

By the first of July all the adults had emerged. The locality was revisited on October 20th at which time adult beetles were to be found under the litter at the base of the dandelion plants and undoubtedly these insects hibernate as adults.

An insect which can destroy approximately one-quarter of the seed crop of a noxious weed is no small factor in farm economics. The dandelion, on the other hand, is now quite extensively used as a green vegetable in certain parts of the country and here the insect in question when abundant will be a crop pest.

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## THE TWO-BANDED FUNGUS BEETLE<sup>1</sup>

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### INTRODUCTION

Among species of tenebrionid beetles which habitually frequent mills, granaries, and other storehouses is a species belonging to a different group from any of the several flour beetles, the tribe Diaperini, which is mostly composed of species which live on fungus or dead or decaying vegetable matter—the two-banded fungus beetle (*Alphitophagus bifasciatus* Say). This species, though now cosmopolitan and credited with exotic origin, would appear to be one of the few cosmopolites native to America, from which country it was described by Say in 1824 (1). This origin, however, is decidedly doubtful.

In 1832 it was redescribed by Stephens (2) from England under the name of *Alphitophagus quadripustulatus*, the genus having been especially erected for this species. It has only been in somewhat recent years that the identity of *Phylethus bifasciatus* Say with the European form has been established.

### DESCRIPTIVE

#### THE BEETLE

In appearance this pretty little beetle, shown in Figure 15, resembles some of the fungus-eating Mycetophagidæ, to which family belongs *Typhæa fumata*, an insect of similar habits, more than it does any of the other farinivorous Tenebrionidæ. In form it is elongate oval, convex, depressed, and a little less than one eighth of an inch long. Its color is red brown, with two broad black bands across the elytra or wing-covers.

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<sup>1</sup> Published by permission of the Secretary of Agriculture

Since the writer's experiments on this species seem to establish it as innoxious, its description will be limited to the original characterization of the genus and of the species by Stephens and Say, respectively, which are here transcribed.

### THE GENUS

#### Genus *Alphitophagus* Steph.

Antennæ slightly elongate, and a little increasing in stoutness to the apex, 11-jointed, basal joint robust, second minute, third and fourth of nearly equal length; slightly elongate, fifth and sixth also equal, stouter and somewhat cup-shaped; four following subquadrate, a little produced within, and thickened at the apex, terminal subglobose, largest. Palpi short, with the terminal joint slightly thickened, somewhat triangular; mentum subcordate; head suborbiculate; thorax transverse, rounded in front, convex; body oval, convex; elytra free; wings ample; legs slender; tibiæ simple, all similar; tarsi heteromerous, with entire joints. (Stephens (2).)

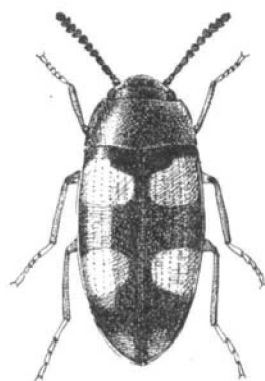


Fig. 15. *Alphitophagus bifasciatus*. (Original.)

### THE SPECIES

#### *Alphitophagus bifasciatus* Say

Body reddish-brown, punctured; head reddish-black; eyes black; palpi whitish; thorax with a dusky obsolete spot on the middle, and another on each side; angles rounded; punctures very minute, dense; elytra yellowish-fulvous, with punctured striae; a broad band in the middle, another near the tip, and scutellar region, black; feet pale reddish-brown. (Say (1).)

### SYNONYMY

The following synonymy is recognized by Seidlitz:

#### *Alphitophagus bifasciatus* Say

? *Diaperis bifasciata* Say (1), Journ. Ac. Phil., vol. III, p. 268, 1823.

*Diaperis picta* Ménétries (1), Cat. rais., p. 203, 1832.

*Alphitophagus quadripustulatus* Stephens-Illus., Brit. Ent. Mand., vol. V, p. 12, 1832.

*Neomida picta* Faldermann-Fauna Franska, vol. II, p. 65, 1837.

*Phylethus populi* Redtenbacher (1), Fauna Austr., p. 589, 1849.

*Phylethus quadripustulatus* Mulsant (1), Col. Fr. Latig., p. 204, 1854.

*Alphitophagus bifasciatus* Hamilton (1), Entomologica Americana, vol. VI, 1890.

### BIOLOGIC NOTES

Aside from two notes published in *Insect Life*, (10), (12), the notes in this Bureau are limited. In the writer's personal experience with the species in and about the city of Washington, it has often been found in spoiled cereals and sweepings from the floors of feed stores, and in one instance the writer found specimens, April 29, in spillings of bran and similar material that had fallen through the cracks of a

railway station platform used for the reception of grain, flour, and feed at Branchville, Md.

During July, 1898, correspondence was had with a milling company at Mt. Pleasant, Iowa, in regard to several species of grain insects, of which this insect was one. September 25, 1906, the late M. V. Slingerland sent this species in a lot of mill products from Plattsburg, N. Y. which was also infested by the European grain moth (*Tinea granella* L.).

Mr. Schwarz informs the writer that at Dallas, on the Hood River in Oregon, the species is often found out of doors, being commonly beaten from bushes and found running on the sand, and that in the District of Columbia it inhabits a fungus growing upon trees.

In the streets of Washington, D. C., the beetles occur in great numbers on the window-panes of stores, where they are attracted by the electric lights. The beetles are comparatively active, free runners and flyers.

A number of experiments were made by the writer to ascertain the true habits and life-history of the species. Beetles taken at electric light and placed in dry cornmeal June 13 perished without any larvæ developing. Beetles afterward placed in cornmeal, which was kept moist and in which fermentation took place, lived for a long time and several generations were developed. That a considerable degree of moisture is necessary to this species when in an immature condition was proved when in the course of dry experiments all died and shrivelled up in a very short time. Even a portion of those which were confined in vials fitted with rubber stoppers met with a like fate.

At one time beetles were placed in fermenting cornmeal (May 10) and a new generation was produced in 38 days; the weather being cool, will account for the period.

In a rearing of fermenting meal and flour in which the beetles were placed on June 22, a new generation of beetles was produced in 32 days. During half of this time the weather was unseasonably cool, but it was ascertained by means of a thermometer that the temperature of the rearing jar was about 10° F. warmer than that of the room in which the experiment took place.

The eggs were not observed, but the pupa period was ascertained to be six days in the hot weather of August. Allowing six days for the probable period of the egg, this will give a larval period of between three and four weeks for ordinary summer weather.

#### LITERATURE

The literature of this species is practically limited to descriptive matter and to brief notices of habits or occurrence.

Mention of its habits was made by Stephens in 1832 (2), who stated that the types of *quadripustulatus* were reared from flour, and that the species was also found "in the decaying floor of a malt house in Cambridge (England)."

Mulsant (4) recorded the capture of the insect under bark; Duval (5) stated that it occurred in debris gathered in a stable; Redtenbacher (6) wrote that it lives under decaying vegetable matter; E. A. Fitch (7) and others that it was found in "corn" (presumably wheat) in storehouses and granaries in England.

Schioedte (9), who gave a description of the larva and pupa with illustrations, states briefly that the species lives in storehouses, in flour and in bread.

What appears to be the earliest mention of its occurrence indoors in the United States is that published by this Bureau in 1889 (10). This is in the form of extracts from correspondence with McPherson & Stevens, Sprague, Wash. Our correspondents stated that this insect seemed to breed under basement floors and to come up and fly away on warm days. The insects did not appear to work in wheat bins but rather in flour dust in dark places. They were stated to be present all the winter and spring and at the time of writing were very numerous.

Several remedies were tried and Persian insect powder was found to be effective.

Prof. L. Bruner, writing in 1893 (11) stated of this species, which he included in a list of insect enemies of small grain, that if it were allowed to increase unmolested it might become a very troublesome pest.

The species is included in a list of insects observed in stored products exhibited at the Columbian Exposition at Chicago, in 1893 (12). The observation was made by Mr. E. A. Schwarz, who noticed the beetles in dried fruit from one of the Central American countries.

#### SUMMARY

This minute insect as its name, fungus beetle, would indicate, is a feeder on fungi such as molds and has never been actually observed attacking perfectly fresh material. It is a scavenger and is usually found in refuse, such as decaying vegetable matter, in flour and feed stores, in mills and in grain warehouses, and is not uncommon in the open as well as indoors.

It requires a considerable degree of moisture for development and is capable of developing in ordinary summer weather in the District of Columbia in about the same time as other indoor insects of its size—in four to six weeks.

It has been observed in flour, corn meal, bread and under bark and in decaying wood and some other material, including dried fruit. It is cosmopolitan and, although abundant nearly everywhere, is not often reported in great numbers.

### CONTROL

As to remedies, the species is hardly worth considering. It has been noted above that Persian insect powder has been found effective. When storehouses, mills, stables and other buildings where stored materials are kept contain other insects which are injurious, this species will, of course, succumb to standard remedies such as fumigants and heat.

It should be unnecessary to add that the insect would not be apt to multiply in any great numbers if scrupulous cleanliness of buildings is maintained.

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## FURTHER TRIAL OF SULPHUR-ARSENATE OF LEAD DUST AGAINST THE STRAWBERRY WEEVIL<sup>1</sup>

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Last year before this Association it was shown by the writer that sulphur-arsenate of lead dust when maintained as a rather complete coating from the time bud-cutting begins until most of the buds have opened gives, in the case of the Heritage variety, almost complete protection from the strawberry weevil (*Anthonomus signatus* Say). It was stated at that time also that the protective action seemed to be due to a repellent effect.

The results were so surprising that confirmatory tests were planned for the season of 1916. The tests involved the treatment of strawberries on at least two farms in each of three counties. The plots to which the writer gave most careful attention were located on the farm of Mr. William Oeser of Cologne, N. J.

Mr. Ellwood Douglass ably and conscientiously assisted in the tests at Cologne and took charge of those elsewhere in Atlantic County, while Mr. Warren Oley and Mr. George T. Reid performed the same tasks in Cumberland and Burlington Counties, respectively. While a large measure of protection was obtained in each of the counties included in the tests, the best results were had on the plots on Mr. Oeser's farm.

The arrangement of the plots in this test are shown in the accompanying diagram.

At this point the first treatment was given before the Champion buds had hardly appeared and just as injury began on the Heritage. Considering the lateness of the Champion it seemed advisable for the sake of thorough protection to dust three times instead of two as is usual in dealing with a single variety. The dusts were applied with a Tow-Lemons one-man dust gun but the experience with it demonstrated the need for traction or power machinery in dealing with

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<sup>1</sup>Contribution No. 2 from the Entomological Laboratory of Rutgers College and the N. J. Agr. Expt. Stations.