Band-winged grasshoppers of the Canadian Prairies and Northern Great Plains

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The band-winged grasshoppers (subfamily Oedipodinae of the family Acrididae; also referred to as subfamily Locustinae, Tribe Oedipodini) are a characteristic feature of semi-arid grasslands in North America. These insects are generally found in open short-grass prairie, and often frequent rough terrain, preferring bare or heavily eroded cliffs or surfaces (and even adopting summer fallow fields as choice territory).

Their large, lobed hindwings, usually with spots and bands, are features that distinguish the band-winged grasshoppers from the other grasshopper subfamilies anatomically. The hindwings are also the basis on which many people who are not familiar with insect taxonomy can distinguish the group by their behaviour. Many species of band-winged grasshoppers snap the hindwings as they fly (crepitation) so loudly that they can be heard across a pasture or field. The red-winged grasshopper (*Arphia pseudonietana*) is well-known across Canada for its startle reaction, exploding in a red and black flash out of the grass ahead of a hiker and clacking loudly away.

Although the band-winged grasshoppers are a coherent group and clearly belong together, the subfamily contains extreme diversity. While this subfamily contains mainly species that are economically harmless (and should be distinguished from other grasshoppers to avoid unjustified control actions), it also contains the clear-winged grasshopper (*Camnula pellucida*), among the most devastating grasshopper pests in Canada. In fact, the oldest genus of Oedipodinae is *Locusta*, the ultimate in devastation. Some band-wings are small and even delicate, like the light-weight Kiowa range grasshopper (*Trachyrhachys kiowa*), but the Oedipodinae is also home to the most massive grasshoppers we have: the black-winged grasshopper (*Dissosteira carolina*), red-shanked grasshopper (*Xanthippus corallipes latefasciatus*), and three-banded range grasshopper (*Hadrotettix trifasciatus*) all outweigh the two-striped grasshopper (*Melanoplus bivitattus*), which holds the title in the subfamily Cyrtacanthacridinae (spur-throated grasshoppers). The flashiest occur in Oedipodinae, like the red wings of *A. pseudonietana* mentioned above, or the nearly cobalt colour of the bluelegged grasshopper

(*Metator pardalinus*), but also some of the most cryptic. Most Canadians have watched a black-winged grasshopper (or "roadduster") fly lilting back and forth with large black and yellow wings and then disappear before the eyes as it lands and fades into the ground. *T. kiowa* sitting and absolutely disappearing into the pattern and colour of a grey-green prairie lichen testifies to millenia of life with grassland birds.

The following notes provide a brief look at some of the band-winged grasshoppers that I have collected and observed on grassland of Alberta and Saskatchewan. The list is not complete, but I have included the more interesting species of Oedipodinae (Locustinae) that would be seen by collectors visiting sites such as the National Wildlife Area at Suffield, AB, the Research substation at Onefour, AB, the Milk River valley, or southern Alberta grazing reserves.

(All collections and photographs are by D. Johnson)

Aerochoreutes carlinianus (Thomas) (= *Circotettix carlinianus*)

Carlinian snapper grasshopper

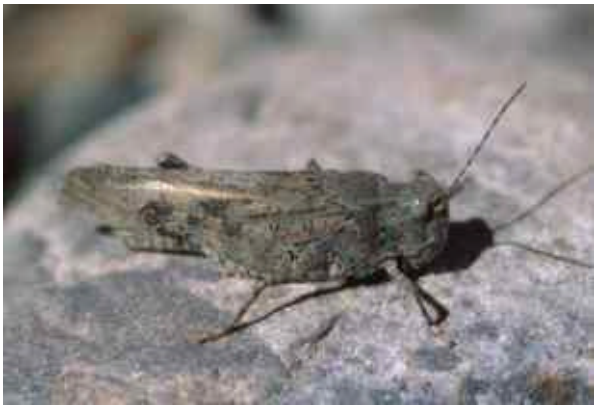

Fig. 1. Adult male

This species is one of the most interesting to be encountered, because of its very active and noisy behaviour while displaying and defending territory. The males hover in flight over bare (usually sun-warmed) ground, swooping and buzzing intermittently. The breaks between each buzz are somewhat temperature dependent, but usually about a half second. They are so loud that a common but unofficial name is rattlesnake grasshopper. Their preference for bare, rough and (unlike *C. rabula* below) flat terrain has caused them to readily adopt summer fallow fields as prime habitat for male displays. I have seen groups of hundreds spaced roughly 5 m apart buzzing up and down between about 1 and 8 m for much of a warm afternoon. They often sit and bask, waiting for a move by another male, and then when it happens, on cue all of the males within 50 m or so will take to the air and buzz. They hover so close to one spot that I have had no trouble videotaping this behaviour.

This grasshopper is normally gray to tan, but I have found them in chalky pink and chalky blue forms that seem best described as pastel.

Arphia conspersa Scudder

Speckled range-land grasshopper

This charcoal-coloured grasshopper is common on native short grass (for example, blue grama, needle-and-thread and June grass), especially where sand ridges, dunes, bare ground and small blowouts occur. It winters as late nymphal instars that can be easily found whenever the snowcover disappears during January through April. They become adults early, usually in May, and are mostly gone before the end of the summer.

Arphia pseudonietana (Thomas)

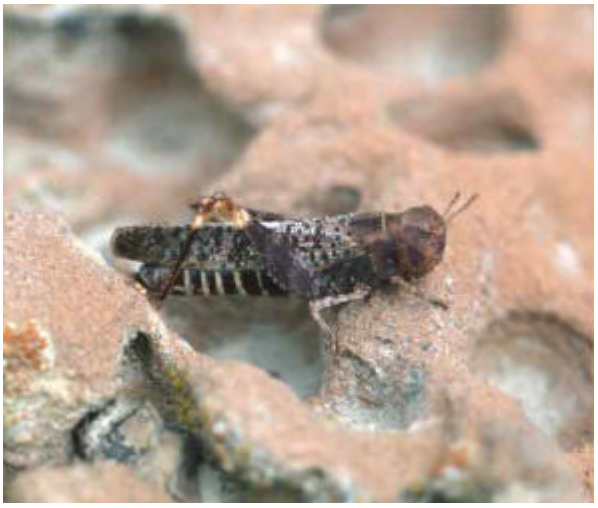

Fig. 2. Adult female

I have already mentioned the loud crepitation of this species. Although it looks like *A.conspersa*, it overwinters in the egg and there-

Red-winged grasshopper

fore appears as late nymphal instars in June, and as adults in late summer. Both species feed on grass, and may prefer wheatgrass.

Fig. 3. Red wing exposed

Camnula pellucida (Scudder)

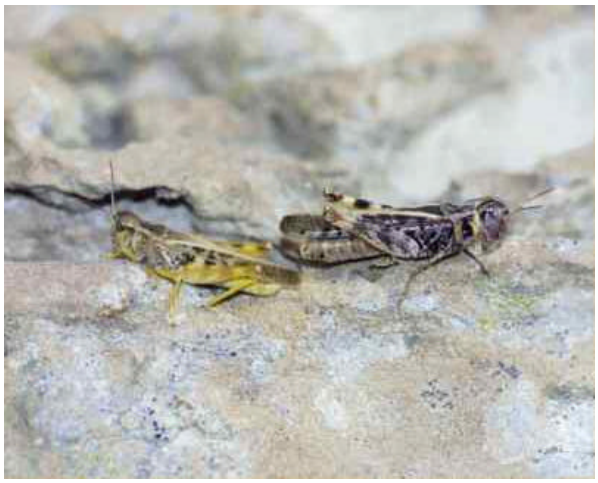

Fig. 4. Male and female

At one time this serious pest of wheat and barley was thought to be a strict graminovore, but in recent years it has appeared as a significant pest of young canola plants. We found that al-

Clear-winged grasshopper

though it will not feed on the leaves of safflower, it will nibble the stem under the head until it nods over, and thereby do more damage to final yield than the more voracious *Melanoplus* species. This species is commonly found hanging dead on vegetation, in some cases with visible conidiophores of fungi of the *Entomophaga grylli* complex (Entomophthorales: Entomophthoraceae). An outbreak of this species that covered much of Prairie Canada was stopped by this fungus in 1962.

No grasshopper species in Canada exhibits such extreme fluctuations in abundance. The clear-winged grasshopper went from dominance in some sites in southern Alberta, Saskatchewan and B.C. in 1984, to being an endangered species by 1993-4 when we found only a few specimens in collections that totalled well over 15,000 grasshoppers (Johnson and Andrews, unpublished). In the same years, it accounted for an outbreak in northern regions (for example, Peace River,

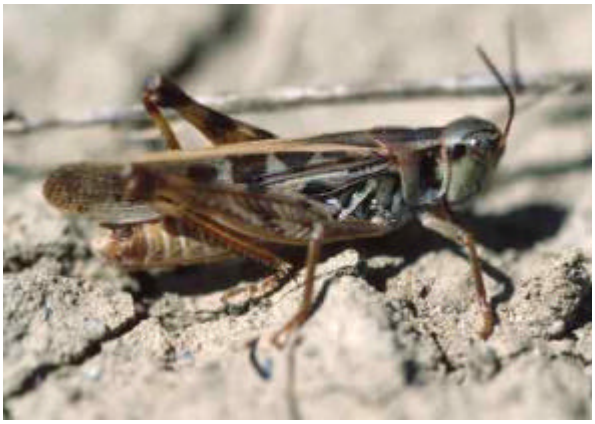

Fig. 5. Greenish male form

Cache Creek, Dawson Creek). This is the only grasshopper I have seen that has mass matings so thick that they can be seen from several hundred m, in which several males may be simultaneously attempting to copulate with a female.

Chortophaga viridifasciata (DeGeer)

Northern green-stripe grasshopper

Although never abundant, it is usually possible to find one of these very green grasshoppers on a hike in grassland in April or May. They overwinter as nymphs, one of about seven species that do so. The keeled shape of the pronotum and the small dots of other colours make it a beautiful insect.

Circotettix rabula Rehn and Hebard

Wrangler grasshopper

Fig. 6. Male resting

They can be captured with a net snapped quickly down with tension, but rarely by normal sweeping.

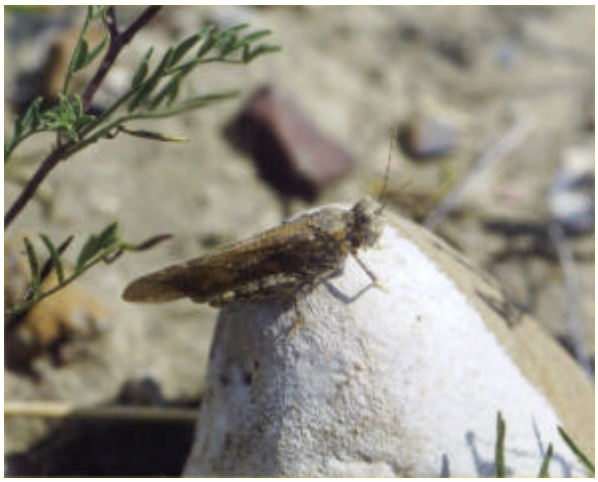

Fig. 7. Male sitting in observing/basking spot

This angular and bugged-eyed species is the most seemingly aggressive grasshopper, difficult to approach for a photo but not easily scared off either. They will actually charge a collector, pass to the side, and come back to reclaim the territory.

***Cratypedes neglectus* (Thomas)** **Pronotal range grasshopper**

This is another crepitating grasshopper that never becomes very abundant, and can sometimes be heard before it is seen.

***Dissosteira carolina* (Linnaeus)** **Black-winged grasshopper**

Fig. 8. Pair in copulo

This very large and familiar grasshopper occurs right across Canada and the northern U.S., and can be found in most habitats that have dry, bare ground. They appear to be very sensitive to soil type and weather. In Alberta they appear in large numbers (I have seen 40 per sq. m.) only when several years in a row have a dry spring, and then only in certain areas. Elsewhere typical densities are around one per 10 sq. m. We have found this species to be an excellent lab animal (meaning that it has good survival in a cage and seems to feed and grow normally).

***Encoptolophus costalis* (Scudder)** **Western clouded grasshopper**

This is another good example of the changes that can occur in species composition. *E. costalis* seems to prefer slightly moist conditions, and I have observed it feeding on forbs. It was a common early hatching species in Alberta until the hot, dry period that so encouraged the melanoplines. Now it is very rare.

***Hadrotettix trifasciatus* (Say)** **Three-banded range grasshopper**

There are two ways to camouflage, to match the background colour or to break up the outline. *H. trifasciatus* takes the second approach and does it very well. When this grasshopper lands and sits at rest, the bars on the femur and tegmen line up perfectly to make a stripe that cancels the grasshopper shape.

Fig. 9. Adult female alighting and closing the band pattern

Metator pardalinus (Saussure)

Bluelegged grasshopper

This was once a common grassfeeder on native and semi-native pastures in southern Alberta, but like many band-winged grasshoppers it became rare during the wet years, 1991-99. During the drought of 2000 it quickly made a comeback at sites such as Onefour and Lost River, AB. The blue of the leg of this grasshopper is as bright and striking as any I have seen on beetles.

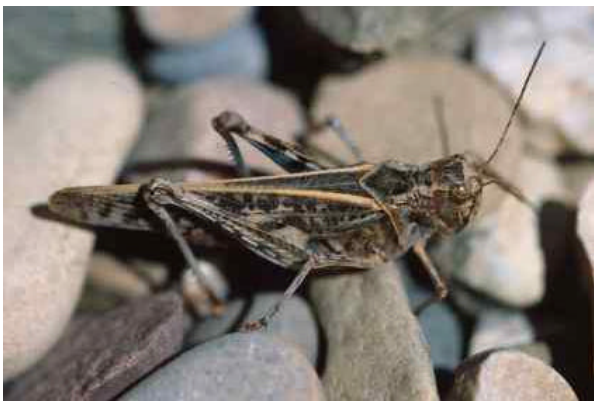

Fig. 10. Adult male

Spharagemon collare (Scudder)

Mottled sand grasshopper

This species is similar to *S. equale*, but not as well defined. It is associated with sandy grassland and feeds on grasses.

Spharagemon equale (Say)

Barren ground grasshopper

Fig. 11. Adult male

I would chose this species for the official Alberta grasshopper if there were such a contest. It is a beautiful insect that thrives in dry conditions, increasing in both prominence and abundance as others drop out due to extreme drought or heat. It is a common grasshopper that can be collected in the southeast corner of the province, but also occurs in most of the short grass of the southern region. It has been reported to feed on crucifers, but I have found both forb and grass remains in the gut of this species. It is a very good flier, and its relative abundance can be underestimated by using a standardized, inflexible sweep-sampling method.

Trachyrhachys k. kiowa (Thomas)
Kiowa range grasshopper

This lovely little grasshopper has a head that seems too big for the body, and a line of fringe hairs on the femur so that you can never go wrong identifying it. This is a helpful feature, because it occurs in colours from pastel green to tan to gray.

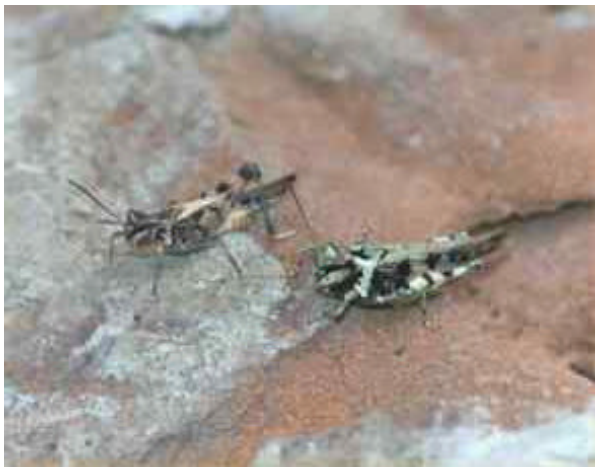

Fig. 12. Brown adult male and green female (colour is not determined by sex)

Trimerotropis species

Trimerotropis species are fascinating in that some of them have such specific habitat preferences that one can look at a landscape and see where to go to find a particular species. I will illustrate their appearance with only one species, and leave the group for a separate description another time, as it deserves.

Trimerotropis suffusa Scudder
Crackling forest grasshopper

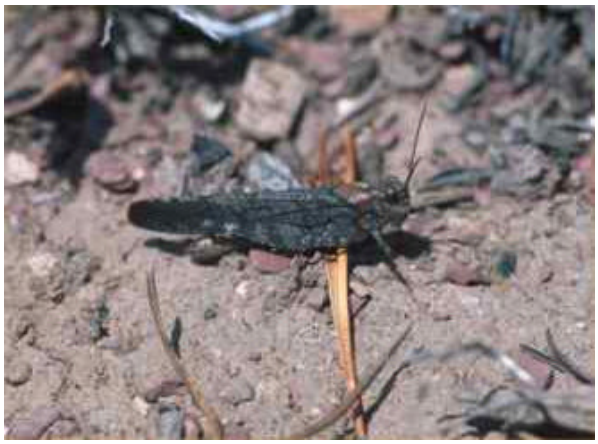

Fig. 13. Adult male found flying back and forth between subalpine grass meadow and edge of wooded area

I selected this species to illustrate because it is unusual in that it is a forest species that inhabits grassy alpine meadows but also moves out on to the plains. I realized this only after chasing them down in unexpected places (they are fast and hard to catch).

Other species are:

Trimerotropis agrestis McNeill
Toothed field grasshopper

Trimerotropis campestris McNeill
Campestral grasshopper

Trimerotropis latifasciata Scudder
Broad-banded grasshopper

Trimerotropis pallidipennis salina McNeill
Alkaline pallid-winged grasshopper

Trimerotropis pistrinaria Saussure
Barren lands grasshopper

Trimerotropis sparsa (Thomas)
Great basin grasshopper

Trimerotropis sordida E.M.Walker
Walker's dingy grasshopper

Trimerotropis verruculata (W.Kirby)
Cracker grasshopper

***Xanthippus corallipes latefasciatus* (Scudder) Red-shanked grasshopper**

Fig. 14. Fifth-instar female sitting on snow in March

This species is our largest grasshopper, and looks almost the size of a wren while flying. It overwinters as a toad-like nymph (which is often heavily parasitized by flies, as shown by T. Danyk in my lab) and matures quickly in the spring. I have seen these grasshoppers impaled on barbed wire or on prickly pear cactus, apparently by shrikes. We have also found them to be a common constituent of coyote dung in spring and early summer, and the hind femora and tegmina are common refuse around the holes of burrowing owls, or beneath posts used by kestrels.

Selected references

I recommend the following references for anyone who would like to identify and read further about this group:

Brooks, A.R. 1958. Acridoidea of southern Alberta, Saskatchewan, and Manitoba (Orthoptera). Canadian Entomologist Supplement 9: 3-32.

Otte, D. 1984. The North American Grasshoppers. Vol. 2. Oedipodinae. Harvard Univ. Press, Cambridge, MA. 366 pp.

Vickery, V.R. and D.K. McE. Kevan. 1986. The insects and arachnids of Canada. Part 14. The grasshoppers, crickets and related insects of Canada and adjacent regions. Ulonota: Dermaptera, Cheleutoptera, Notoptera, Dictyoptera, Grylloptera and Orthoptera. Agriculture Canada Publication 1777. 918 pp.

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Fact file

The prairie grassland of North America is characterized by relatively limited rainfall, ranging from about 100 cm at the forested eastern edge to less than 30 cm at the western edge. On the plains, May and June are the months with the greatest amounts of precipitation, and about 40% of the annual total falls as snow during the winter. Closer to the Cordillera, due to Chinooks, the duration and the depth of snow cover are reduced. At Lethbridge, for example, snow depths greater than 25 cm are rare even with an annual snowfall of 140 cm.