Of all the insect pests of wheat in Missouri the Hessian fly is most destructive. It was first introduced into this country in straw brought from Europe by the Hessian soldiers in revolutionary days.

In Missouri it is widely distributed and does more or less injury locally every year. Like most of our destructive pests, however, it appears as a general scourge more or less periodically following a series of favorable years. One or more dry summers followed by mild winters usually brings on Hessian fly troubles. The dry weather keeps the pest in the resting condition in the stubble and also prevents the plowing under of stubble and then with the early fall rains, wheat is sown early and the flies appear and lay their eggs on the young wheat. These are the ideal conditions for an outbreak of the fly.

**Nature of Injury.**—The injury to wheat is due to the work of the maggot or larval stage of the fly. The small, dark, winged, mosquito-like fly does not attack the wheat. The maggot rasps on the tender plant with a pair of sharp fangs, causing a flow of sap which it drinks. The young wheat, when attacked in the fall, stops growing and turns yellow. Usually this first appears where the ground is poorest, but if the infestation is bad it will finally show up over the whole field. If the weather is favorable tillers are usually produced and the crop is not completely destroyed, unless the infestations be very severe. In the spring the wheat may start off strong and thrifty, but as soon as the rains cease and the spring brood of maggots begins to feed, the wheat stops growing and turns yellow. When the pest is not too abundant the wheat may head out and produce a partial crop, though the heads do not fill properly and the grain is light. The lodging or falling of wheat
begins about the time of heading and continues until it is ripe. In case of severe infestations no heads form at all.

**Life History of Pest.**—The development of the Hessian fly is similar to that of other flies. The adult winged fly lays eggs on the wheat leaves. These hatch into very small, whitish maggots which feed on the sap of the plant. When nearly full fed the maggot may appear green due to the green sap it contains. When full fed the maggot turns brown and takes on the shape of a flaxseed. The maggots in the flaxseed stage are often packed together in groups of from six to thirty in the base of a wheat plant. Within this brown case the small maggot changes to the resting or pupal stage and later the fly emerges. In Missouri there is normally one fall brood, one full spring brood and a later partial spring brood of flies. From the last of August to the middle of October the small black mosquito-like flies continue to emerge and lay eggs on the leaves of wheat. Each fly lives but a few days. The females lay an average of 100 eggs. When the eggs hatch the small maggots pass down between the leaf and the small stalk to feed on the stalk. By the time cold weather comes, the maggots are full fed and change to the brown flax seed stage. In this form they spend the winter below ground in the crown of the wheat plant. About the middle of April they hatch and the first brood of Hessian flies appears. These flies lay eggs which hatch during May, producing the spring brood of maggots. In case of a warm, damp spring these may mature and produce a second brood of flies which pass the summer in the wheat stubble in the flax seed stage. It is this brood which is mainly responsible for the destructive fall swarms of flies.

While this is the normal cycle, some years additional secondary broods may appear and during a dry spring the secondary spring brood may not appear at all. Cool, dry weather always retards the development of the fly while warm, damp weather hastens it. If there is an excess of moisture during the summer the flies may come from the flaxseed stages in the stubble and deposit eggs on volunteer wheat producing a secondary summer brood. In the same way a small secondary fall brood may appear during November in case of excessive rainfall though such cases are rare. Late sown wheat is seldom attacked except by the spring brood which migrates in from infested fields.

**Remedies.**—The Hessian fly is most effectively controlled by proper methods of farm practice. The destruction of all infested stubble
in July and the sowing of wheat late enough in the fall to escape the fall brood of flies are the most practical methods known for controlling this pest.

Since the pest is found in the wheat stubble during the summer in the resting flaxseed stage it can be completely destroyed if all infested stubble be destroyed. Plowing under stubble early in July where it is not too dry, is the most logical and economical method of placing the stubble where the pest will be destroyed. Some farmers disk thoroughly and then in a week or two plow the stubble under. In case the pest be located in the stubble above ground, burning off stubble will destroy it though the stubble is also lost. The flaxseed stages are often located so low in the stubble that burning them may not destroy all of them. By all means get rid of all stubble in the infested regions before August. Co-operation is necessary. One infested stubble field will furnish flies for a whole community. Farmers must work together in order to fully destroy the pest. After the stubble has been plowed under, work the ground so as to pack it, and keep down all volunteer wheat.

The second effective remedy for the fly is to sow wheat as late in the fall as possible so as to escape the heavy swarm of flies. If wheat is not yet up when the flies come they die without a place to lay their eggs and the crop escapes injury. It is folly to suppose that wheat sown after the swarm has come and gone, will be as badly infested as early sown wheat. In a normal fall the flies have largely come and gone in north Missouri by the first of October, in central Missouri by the seventh of October and in south Missouri by the fifteenth of October and wheat sown after these dates is seldom attacked by the fly in the fall. Late sown wheat may suffer severe injury in the spring if the spring brood of flies migrates to it from neighboring fields which were sown sufficiently early in the fall to be attacked by the fall brood of flies. It shows poor judgment to sow wheat in August or September for pasture, in a region where the fly is abundant.

In conclusion, look out for trouble on the crop of wheat following a year in which the Hessian fly has been destructive. Avoid this by thoroughly destroying the infested stubble and by sowing late enough in October to escape the fall swarm of flies. If these precautions are taken by all farmers there is no need of completely abandoning the growing of wheat in any community for a few years.
VARIOUS STAGES OF HESSION FLY.

A. Egg; B. Larva; C. Flax-seed stage; D. Pupa; E. Male fly; F. Female fly; (all greatly enlarged); G. Flax-seed as it appears in the stubble; H. Female, laying eggs on young wheat in the fall.