SAPERDA FAYI, S. CONCOLOR AND APHODIUS RUFIPES.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

SAPERDA FAYI, Bland.—This beautiful Saperda breeds in the small limbs of Crataegus, especially *crus-galli* and *tomentosa*, as first observed by Mr. C. D. Zimmermann, CAN. ENT., 10, 220; and should it, like some of its allies, acquire a taste for cultivated fruit trees, it would be a formidable enemy, as is evidenced by the way it depredates on thorn bushes. The beetles appear here the last week in May or the first week in June, according to the season, the males preceding the females three or four days. They do not appear to eat and are short lived, the whole brood (except stragglers) appearing and disappearing within the space of ten or twelve days, so that should the collector be negligent, or the weather unsuitable for collecting at the time of their appearance, he may get none till the next season. As soon as the females appear the males are ready to associate with them, the union lasting three or four hours. They are not much given to flying about, usually ovipositing on the same tree they inhabited as larvæ. There may be several thorn trees not far apart, and one will be depredated on year after year till it is nearly destroyed, while the others will remain untouched till colonized apparently by accident. The beetles are sluggish, and when approached suddenly fall to the ground and quickly endeavor to conceal themselves, not feigning death, as many insects under the same circumstances do; and when I say feigning death, I mean it literally, in opposition to an unsupported dogmatic statement which I lately saw in print somewhere, "that insects can have no knowledge of death."

Oviposition is effected probably during the night, and the process has not been witnessed, nor the eggs seen. The limbs selected for this purpose vary from one third to one and one fourth inches in diameter, and according to the thickness of the limb, the female with her powerful mandibles makes from three to six longitudinal incisions through the bark, each about three fourths of an inch long and equi-distant and parallel to one another, dividing the circumference into sections nearly equal; an egg is placed in each end of each of these slits, and as soon as hatched the larva makes a burrow beneath the outer layer of wood, perhaps one eighth inch in length at first, and uses this as a retreat whence it issues to feed on the diseased wood caused by the incision. These slits and the

irritation produced by so many larvæ at work, cause an increased flow of sap to the part, and a consequent thickening of the sections between the slits, so that the injured part soon assumes a gall-like appearance. On the approach of winter, the larvæ having now attained the length of .25 inch, retire back a little further and close the opening of their burrows with borings. One of the larvæ, however, and in thick limbs two or three at each end bore obliquely till one of them reaches the centre of the limb, up which it proceeds, often two or three inches; the others parallel this, but keep a wooden partition between the burrows. These larvæ are much larger—often twice the size—of those inhabiting the outer wood, and are the only ones that produce beetles.

The whole of the interior of the limb is now dead wood enclosed by a growth of living but unsound woody tissue, through which some openings remain. The limbs are much weakened at these places, and many of them, like the oak on which *Elaphidion villosum* depredates, would be broken off by the winter storms were the fibre not very tough and the trees very low. And here analogy leads to the conclusion that as the larvæ inhabit the portion of the limb next the tree, equally with that beyond the injured part, this is likely to be the case in the history of the *Elaphidion* mentioned.

Many of the larvæ in the outside wood perish during the winter, and the survivors, after feeding a while in the spring, likewise die, their mission seeming to have been merely to insure a sufficiency of dead wood to sustain the life of the favored few destined for full development.

In the spring the larvæ in the deep wood return and feed on the dead wood, which is now abundant enough for all their wants, and by autumn they are nearly full grown; they again retire for the winter, and in the spring, after opening up communication with the outside world, feed for a short time, and when full grown measure in length about three fourths of an inch. The larvæ now return to their burrows for final transformation. Some of them bore for at least six inches, while others scarcely go from the entrance more than twice their own lengths; the outer ends are closely packed with borings without and soft fibre within, which also fills the inner ends. The head of the larva may be either toward or away from the opening—seemingly a matter of indifference; in the former case the beetle emerges from the place of entrance, in the latter from a round hole at right angles to the burrow, probably cut by the beetle itself, as no such hole has been detected in the many limbs I have examined contain-

ing pupæ with their heads turned from the opening. Pupation occurs after the middle of April, and the perfected beetle will be found in the limbs about the first of May, though few of them emerge till the time stated at the beginning of this paper.

The above is the result of three years careful observation of the habits of this beetle, and imperfect as the history is, the amount of time and labor expended in developing it can only be understood by those who have attempted similar things. How widely this beetle is distributed is uncertain, as till recently its habitat was unknown. The typical insects were taken in Ohio; it is in Mr. Reinecke's Buffalo Catalogue, and occurs at Hamilton, Ontario (Moffat). Any one can readily ascertain whether it occurs in his fauna by examining the limbs of the *Crataegus* for the unmistakable swellings it occasions.

SAPERDA CONCOLOR Lec. appears about the same time as *S. Fayi*, and like it, is short lived, few individuals occurring after the middle of June. Its larvæ infest the canes of a small willow growing along water courses and in swampy places—*Salix longifolia*. The smaller canes are usually selected for breeding purposes, these varying from one fourth to three fourths of an inch in diameter. The beetle makes a longitudinal incision through the bark with her jaws about three fourths of an inch in length, and in each end deposits an egg. Usually several incisions are made in the same cane some distance apart, which often cause its death the following year. The young larvæ follow the same course as those of *S. Fayi*, only they burrow deeper into the wood, and there are no super-numeraries, as there is no need for them, the wood of the willow dying much more quickly than that of *Crataegus*, and a warty, gnarly swelling occurring around each incisure.

The beetle, however, does not always select the smaller canes, sometimes choosing ones from one and one half to two inches thick, in which case the larvæ pursue a different course, for instead of boring up and down, they take a transverse direction and girdle the stem one third to one half its circumference, causing a rough annular swelling and frequently the death of the cane. Two years is the time usually required to complete the transformation, but some individuals probably pass through all the stages in a single year. The head of the pupa is toward the opening, from which the perfect insect emerges. The willow named seems to be the natural food-tree of the larvæ of *S. concolor*, and, did it confine itself

to this insignificant shrub, could scarcely be classed with injurious insects; but it appears to have likewise either a natural or an acquired taste for poplar, and might become very destructive, a fact first brought to notice in Bul. No. 7, 118, U. S. Ent. Com., where the compiler writes: "Girdling the trunks of sapling poplars, by carrying a mine around the trunk, which causes a swelling often nearly twice the diameter of the tree. We have found numerous saplings of the common poplar in the woods about Providence with the unsightly swellings around the trunk." In case this taste is perpetuated, this beetle will no doubt prove a formidable enemy to this species of shade or forest tree. But in what State this Providence is, or what kind of a tree "common poplar" is, we are not informed. Here the common poplar is the *Liriodendron tulipifera*, but at that Providence it may be a tree of some other genus. This beetle seems to have an extended distribution, occurring in Texas, Michigan, Canada and New York, as well as here.

APHODIUS RUFIPES Linn.—This fine beetle is an interesting addition to our list, and is fully described by Dr. Geo. H. Horn in his exhaustive Monograph of our Aphodiini, just published, Tr. Am. Ent. Soc. Phil., 14, 1. In Europe it is widely distributed, and, though probably indigenous here, as observed by Dr. Horn, has only recently been discovered owing to its inhabiting territory the Coleopterous fauna of which is very imperfectly known. Only three American specimens were known while Dr. Horn was writing the description, two taken at Deer Park, Garret county, Md., and one at St. Vincent's Abbey, Westmoreland county, Pa. Dr. Horn has now two specimens in his collection taken at the latter place, and I have one from Turkey Foot (now Confluence), Somerset Co., Pa., midway between there and Deer Park, which is in the extreme north-west corner of Maryland, the meridian of which to the north passes over a rugged semi-mountainous country; first over the hills bordering the Yonghiogheny thirty miles to Confluence, and thence through the Laurel Ridge Mountains forty miles to St. Vincents. How much further to the north or to the south-west from the points named it extends in a long range of country of the same general character, the future will determine. The two individuals I have examined, on comparison with my European specimens, do not differ perceptibly—a proof of the remarkable stability of species, considering the time that has elapsed since the ancestors of those of the two hemispheres parted company.