

# Flabellate Grasshopper

## *Melanoplus occidentalis* (Thomas)

### Distribution and Habitat

The range of the flabellate grasshopper includes nearly all of the grasslands of the western United States and Canadian provinces. The species inhabits the natural prairies as a common member of grasshopper assemblages. Densities are greatest in the mixedgrass prairie.

### Economic Importance

The flabellate grasshopper feeds on grasses and forbs. It competes for food with both cattle and sheep, because cattle are generally graminivorous and sheep forbivorous. By itself the species rarely reaches an economic level of eight individuals per square yard, but it frequently contributes one to three adults per square yard to heavy infestations of rangeland grasshoppers. Adult weights are at the light end of the large third of grasshopper size. Collected in Big Horn County, Wyoming, 22 July 1993, males averaged 280 mg live weight and females 567 mg. (dry weight: males 86 mg, females 174 mg).

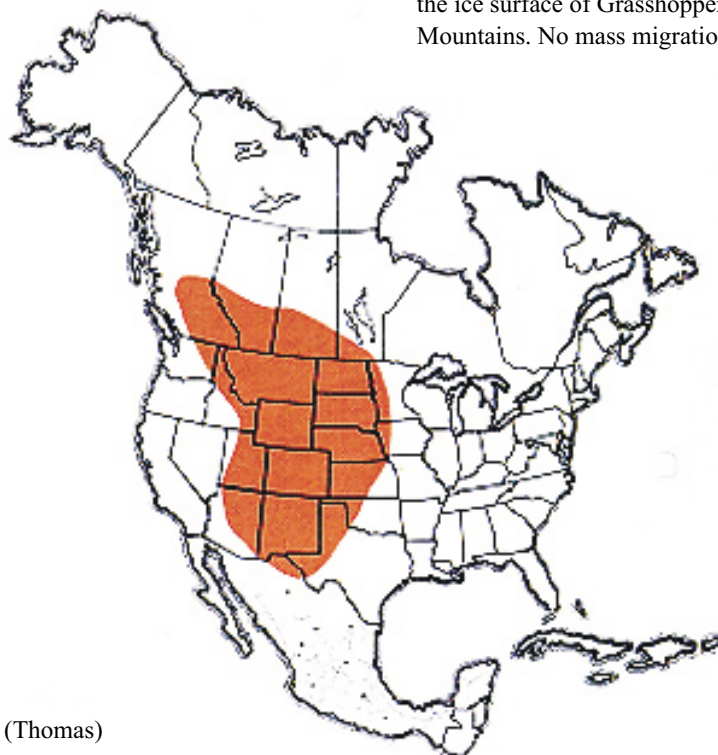
### Food Habits

The flabellate grasshopper is a polyphagous insect. It feeds chiefly on the leaves of forbs but it also consumes substantial amounts of grasses, moss, roots, seeds, and dying or dead arthropods. Crop contents of grasshoppers collected in the mixedgrass prairie of Nebraska and Wyoming consisted of 70 to 90 percent forbs, 8 to 15 percent grasses, and 1 to 10 percent arthropod parts. Favored host plants are scarlet globemallow, wildbuckwheat, and milkvetch. Grasses on which it is known to feed include blue grama, needlandthread, western wheat-grass, and bluegrasses. It also consumes needleleaf sedge.

The flabellate grasshopper feeds both while on the ground, ingesting moss and litter, and on plants, climbing to feed on leaves and bark.

### Migratory Habits

The flabellate grasshopper is a strong flier with long wings extending to or beyond the end of the abdomen. Relatively frequent "accidentals" of this species have been found above 7,000 feet in the Rocky Mountains of Colorado. In Montana two long-winged individuals, a male and a female, were collected from the ice surface of Grasshopper Glacier in the Crazy Mountains. No mass migration of the flabellate



Geographic range of  
*Melanoplus occidentalis* (Thomas)

Instar 1



1. BL 3.8-4.9 mm FL 2.6-2.9 mm AS 13.

Instar 2



2. BL 5.7-6.5 mm FL 3.6-3.9 mm AS 15-16.

Instar 3



3. BL 6.1-8.6 mm FL 4.5-5.6 mm AS 18-19.

Instar 4



4. BL 9.4-13.3 mm FL 6.8-7.4 mm AS 21.

Instar 5



5. BL 15-16.5 mm FL 8.4-10.2 mm AS 22.

Figures 1-5. Appearance of the five nymphal instars of *Melanoplus occidentalis* - their sizes, structures, and color patterns. Notice progressive development of the wing pads. BL = body length, FL = hind femur length, AS = antennal segments number.

grasshopper has been observed but it appears likely that such behavior occurs.

When flushed, flabellate grasshoppers fly distances of 2 to 7 feet at heights of 3 to 6 inches. The evasive flight is straight, silent, and usually across the wind.

### Identification

Adults of the flabellate grasshopper are brightly colored (Fig. 6 and 7). The lower and inner surfaces of the hind femora are bright orange. The hind tibiae are light blue. The middle fuscous patch on the medial area of the hind femur is V-shaped. The cercus of the male is diagnostic, appearing ear-like or fan-shaped (Fig. 9). The latter description of the cercus gives this grasshopper its common name (flabellate = fan-shaped). The body is gray with bright orange patches. The wings are long, reaching the end of the abdomen or extending beyond.

The nymphs (Fig. 1-5) are identifiable by their shape, spots, and color patterns:

1. Head with face nearly vertical and solid tan or green; frontal costa sometimes darker (Fig. 8); antenna filiform; compound eye spotted and with a diagonal fuscous line on posterior half near middle (See Figure 5 for clear illustration).
2. Prominent cream colored crescent beginning on gena below compound eye and running onto pronotal lobe.
3. Hind femur with fuscous stripe interrupted (cut completely across) three times.
4. Body brightly colored gray, tan, or green; underside of body pale gray.

Many of the described nymphal characters of *M. occidentalis*, *M. infantilis*, and *M. gladstoni* are similar, yet nymphs of these species can be separated easily by color and by their seasonal appearance. The venter (ventral side of both thorax and abdomen) of nymphs of *M. occidentalis* is pale gray, while the venter of nymphs of *M. infantilis* is usually white and of *M. gladstoni* usually bright yellow. Nymphs of *M. occidentalis* and *M. infantilis* are present in the grasshopper assemblage early in the season along with nymphs of *M. sanguinipes* and *M. packardii*, while those of the *M. gladstoni* are present late when all four of the former species are adults.

Figures 6-10. Appearance of the adult male and female of *Melanoplus occidentalis*, diagnostic characters, and the egg pod and eggs.

### Hatching

Eggs of the flabellate grasshopper hatch in mid-spring at almost the same time as the bigheaded, striped, and spottedwinged grasshoppers with which it consorts. The period of hatching lasts approximately 25 days.

### Nymphal Development

The flabellate grasshopper passes through five instars, becoming an adult in 40 to 45 days. Nymphal development proceeds at approximately the same rate as the bigheaded grasshopper. As with most grasshoppers the adult males appear before the females.

### Adults and Reproduction

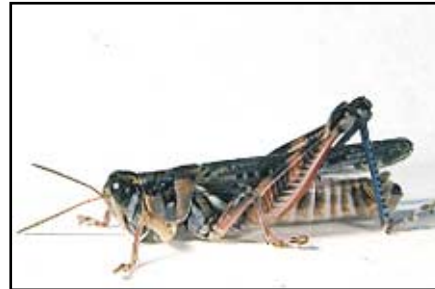
Adults of the flabellate grasshopper remain in the same habitat in which the nymphs hatch and develop. This habitat of the mixedgrass prairie continues to furnish green host plants for their food and a favorable place for them to live and reproduce. Observations of their courtship have not been made. Mating pairs, however, have been observed frequently during the morning, as early as 30 minutes after sunrise, and less often in the afternoon.

About two weeks after fledging, the female deposits her first clutch of eggs. She selects a bare spot and works her ovipositor into the soil to a depth of approximately 1 inch. She deposits eight to ten eggs, which lie in two columns at depths between one-half inch and 1 inch. Upon withdrawing her abdomen she briefly brushes soil over the exit hole with her ovipositor and walks away. A female will continue to reproduce for the length of her short life. The fecundity of females is unknown. There is one generation annually.

The pod is 1 inch long and one-eighth inch in diameter (Fig. 10). The bottom half contains the egg mass and is curved. The top half, vertically oriented just below the surface of the soil, is dried froth. Eggs are pale yellow and 4.5 to 5.3 mm long.

### Population Ecology

Populations of the flabellate grasshopper fluctuate in a habitat with time. In a favorable habitat of mixedgrass prairie in Wyoming, densities ranged from 0.1 to 7.3 adults per square yard over a period of 10 years. During half of this time the population was below one adult per square yard. In some habitats of the mixedgrass prairie this species appears to be absent, as is often the case in Montana.



Male

6. BL 19.2-21 mm FL 10.2-11.4 mm AS 24-25.



Female

7. BL 22-24 mm FL 11.5-12.6 mm AS 24.



Faces

8. Front of head of nymphal flabellate grasshoppers.



Cercus

9. Cercus of adult male flabellate grasshopper.



Egg pod

10. Egg pod (bottom at right) and four eggs.

### Daily Activity

The flabellate grasshopper is a diurnal insect being inactive at night and active during the day. Both nymphs and adults rest horizontally on bare ground at night. They move to basking positions, usually with their side perpendicular to rays of the sun, about 45 minutes after sunrise. They bask for about two hours before they start their normal activities of pottering, feeding, and egg laying. At this time temperatures have risen to about 70°F

(air) and 90° to 100°F (soil). Activity ends when temperatures in midsummer reach 90°F (air) and 130°F (soil). Flabellate grasshoppers, adult by this time, climb small shrubs to heights of 3 to 6 inches and rest in the shade. When temperatures decline in late afternoon, they return to normal activities. Two hours before sunset, with further decline in temperature, they again begin basking. As the sun begins to set and shadows cover the ground, they assume their nocturnal resting positions.

### Selected References

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