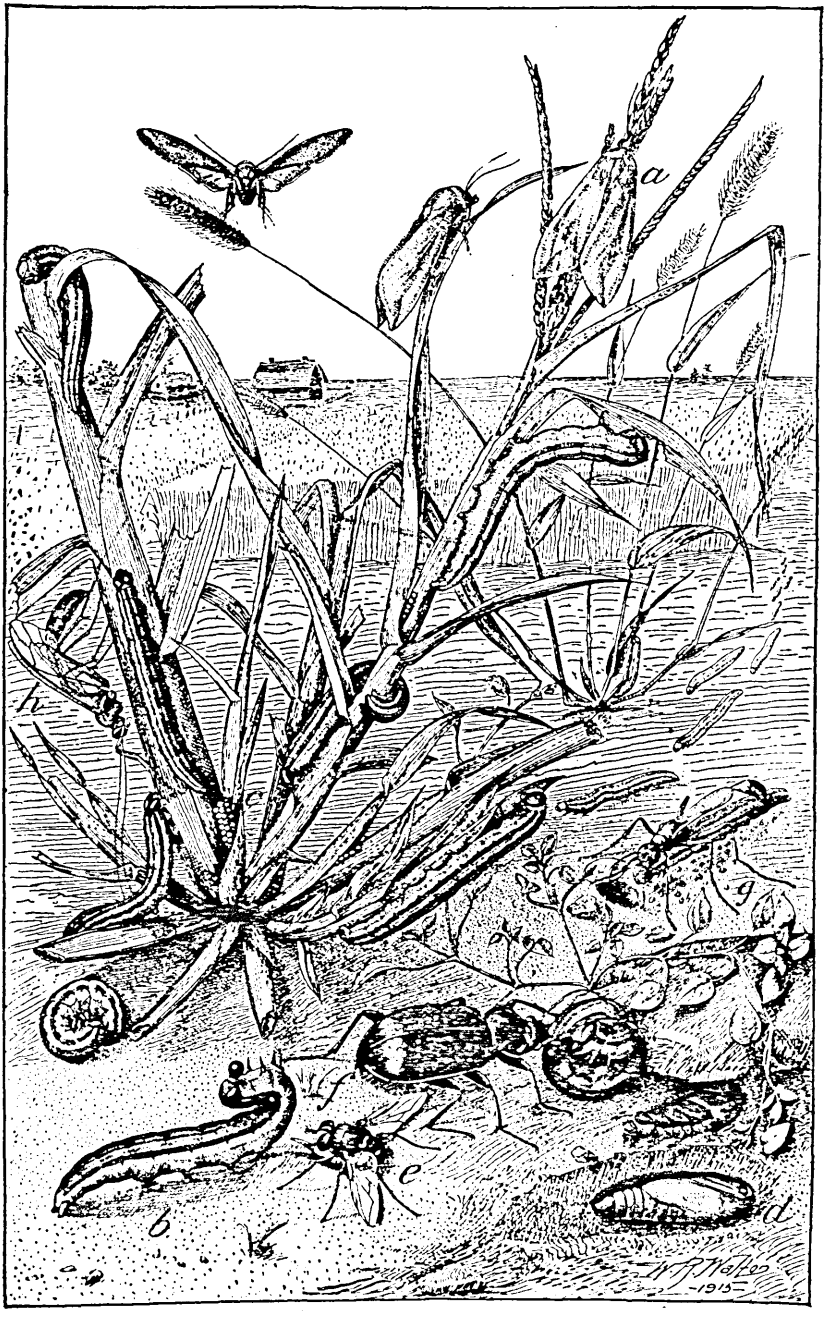
Damage to Turf from the Army Worm

A report has been received from the Ottawa (Illinois) Country Club indicating the spread of the army worm on their course. As there is at the present time an outbreak of the army worm in Illinois, occasioning damage to lawns, it is doubtless to the interest of golf-clubs to be on the lookout for the presence of this insect on their courses and to be prepared for control measures in case such are found necessary. A description of the insect and its habits, and a discussion of control measures, are contained in Farmers' Bulletin 731, United States Department of Agriculture, from which the following quotations and illustration are taken.

"The fully developed parent of the army worm is a moth or 'miller' measuring about 1½ inches across the expanded wings. It is brownish-gray in color, having a single small white spot near the center of the front pair of wings, the hind wings being somewhat darker along the hind edges. Although these parents of the worm sometimes are very numerous, they fly only at night and are therefore often entirely overlooked by the farmer. The stage of the insect most familiar to him is the full-grown, striped, nearly naked caterpillar, usually discovered in the act of devouring his crops and in most cases after having already destroyed the greater portion of the infested crop."

"The army worm injures crops in but one way, and that is by eating away all the tender portions of the leaves, the immature seed, and sprouts, and when numerous it may even devour the plants down to the very ground. The more important and by far the most conspicuous injury is always inflicted by the nearly full-grown caterpillar, whose greed and capacity for food are almost unbelievable. The pupa takes no food. The moth subsists principally upon the nectar gathered from flowers. The army worm feeds by preference upon grasses, both wild and cultivated."

"The army worm, like many other common insect pests, has four forms or stages, as follows: First, the parent moths or millers, which seek out rankly growing grass or grasslike grains, such as millet, upon which they lay their eggs. From these eggs hatch the little caterpillars or 'worms,' which feed and grow rapidly. When full grown they shed



Stages and work of the true army worm and some of its insect enemies: A, Parent or moth; B, full-grown larva; C, eggs; D, pupa in soil; E, parasitic fly laying its eggs on an army worm; F, a ground beetle preying upon an army worm, and, at right, Calosoma larva emerging from burrow; G, a digger wasp carrying an army worm to its burrow; H, a wasplike parasite of the army worm. All about natural size.

their skins and change to the brown pupa or resting stage, usually beneath the surface of the soil. From these pupæ come the parent moths, which in turn mate and lay their eggs, thus providing for another brood of caterpillars. There are usually three generations of caterpillars in any one year, but seldom or never two successive outbreaks in any given locality."

"According to the records of the United States Biological Survey, more than 40 species of native wild birds are known to eat the army worm in its various stages. Among the most important of these are the following: Crow blackbird or grackle, yellow-headed blackbird, chipping sparrow, bluebird, prairie hen, and European starling. Domestic fowls of all kinds will greedily devour the caterpillars and pupæ if allowed to roam over infested fields. Skunks and toads also undoubtedly eat thousands of the army worms, both caterpillars and pupæ. These birds and other animals should therefore be encouraged and protected by the farmer by all possible means.

"The importance of watchfulness on the part of the farmer, as a factor in combating the army worm can not be too greatly emphasized. Upon the discovery of the pest in its younger stages depends very largely the possibility of stamping out an infestation before serious injury to crops has occurred. The farmer should examine his meadows frequently during the spring and early summer months, particularly those planted to timothy, bluegrass, and especially millet. He should not be satisfied with looking merely at the surface of the stand; the thicker and longer the growth, the greater the danger from the army worm. The grass or grain should be parted with the hands in various parts of the field and the lower portions of the growth closely examined, in order to discover the presence of the small, greenish caterpillars, and if such be found in any number the area covered by the infestation should be determined and vigorous action taken at once to destroy the worms before they become large enough to begin their journey to other portions of the farm. If the infested spot be small, the grass or grain can be mowed off and straw scattered over the spot and burned, thus destroying the worms. If the caterpillars have become distributed over a considerable area, this can be marked off by stakes and the crop sprayed heavily with a mixture of Paris green at the rate of 1 pound to 50 gallons of water. In case this poison is used, care should be exercised in preventing stock from gaining access to the poisoned grass or grain and being injured or killed by eating it. It is far better to sacrifice a portion of the crop if the destruction of the pest can be accomplished thereby, because if the army worms are not destroyed they will take the crop anyway and probably devastate other portions of the farm.

"Poisoned baits of varying composition have long been used as a means of destroying the many different species of cutworms and also the army worm. An efficient bait of this kind may be prepared and used as follows:

Wheat bran	pounds	50
Paris green or crude arsenic	do	2
Blackstrap molasses	quarts	2
Water	do	2 to 4, or more as needed.

"Mix thoroughly together in a dry state the poison and the bran, then add the diluted molasses and stir vigorously until thoroughly mixed.

"Distribute this bait over the infested field broadcast, taking care to sprinkle or sow it sparingly. In case bran can not be readily obtained, middlings or alfalfa meal may be successfully substituted. This poisoned bait may be safely used in alfalfa and cornfields where it is desired, if possible, to save the crop for forage purposes.

"In case the worms are not discovered until they have begun to travel in a mass, they can usually be destroyed by furrowing or ditching completely around the infested area. In attempting to cross such ditches the worms will fall into them and can easily be destroyed by crushing them with a log dragged back and forth through the ditch or furrow. If shallow post holes are sunk in the bottom of the ditch at intervals of about 20 feet, the worms will crawl along the ditch bottoms and fall into the holes, where they may be destroyed by crushing or other means. If the subsoil be of such a nature that water penetrates it but slowly, the post holes may be partially filled with water, on the top of which a layer of coal oil or petroleum may be poured. Upon falling into such holes, the worms are almost immediately destroyed without further action on the part of the farmer.

"(1) Watch fields of growing grass and grain carefully, especially the meadows, during the spring and early summer months, in order to discover the army worms before they have a chance to become full grown and spread over the entire farm. When the worms are discovered at work do not lose a minute, but attack them vigorously by means of the measures outlined in the foregoing pages.

"(2) In case the worms are crawling in a body, surround them with a furrow or ditch and crush them with a log drag as they fall into it.

"(3) Poison them by spraying crops not intended for forage purposes with 1 pound of Paris green to 50 gallons of water, or with 2 pounds of arsenate of lead to 50 gallons of water. In case the Paris green is used on tender plants, like corn, 2 pounds of freshly slaked lime should be added to 50 gallons of the mixture. This is to prevent burning the tender plants. Where spraying is not practicable, the use of the poisoned bran bait is strongly recommended."

Chemical Weed-Killers on Golf Courses

By L. W. Kephart, U. S. Department of Agriculture

There is no royal road to weed eradication, and for general, every-day weed-fighting there is nothing that beats old-fashioned strong-arm methods with the hands, hoe, scythe, and plow. However, for certain special jobs chemical weed-killers are very useful, and every greenkeeper should know something of their characteristics and how to handle them.

First be it said, before false hopes are raised, that chemicals are not of much help in combating the particular weeds which are most troublesome in turf. Hundreds of tests have been made, and tests are still being conducted, in the use of chemicals in combating crab grass, chickweed, and the other weeds destructive to fine turf, but as yet no really reliable remedy has been found, except where the weeds are treated individually, as in the case of dandelion or plantain injected with sulfuric acid. The place for chemical weed-killers is on the tennis courts, the gravel roads, the cobblestone gutters, the traps, the tees, and other places where no vegetation of any kind is desired but where vegetation never-