Ground beetles are an integral component of biological control in agricultural fields, but information on the species that are present in Oregon and throughout the United States is surprisingly limited. This guide was created as a quick reference for common ground beetles found in grass seed crops in the Willamette Valley. It describes the general biology and ecology of these beetles and includes a straightforward, illustrated key and a profile for each of 26 species. Each species profile includes detailed images, identifying features and concise information on seasonality and abundance in annual ryegrass and tall fescue fields.

Ground beetle biology

Carabid beetles (Carabidae), known colloquially as ground beetles, are one of the largest insect families in the world, with roughly 40,000 species occurring globally and approximately 2,500 species in North America alone.

Ground beetles range in size from about 1.5 to 35 mm, and they are found in a variety of habitats, including agricultural fields. They spend most of their lives on the ground, where their typically long legs enable them to successfully pursue prey and avoid predators. However, some species (for example, *Calosoma* spp.) can also be found foraging on trees.

While most ground beetles are nocturnal (night-active), there are also many diurnal (day-active) species. Some species alter the timing of activities such as foraging and reproduction depending on the season, temperature, light intensity or humidity. Typically, diurnal ground beetles are smaller and display iridescent colors, while nocturnal species tend to be larger and darker colored.

The life cycle of a ground beetle consists of four distinct stages: egg, larva, pupa and adult. Eggs are typically laid in clusters of various sizes within soil crevices, under leaves and in other protected areas at the soil surface. Ground beetle larvae have well-developed legs, antennae and a flattened body, which enable them to forage actively, primarily beneath the soil surface.

Beetles undergo two or three larval stages (instars) before pupating in the soil. The pupa is an inactive, nonfeeding stage. Newly emerged adults (called tenerals) are...
still soft bodied and light in color until sclerotization, or hardening, occurs. Generally, development from egg to adult takes less than a year for most species.

Life cycles for many ground beetles are quite complex, with some species breeding during spring and others during fall. In addition, these beetles may undergo a period of suspended development (known as diapause), either as late-stage larvae or as adults, during periods of extreme or unfavorable conditions, such as hot summers or cold winters.

Ground beetles are capable of consuming close to their own body weight in food every day. Many species feed on a variety of prey, including small invertebrates, seeds or seedlings and, in some cases, rotting vegetable matter or ripe fruit. Ground beetles often feed opportunistically, meaning that they feed on whatever prey items are most abundant, or most likely to be encountered, in their habitat.

However, some species specialize in feeding on certain types of prey. Species of the genus *Loricera*, for example, have long setae (structures resembling hair or bristles) on their antennae, which aid in catching small invertebrates such as collembola. Others, such as the genera *Cychrus* and *Scaphinotus*, have morphological and behavioral adaptations for feeding on slugs and snails; their narrow heads can reach inside snail shells, where they bite their prey in a specific location, which paralyzes the snail and renders it unable to produce mucus.

Ground beetles often locate their food randomly, but there is evidence that some species hunt by sight or use chemical cues.

**Ground beetles in agricultural systems**

Ground beetles are generally considered beneficial insects in agricultural systems because they contribute to natural control of invertebrate pests and weeds. For example, the range of pest organisms consumed by ground beetles includes slugs, aphids, wireworms (larvae of click beetles) and weed seeds such as common lambsquarters. Thus, ground beetles can help reduce crop yield loss by maintaining low pest populations during the early stages of crop growth when plants are more vulnerable to damage. Having a more diverse carabid community within a field can improve biological control, as beetle species will be present at various stages of crop development, and different species will feed on a wider range of pests.

Management operations routinely carried out in agricultural fields, such as soil cultivation or pesticide applications, can negatively influence ground beetles. Broad-spectrum insecticides can kill beetles directly, through contact or ingestion, or indirectly when beetles feed on plant-eating invertebrates that have fed on treated crops. Sublethal doses of insecticides can interfere with beetles’ reproductive success and/or increase beetle activity by reducing the availability of invertebrate prey. When prey are scarce, carabid beetles may move into adjoining areas in search of food. With fewer beetles in the field to provide biological control, pest populations may surge.

Applications of herbicides can also contribute to a decline in ground beetle species. Herbicides can reduce both weed seeds, which are consumed by some ground beetle species, and weed cover, which is used for shelter and provides habitat for invertebrates consumed by beetles.

Soil cultivation (for example, tillage) can have varying effects on carabids, depending on factors such as tillage type, intensity (or depth) and timing of cultivation in relation to the phenology, activity period and habitat/microclimate preferences of different carabid species. In general, direct mortality of ground beetles is lower in conservation tillage systems, and the retention of crop residue in the field can provide shelter from severe abiotic conditions as well as offer habitat for a variety of ground-dwelling species, including ground beetles and their prey.

Agricultural fields are a system in which frequent disturbances occur. Therefore, to retain these beetles, a permanent environment in which they can shelter, reproduce and find readily available food throughout the year is needed. To maximize the biological
control potential of carabid beetles, habitat can be enhanced in a way that is favorable for the species of interest. Beetle banks, for example, can serve as refuges and as places of alternative food sources in times of disturbance in neighboring agricultural fields. From these banks, beetles can recolonize fields once conditions improve. Beetle banks are raised mounds planted with native perennial grasses that run alongside or within agricultural fields. They can be several hundred meters long. The raised nature of the beetle bank ensures drier conditions during rainy periods, but even field margins containing a range of perennials offer valuable habitat if left undisturbed.

How to collect ground beetles

The easiest way to collect ground beetles is with pitfall traps (figure 1), which are cups buried in the ground, flush with the soil surface. Traps may contain a killing and/or preservative fluid if they are to be left out for an extended period of time before collection. The fluid can be, for example, ethylene/propylene glycol (antifreeze), rubbing alcohol, ethanol or a mixture of vinegar, salt and detergent, which is cheap, nontoxic and has been shown to be particularly attractive to ground beetles.

![Figure 1. Cross section of a basic pitfall trap used to collect ground beetles.](image)

Install a rain guard to protect the trap from rain and debris. Guards can consist of a sheet of corrugated plastic, metal or wood. The diameter should be at least equal to that of the cup. Suspend the guard over the trap using nails or metal stakes stuck into the ground.

Larger and more mobile ground beetle species have a greater probability of being captured than smaller species. For more details on pitfall traps, see supplementary figure 1 in Reich, et al. (2020).

How to use this key

The carabid beetles described in the following key consist of species trapped during two studies in the southern Willamette Valley, Oregon. All sites were located in Linn County, which is known as the Grass Seed Capital of the World. The first study was conducted for 15 months (April 2018–June 2019) using overnight pitfall trapping in 10 annual ryegrass (ARG) fields. The second study was conducted for 14 months (June 2018–July 2019) using both daytime and nighttime pitfall trapping in six tall fescue (TF) fields. Some species were commonly found, while others were confined to only a few sites or were collected in low numbers.

The key is based on Lindroth (1961) and the distinguishing features the authors have used when identifying carabid beetles. A generalized carabid beetle morphology (figure 2, page 5), other distinguishing features (figures 3 and 4, page 5) and a glossary (page 6) are provided. Technical terms used throughout the key are italicized and defined at the bottom of each page.
Following the key, each species (listed in alphabetical order) is described in more detail, including size, diet, abundance and temporal activity in the pitfall traps. The following general classification of abundance was used:

- **Scarce:** ≤ 10 individuals collected in total.
- **Occasional:** 11–50 total individuals.
- **Abundant:** > 50 total individuals.

Species were classified as “common” if more than 50 individuals were caught and beetles occurred in 80 percent of fields sampled for each study and “very common” if more than 200 individuals were caught and beetles occurred on all sites.

This key was designed as an aid to distinguish among only the 26 species discussed in this publication. Beetle identification should be cross-checked against the checklists provided in the species profiles (based on species descriptions in Lindroth, 1961). If possible, collected beetles should also be compared to a pinned reference specimen. (The author can provide access to pinned specimens.) Some things to note:

- Within a genus (for example, *Amara*), many species are very similar, and examination of genitalia may be required to confirm identification.
- Body length is measured from the tip of the mandibles to the end of the elytra or abdomen (whichever is longest). When carabids are collected in pitfall traps with a killing fluid, their abdomen can be artificially distended so that it pushes out below the elytra. In such cases, measurements should be made to the end of the elytra.
- Body size can differ greatly among individuals of the same species. Females are generally larger and broader than males, and some specimens may fall outside the size ranges given in the species profiles. The size range of the beetles given in the detailed species descriptions refers to those measured in our studies. If the sizes given in Lindroth (1961) fall outside our measurements, they are shown in parentheses.
- The color descriptions in the key refer to mature adult beetles. Newly emerged adults (tenerals) can be a lot paler and often feel rather soft.
- Metallic hues can be misleading, as they can exhibit a range of colors, depending on light or age of the specimen.
- Seta(e) (hairs or bristles) are used as identifying features in some couplets but sometimes can be broken off. Look instead for a pore, which indicates their position (figure 3c, page 5).
- For many species, differentiating males from females can be as easy as looking at the tarsi (“feet”) on the first pair of legs; the presence of hairy pads indicates a male beetle (figure 4a, page 5). However, this is not the case for all species. Another, more reliable, approach to determining a beetle’s sex is to carefully examine the genitalia, either by looking at the posterior end and identifying any extruding genitalia or by using forceps to carefully extract them. In males, genitalia consist of the aedeagus, which is a hooked structure (figure 4b). In females, the valvulae (external structures of the ovipositor, figure 4c) and ovipositor (figure 4d) are the main identifying characteristics. In most cases, morphology of the male genitalia can be used for species identification. This technique requires a microscope, however, so it is not included in this key.
Figure 2. Schematic of a generalized carabid beetle showing main structures referred to in the key.

Figure 3. (a) Prosternum; (b) clypeo-ocular line; (c) supraorbital seta (circle) and pore (arrow).

Figure 4. (a) Hairy pads; (b) aedeagus; (c) valvulae; (d) ovipositor.
**Glossary**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Abdomen</strong></td>
<td>The third body segment of the beetle after the head and thorax (figure 2).</td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td>Less than a 90° angle.</td>
</tr>
<tr>
<td><strong>Aedeagus</strong></td>
<td>Male reproductive organ (figure 4b).</td>
</tr>
<tr>
<td><strong>Aeneous</strong></td>
<td>Brassy, golden-green.</td>
</tr>
<tr>
<td><strong>Antenna(e); antennal</strong></td>
<td>Segmented sensory appendage(s) projecting off the head. When counting antenna(e) segments, begin at the base of the antennae (for example, the second antennal segment refers to the second segment of the antenna from the head).</td>
</tr>
<tr>
<td><strong>Antepenultimate</strong></td>
<td>Third from the base.</td>
</tr>
<tr>
<td><strong>Apex; apical(ly)</strong></td>
<td>Endpoint; toward the end.</td>
</tr>
<tr>
<td><strong>Base; basal(ly)</strong></td>
<td>Nearest to the body of the beetle. For example, the base of the elytra is the top of the elytra, while the base of the pronotum/antennae is the bottom of the pronotum/antennae.</td>
</tr>
<tr>
<td><strong>Bead</strong></td>
<td>Elevated “rim” of the pronotum (figure 2). See Agonum muelleri profile (page 16) and Agonum suturale profile (page 17).</td>
</tr>
<tr>
<td><strong>Carina(e); carinate</strong></td>
<td>Keel(s), ridge(s); keeled, ridged. See Couplet 18 (figures a and b) and Couplet 19 (figure a).</td>
</tr>
<tr>
<td><strong>Clypeo-ocular line</strong></td>
<td>Line running from each compound eye across the clypeus (figure 3b).</td>
</tr>
<tr>
<td><strong>Clypeus</strong></td>
<td>“Nose”: anterior head plate below the frons (figure 2).</td>
</tr>
<tr>
<td><strong>Confluent</strong></td>
<td>Flowing together.</td>
</tr>
<tr>
<td><strong>Cordiform</strong></td>
<td>Heart-shaped. See Nebria brevicollis profile (page 24).</td>
</tr>
<tr>
<td><strong>Cupreous</strong></td>
<td>Like copper.</td>
</tr>
<tr>
<td><strong>Denticle; denticulate(d)</strong></td>
<td>Toothlike projections; tooth(ed). See Couplet 19 (figure a).</td>
</tr>
<tr>
<td><strong>Diaphanous(ly)</strong></td>
<td>Translucent(ly).</td>
</tr>
<tr>
<td><strong>Disc</strong></td>
<td>The middle, more uniform, part of the pronotum or elytra (figure 2).</td>
</tr>
<tr>
<td><strong>Dorsal</strong></td>
<td>Referring to the back or upper side of the beetle.</td>
</tr>
<tr>
<td><strong>Elytral epipleura</strong></td>
<td>Side margins of the elytra. See Couplet 17 (figure a).</td>
</tr>
<tr>
<td><strong>Elytrum, elytra</strong></td>
<td>The modified (usually hardened) forewing(s) of the beetle (figure 2).</td>
</tr>
<tr>
<td><strong>Femur, femora</strong></td>
<td>The third segment of the leg, the “thigh(s)” of the beetle (figure 2).</td>
</tr>
<tr>
<td><strong>Fovea(e); foveate</strong></td>
<td>Usually demarcated dimple(s) or depression(s); dimpled.</td>
</tr>
<tr>
<td><strong>Frons</strong></td>
<td>“Forehead”: the part of the head between the eyes and above the clypeus (figure 2).</td>
</tr>
<tr>
<td><strong>Furrowed</strong></td>
<td>Grooved, wrinkled.</td>
</tr>
<tr>
<td><strong>Glabrous</strong></td>
<td>Free from hairs or bristles, nonpubescent.</td>
</tr>
<tr>
<td><strong>Infuscated</strong></td>
<td>Darkened with a brownish tinge.</td>
</tr>
<tr>
<td><strong>Lateral(ly)</strong></td>
<td>Referring to the sides.</td>
</tr>
</tbody>
</table>
**Mandible**  
Large, protruding mouthparts, “jaw” (figure 2).

**Meso-**  
Referring to the middle of the three thorax segments. For example, the mesotibia is the “shin” of the second pair of legs.

**Meta-**  
Referring to the last of the three thorax segments. For example, the metatibia is the “shin” of the third pair of legs.

**Oblique**  
Slanting, sloping.

**Obtuse**  
Greater than a 90° angle and less than a 180° angle.

**Ocellate**  
Resembling an eye.

**Ovipositor**  
Female reproductive organ. Can be extended outside the body cavity (figure 4d).

**Palp(i)**  
Elongated, segmented appendage(s) near the mouth of the beetle. The maxillary palpi are the outermost pair followed by the labial palpi (figure 2).

**Piceous**  
Glossy brownish-black.

**Pro-**  
Referring to the first of the three thorax segments. For example, the protibia is the “shin” of the first pair of legs.

**Pronotum**  
Dorsal (back) body plate of the prothorax (the first segment of the thorax), just behind the head and above the elytra (figure 2).

**Pubescence; pubescent**  
Covering of hairs; hairy. See Couplet 13 (figure a).

**Punctuation; punctulate**  
Series of small indentations; marked with small dots.

**Rufous**  
Reddish-brown.

**Rufo-piceous**  
Reddish-brown-black.

**Rufo-testaceous**  
Reddish-brownish-yellow.

**Rugose(ly)**  
Full of wrinkles.

**Rugulose**  
Finely wrinkled.

**Scutellar stria**  
Shortened stria next to the first stria from the suture. See figure 2 and Couplet 16 (figure a).

**Seta(e); setiferous**  
Bristle(s), hair(s) that arise(s) from a small indentation or pore (figure 3c); with bristle(s), hair(s). See Couplet 6 (figure a).

**Sinuation; sinuate**  
Winding, bending in and out; wavy.

**Sternite(s)**  
Sclerotized (hardened) plate(s) on the ventral side (the “stomach” or underside) of the beetle.

**Sternum, sterna**  
The ventral portion (underside) of a segment of abdomen or thorax. Like the legs, sterna are divided into pro- (figure 3a), meso- and metasterna. See Poecilus laetulus profile, page 25.

**Stria(e)**  
Linear impression(s) along the elytron (figure 2).

**Subapical**  
Just above the apex (endpoint).

**Suture; sutural**  
Meeting point of the two elytra (figure 2).

**Tarsus, tarsi; tarsal**  
“Foot, feet”: consisting generally of five segments, the last one of which is clawed; regarding the foot (figure 2).

**Tergite**  
Sclerotized (hardened) plate on the dorsal (upper) side of the beetle. See Couplet 2 (figures a, c).
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Testaceous</td>
<td>Brownish-yellow.</td>
</tr>
<tr>
<td>Thorax</td>
<td>The second body segment, between the head and the abdomen (figure 2).</td>
</tr>
<tr>
<td>Tibia(e)</td>
<td>Fourth leg segment(s) of the beetle, “shin(s)” (figure 2).</td>
</tr>
<tr>
<td>Trifid</td>
<td>Split into three parts. See Couplet 15 (figure b).</td>
</tr>
<tr>
<td>Trochanter</td>
<td>Second leg segment of the beetle, visible only on the underside of the beetle. See Couplet 17 (figures c, d).</td>
</tr>
<tr>
<td>Truncate</td>
<td>Ending abruptly, cut off.</td>
</tr>
<tr>
<td>Tubercle</td>
<td>Small, rounded, projecting part. See Couplet 4 (figure a).</td>
</tr>
<tr>
<td>Unilaterally</td>
<td>One-sided.</td>
</tr>
<tr>
<td>Valvulae</td>
<td>The first pair of structures in the female ovipositor. In female carabid beetles, these are visible externally (figure 4c).</td>
</tr>
</tbody>
</table>
Key

1  Body length ≤ 5 mm (if about 5 mm, check both descriptions) .................................................................................................................................................................................................2
   Body length > 5 mm .................................................................................................................................................................................................4

2  Elytral apex truncate (a), leaving most of the last tergite (or more) exposed .................. p. 23 Microlestes nigrinus
   Elytral apex entire (b, c), leaving at most parts of the last tergite free (for example, gravid females) .............................................................................................................................................................................................................3

3  Two long, paired supraorbital setae; sutural stria recurring at apex (a); elytral stria after the fifth stria is only a series of unconnected dots that are at most faintly impressed ................................................................. p. 27 Trechus obtusus

4  Elytral striae indistinct or with rows of tubercles (a) ................................................. 5
   Striae ± regular without tubercles .............................................................................. 6

5  Very large and stout (≤ 23 mm); elytron with three stria intervals (fourth, eighth, twelfth) consisting of rows of elongated, raised tubercles .................................................................................... p. 21 Calosoma cancellatum
   Slender with long legs and narrow prothorax; elytra fused and covered in small punctures ............................................................................................................................................................................. p. 24 Omus audouini

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Apex: Endpoint
Elytral apex: Endpoint of the elytra (forewings)
Prothorax: First of the three thorax segments
Seta(e): Bristle(s), hair(s)
Stria(e): Linear impression(s) along the elytron
Strial interval: The space between two linear impressions on the elytron
Supraorbital seta(e): Bristle(s) over the eyes
Sutural: Referring to the meeting point of the two elytra
Tergite: Hardened plate on the upper side of the beetle
Truncate: Ending abruptly, cut off
Tubercle: Small, rounded, projected part
6 Antennae segments 2 through 4 with very long, stiff setae (a) ................................................................. 7
Antennae without stiff setae (b) .................................................................................................................. 8

7 Femora as pale as the tibiae; striae with small, sharp and regular but rather sparse punctures ......................................................... p. 23 Loricera foveata
Femora black or almost so, tibiae paler; striae with closer, more irregular punctation .................................................................... p. 22 Loricera decempunctata

8 One long, paired supraorbital seta .............................................................................................................. 9
Two long, paired supraorbital setae ........................................................................................................... 14

9 Pronotum with long seta at hind angle ................................................................................................ 24 Nebria brevicollis
Pronotum without seta at hind angle ................................................................................................... 10

10 Body length < 8 mm (if about 8 mm, check both descriptions); elytra mostly dark; hind angles of pronotum rounded ........................................ p. 27 Stenolophus aniceps
Body length > 8 mm .............................................................................................................................. 11

11 Legs and margins of pronotum rufous or pale .................................................................................... 12
Entire pronotum and legs dark ............................................................................................................. 13

12 Metallic with dark elytra; hind angles of pronotum not protruding; short pubescence on outer elytral intervals ........................................................................ p. 22 Harpalus affinis
Nonmetallic; most of elytra (or at least margins) pale; hind angles of pronotum slightly protruding; no pubescence on elytra ...................... p. 20 Anisodactylus sanctaecrucis

13 Short pubescence on outer and apical part of inner elytral intervals (a), as well as laterally on base and along side margin of pronotum; hind angles of pronotum with small denticles ............ p. 19 Anisodactylus binotatus
Pronotum and elytra without pubescence; hind angles of pronotum without denticles ...................... p. 20 Anisodactylus californicus

Apical: Toward the end
Base: Nearest to the body
Denticle: Toothlike projection
Femora: Third segments or “thighs” of the leg
Laterally: Referring to the sides
Pronotum: Dorsal (back) body plate of the first segment of the thorax
Pubescence: Covering of hairs
Punctuation: Series of small indentations
Rufous: Reddish-brown
Seta(e): Bristle(s)
Stria(e): Linear impression(s) along the elytra
Supraorbital seta(e): Bristle(s) over the eyes
Tibia(e): Fourth leg segment(s) or “shin(s)”
14 Posterior margin of pronotum (red arrows) as wide as elytral margin (blue arrows) (a) ................................................................. 15
Posterior margin of pronotum narrower than elytral margin (b) ................................................................. 17

![Image of pronotum and elytron]

15 Protibia with simple terminal spur (a) ........................................................................................................................................ 16
Protibia with trifid terminal spur (b) ............................................................................................................................. p. 19 Amara longula

![Image of protibia]

16 Eyes distinctly convex; elytron often with ocellate puncture (circle) at base of abbreviated scutellar stria (a); inner basal foveae (b) of pronotum at oblique angle (line) to median line (arrow) ................................................................. p. 18 Amara littoralis
Eyes more or less flattened laterally; elytron without ocellate puncture at base of abbreviated scutellar stria; inner basal foveae of pronotum a short, sharp streak parallel (line) to median line (arrow) (c) ................................................................................................ p. 18 Amara aenea

![Image of elytron and pronotum]

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*Basal fovea(e)*: Depression(s) at the bottom of the pronotum
*Laterally*: Referring to the sides
*Oblique*: Slanting, sloping
*Ocellate*: Resembling an eye
*Pronotum*: Dorsal (back) body plate of the first segment of the thorax
*Protibia(e)*: The “shin(s)” of the first pair of legs
*Scutellar stria(e)*: Shortened stria(e) next to the first stria from the suture
*Trifid*: Split into three parts
17 *Elytral epipleura* distinctly crossed (a); species stout with short appendages; *metatrochanter* half the length of *metafemur*, or nearly so (c) ................................................................. 18

*Elytral epipleura* not or indistinctly crossed (b); species with long, slender appendages; *metatrochanter* at most one-third the length of *metafemur* (d) ................................................................. 20

18 First and base of second and third antennal segment *carinate* (a, b); vividly blue-green metallic; legs, antennae *rufo-piceous*; < 12 mm ........................................ p. 25 *Poecilus laetulus*

Antennae not *carinate*; black; ≥ 12 mm ................................................................. 19

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*Carina(e), carinate*: Keel(s), ridge(s); keeled, ridged

*Elytral epipleura*: Side margins of the elytra

*Metafemur*: Third leg segment (“thigh”) on the third pair of legs

*Metatrochanter*: Second leg segment (lobelike projection) on the third pair of legs

*Rufo-piceous*: Reddish-brownish-black

12
19 Hind angles of *pronotum* denticulate with thick carinae (a); elytron with two or three dorsal setiferous punctures on third elytral interval from the suture...........p. 26 *Pterostichus melanarius*

Hind angles of *pronotum* almost right angles but not denticulate (b); elytra without dorsal punctures.............................................................................................................. p. 26 *Pterostichus algidus*

![Carina](image)

20 Head with constricted neck right behind the eyes (a); body length > 8.5 mm; *piceous* to almost black with paler appendages and no metallic luster..........p. 25 *Platynus brunneomarginatus*

Head not suddenly constricted behind the eyes (b); if > 8.5 mm then either entirely deep black or with metallic luster........................................................................................................ l. 21

![a](image) ![b](image)

21 Elytron with four or more dorsal punctures; if, very rarely, less, then clearly foveate........................................................... p. 22

Elytron with three (rarely unilaterally or irregularly placed with four) rather small, never foveate dorsal punctures ........................................................................................................ l. 23

22 Elytra pale brown, contrasting with darker *prothorax* and head; hind angles of *pronotum* completely obsolete.............................................................p. 15 *Agonum limbatum*

*Piceous*-black head and *prothorax*; greenish or bluish elytra with faint aeneous or bronzy reflection; *pronotum* with obtuse but evident hind angles................. p. 15 *Agonum decorum*

23 Legs entirely pale, testaceous............................................................. p. 17 *Agonum piceolum*

At least tarsi piceous or black........................................................................................................... l. 24

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Aeneous: Brassy, golden-green  
*Carina(e)*: Keel(s), ridge(s)  
Denticulate: Toothed  
Dorsal: Referring to the back or upper side  
*Foveate*: Dimpled  
Obtuse: Greater than a 90° angle and less than a 180° angle  
*Piceous*: Glossy, brownish-black  
Pronotum: Dorsal body plate of the prothorax  
Prothorax: First segment of the thorax, just behind the head  
Setiferous puncture: Puncture with bristles or hairs  
Suture: Meeting point of the two elytra  
Tarsi: Fifth leg segment or “feet”  
Testaceous: Brownish-yellow  
Unilaterally: One-sided
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*Elytral epipleura*: Side margins of the elytra  
*Tibia(e)*: Fourth leg segment(s) or "shin(s)"
**Agonum decorum** Say 1823

*Size:* 8 mm (7–9 mm)  
*Crop:* ARG  
*Occurrence:* April–May; scarce  
*Diet:* animal matter

**Coloration**

✔ Piceous-black; elytral epipleura slightly paler.  
✔ Forebody with metallic reflection (bluish or greenish).  
✔ Mouthparts, first antennal segment and legs more or less piceous.

**Pronotum characteristics**

✔ Hind angles always evident, usually forming minute dentine at tip.  
✔ Base faintly punctulate, at least in the foveae.  
✔ Foveae usually delimited by a flat tubercle.

**Elytra characteristics**

✔ Long, parallel sided at middle.  
✔ Fine but sharp striae, barely visible punctulate.  
✔ Intervals flat.  
✔ Five or six dorsal punctures.

---

**Agonum limbatum** Motschulsky 1845

*Size:* 5.5–7.5 mm  
*Crop:* ARG  
*Occurrence:* January and April; scarce  
*Diet:* seeds, vegetal tissues, aphids, caterpillars

**Coloration**

✔ Black forebody with aeneous hue.  
✔ Elytra testaceous and somewhat browned on disc.  
✔ Appendages pale.

**Pronotum characteristics**

✔ Strongly rounded sides; hind angles completely obsolete.  
✔ Base laterally with raised bead.  
✔ Shallow basal foveae.

**Elytra characteristics**

✔ Very fine striae with flat intervals.  
✔ Shoulders evident (red arrow).  
✔ Usually six (three anterior on third stria, three posterior on second stria) but from four to seven deeply impressed dorsal punctures.
**Agonum melanarium** Dejean 1828

**Size:** 9–11 mm (8–11 mm)  
**Crop:** ARG  
**Occurrence:** early May; scarce  
**Diet:** earthworms, flower beetle larvae (in captivity)

**Coloration**
- ✔ Deep black without metallic reflection, *elytral epipleura* slightly paler.
- ✔ Elytra faintly iridescent.
- ✔ Mouthparts, first antennal segment and at least *tibiae* of legs slightly paler.

**Pronotum characteristics**
- ✔ Broad, widest just before middle with protruding front angles (blue arrow).
- ✔ Hind angles evident with a small, blunt *denticle* (red arrow).
- ✔ *Fovea* large and *rugosely punctulate*.
- ✔ *Lateral bead* continued as a strongly widening reflection toward hind angle.

**Elytra characteristics**
- ✔ *Striae* deep and *punctulate* with convex intervals.
- ✔ Fifth *stria* not impressed at tip.
- ✔ Usually with three, rarely two or *unilaterally four dorsal punctures*.

---

**Agonum muelleri** Herbst 1785  
nonnative, introduced from Europe

**Size:** 6.5–11 mm  
**Crop:** ARG, TF  
**Occurrence:** March–August; *common* in ARG, *occasional* in TF  
**Diet:** wireworms and other larvae, including leatherjackets and caterpillars

**Coloration**
- ✔ *Piceous* black; *elytral epipleura* paler.
- ✔ Forebody usually with greenish elytra with bronzy metallic reflection, rarely unicolorous.
- ✔ First antennal segment and *tibiae* paler.

**Pronotum characteristics**
- ✔ Rounded, with suggested hind angles.
- ✔ *Lateral bead* always and *basal bead* usually present *laterally* (red arrow) but not behind *foveae* (blue arrow).

**Elytra characteristics**
- ✔ Angulate, prominent shoulders (black arrow).
- ✔ Very fine, virtually *impunctate striae*.
- ✔ *Dorsal punctures*, usually three, rarely four.

**Other identifying features**
- ✔ Broad head with prominent eyes.
**Agonum piceolum** LeConte 1879

Size: 6.5–8.5 mm (6–8.5 mm)  
Crop: ARG  
Occurrence: April–June; occasional  
Diet: unknown

**Coloration**

✔ Piceous to dark brown with nonmetallic elytra.  
✔ First three antennal segments paler, second hardly darker than third.  
✔ Legs pale.

**Pronotum characteristics**

✔ Broad, widening anteriorly.  
✔ Pronounced depression along sides in basal half.

**Elytra characteristics**

✔ Shallow *subapical sinuation* (red arrow).  
✔ Rather convex with narrow shoulders and rounded sides.  
✔ Usually four, but between three and five small, *nonfoveate dorsal* punctures.

---

**Agonum suturale** LeConte 1863

Size: 9–12 mm  
Crop: ARG  
Occurrence: April–June; abundant  
Diet: unknown

**Coloration**

✔ Black with green metallic reflection.  
✔ Main part of elytra often with *cupreous* or bronze metallic reflection with sharp limit against the greenish margins.  
✔ Hardly paler appendages.

**Pronotum characteristics**

✔ Rounded, usually with suggested hind angles.  
✔ *Basal foveae rugulose*.  
✔ Thin but clearly defined *lateral bead* as well as *basal bead* (red arrow), also behind the *foveae* (blue arrow).

**Elytra characteristics**

✔ Shoulders broadly rounded, not prominent.  
✔ *Subapical sinuation* quite pronounced.  
✔ Usually three or *unilaterally* four *dorsal* punctures.
**Amara aenea** De Geer 1774  
nonnative, introduced from Europe

**Size:** 7–9 mm (6.2–9 mm)  
**Crop:** ARG, TF  
**Occurrence:** May–July; scarce in ARG, scarce in TF  
**Diet:** seeds, insect eggs and larvae

**Coloration**
- ✔ Black upper surface with often quite bright brassy or green (rarely bluish) reflection.
- ✔ First to third and base of fourth antennal segments *rufo-testaceous*.
- ✔ *Tibiae* ± *rufous*.

**Pronotum characteristics**
- ✔ Front angles protruding.
- ✔ Outer *basal foveae* obsolete, inner *foveae* consisting of a short, sharp streak *parallel* with the median line.

**Elytra characteristics**
- ✔ *Elytral striae* very fine.
- ✔ Seventh *stria* with three *subapical* punctures.

**Other identifying features**
- ✔ Small head with flat eyes.

---

**Amara littoralis** Mannerheim 1843

**Size:** 8–9 mm (6.2–9.3 mm)  
**Crop:** ARG  
**Occurrence:** May–June; scarce  
**Diet:** unknown

**Coloration**
- ✔ Black upper surface with brassy, sometimes bluish or greenish reflection.
- ✔ First to third antennal segments pale; *palpi* usually entirely dark; *antepenultimate* segment of *maxillary* pair very seldom pale.
- ✔ Legs with clearly *infuscated* femora.

**Pronotum characteristics**
- ✔ Only slightly protruding front angles.
- ✔ Sides almost straight in *basal* half (red arrow).
- ✔ Inner *basal foveae* small but usually evident, outer *foveae* ± *stretched* and pointed diagonally toward hind angle.

**Elytra characteristics**
- ✔ *Apex* pointed.
- ✔ *Striae* very fine with flat intervals, not or only slightly deepening toward *apex*.
- ✔ Seventh *stria* with three or four *subapical* punctures.

**Other identifying features**
- ✔ Third antennal segment (and sometimes decond) usually with ± pronounced darker *carina at base*. 
**Amara longula LeConte 1855**

*Size:* 6.5–9.5 mm  
*Crop:* ARG, TF  
*Occurrence:* May–August; abundant in ARG, common in TF  
*Diet:* unknown

**Coloration**
- Black upper surface with aeneous or bronze luster.
- First to third and base of fourth antennal segments bright rufous.
- Legs rufous, but tarsi and femora often more or less piceous.

**Pronotum characteristics**
- Almost conical, front angles not at all protruding (red arrow).
- Base sinuate laterally (blue arrow).
- Hind angles ± acute.

**Elytra characteristics**
- Usually with, but sometimes without, ocellate puncture at base.
- Striae finely punctulate or virtually smooth.
- Generally three subapical punctures on seventh stria.

**Other identifying features**
- Head almost as broad as distance between front angles of pronotum.
- Male metatibiae without inside pubescence.

---

**Anisodactylus binotatus Fabricius 1787**

*nonnative, introduced from Europe*

*Size:* 10.5–13 mm (10–13 mm)  
*Crop:* ARG, TF  
*Occurrence:* April–June; occasional in ARG, scarce in TF  
*Diet:* worms, mollusks, strawberries

**Coloration**
- Black.
- One or two basal segments of antennae rufous; palpi slightly infuscated.

**Pronotum characteristics**
- Hind angles denticulate.
- Very short pubescence laterally on base and side margins.
- Punctuation expanded on base, not reduced to foveae.

**Elytra characteristics**
- Outermost interval and apex punctulate and pubescent.
- Single dorsal puncture on third interval, seventh and sometimes fifth interval with one or more (sub)apical punctures.
- Stretched and parallel sided.

**Other identifying features**
- Clypeus with single pair of setiferous punctures.
- Clypeo-ocular line present.
- Prosternum punctulate and pubescent medially.
**Anisodactylus californicus** Dejean 1829

**Size:** 10.5–13 mm  
**Crop:** ARG, TF  
**Occurrence:** April–June and November; abundant in ARG, scarce in TF  
**Diet:** grasshopper nymphs, caterpillars, strawberries

**Coloration**
- ✔ Black and shiny.
- ✔ First antennal segment *rufous*.
- ✔ *Palpi* ± *infuscated*.

**Pronotum characteristics**
- ✔ Rather narrow.
- ✔ *Cordiform* with almost right hind angles.
- ✔ Deep ± linear *basal foveae*, separated from the side margin by a deep convexity.

**Elytra characteristics**
- ✔ Long and parallel sided at middle.
- ✔ *Punctuation* of intervals very fine to almost disappeared.
- ✔ Single *dorsal* puncture on third interval; seventh interval with one *subapical* puncture

**Other identifying features**
- ✔ Clypeus with single pair of *setiferous* punctures.
- ✔ Red double-spot on *frons* evident.
- ✔ Prosternum smooth and *glabrous*.

---

**Anisodactylus sanctaecrucis** Fabricius 1798

**Size:** 9–10 mm (8.3–10.5 mm)  
**Crop:** ARG, TF  
**Occurrence:** April–June; scarce in ARG, scarce in TF  
**Diet:** vegetal matter (grass), caterpillars

**Coloration**
- ✔ *Frons* and *pronotum* black.
- ✔ Extreme margin of *pronotum rufous*.
- ✔ Elytra *testaceous* with dark cloud not reaching base.
- ✔ Legs pale.

**Pronotum characteristics**
- ✔ ± *cordiform*.
- ✔ Little protruding hind angles.

**Elytra characteristics**
- ✔ *Subapical sinuation* shallow.
- ✔ *Apically and laterally pubescent*.

**Other identifying features**
- ✔ Clypeus with two or three (sometimes four) pairs of *setiferous* punctures per side.
**Bradycellus congener LeConte 1848**

*Size:* 3.5–5 mm  
*Crop:* ARG  
*Occurrence:* April–October; *abundant*  
*Diet:* ladybirds

**Coloration**
- ✔ *Piceous* black.
- ✔ *Pronotum ± infuscated.*
- ✔ Usually only *suture, base* and margins of elytra pale.
- ✔ Appendages pale.
- ✔ Antennae, except *base* and, rarely, *femora,* somewhat darkened.

**Pronotum characteristics**
- ✔ Hind angles virtually rounded and disappeared.

**Elytra characteristics**
- ✔ *Subapical sinuation* very faint.

**Other identifying features**
- ✔ *Clypeo-ocular line* complete.
- ✔ *Antennae* *pubescent* from third segment.

---

**Calosoma cancellatum Eschscholtz 1833**

*Size:* 14.5–23 mm  
*Crop:* ARG, TF  
*Occurrence:* May–August; *common* in ARG, *common* in TF  
*Diet:* caterpillars, click beetles, flies, grasshoppers

*Larvae:* 10–19 mm, were trapped in one TF field between June and July

**Coloration**
- ✔ Black or dark *piceous*; upper surface usually with greenish reflection.
- ✔ Appendages *rufous,* *femora* ± darkened.

**Pronotum characteristics**
- ✔ Sides only slightly reflexed.
- ✔ Hind angles protruding backwards.

**Elytra characteristics**
- ✔ *Striae* with irregular sculpture and small, little-contrasting *foveae.*

**Other identifying features**
- ✔ Head very large with dense, *confluent punctation.*
**Harpalus affinis Schrank 1781**

Size: 9–11 mm (8.5–12 mm)  
Crop: TF  
Occurrence: March–July; scarce  
Diet: omnivorous, ranging from grass and legume seeds to aphids and flies

**Coloration**
- Piceous to black, strongly metallic (usually green, sometimes blue or copper).
- Legs rufous to piceous.
- Antennae pale, middle segments sometimes infuscated.

**Elytra characteristics**
- Outer intervals (rarely entire elytra) with pubescence and punctation, especially at base.
- Shoulders rounded.
- Typically, no punctures on elytra; occasionally third interval with one puncture.

**Other identifying features**
- Frons with single supraorbital puncture.
- Tarsi glabrous dorsally.
- Abdomen punctulate and pubescent.

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**Loricera decempunctata Eschscholtz 1833**

Size: 6.5–8.5 mm  
Crop: ARG, TF  
Occurrence: March–June; abundant in ARG, occasional in TF  
Diet: springtails

**Coloration**
- Black with faint bronze luster.
- Tibiae, mandibles and palpi ± piceous.

**Pronotum characteristics**
- Sides strongly sinuate before the almost rectangular hind angles.

**Elytra characteristics**
- Striae with close, rather irregular punctation.
- Usually two (sometimes one, rarely none) foveae on seventh interval.
**Loricera foveata** LeConte 1851

*Size:* 6–8.5 mm  
*Crop:* ARG, TF  
*Occurrence:* year-round (peak April and May); very common in ARG, occasional in TF  
*Diet:* springtails

**Coloration**
- ✔ *Piceous* black.
- ✔ Elytra brown.
- ✔ Appendages pale.

**Pronotum characteristics**
- ✔ Small, narrowed *basally*.
- ✔ Hind angles *obtuse*.

**Elytra characteristics**
- ✔ *Striae* with small but sharp, rather sparse *punctuation*.
- ✔ Always with three *foveae* on fourth and two *foveae* on seventh interval.

---

**Microlestes nigrinus** Mannerheim 1843

*Size:* 2.5–4.5 mm  
*Crop:* ARG, TF  
*Occurrence:* May–October and December; occasional in ARG, abundant in TF  
*Diet:* unknown

**Coloration**
- ✔ *Piceous* to almost black with faint bronze reflection.
- ✔ Femora only slightly or not at all *infuscated*.

**Pronotum characteristics**
- ✔ Hind angles evident.
- ✔ Front angles quite protruding.
- ✔ Base not widened marginally.

**Elytra characteristics**
- ✔ More widening toward the *apex*.
- ✔ Outer *stria* virtually disappeared.
**Nebria brevicollis Fabricius 1792**  
*nonnative, introduced from Europe*

**Size:** 10–14 mm  
**Crop:** ARG, TF  
**Occurrence:** year-round (peaks April, May and October); very common in ARG, very common in TF  
**Diet:** small flies (including leatherjackets), springtails, mites, spiders, small earthworms, caterpillars  
**Larvae:** 4–14 mm; ARG, TF; November–May (peak March and April); common in ARG, abundant in TF.

**Coloration**  
✔ Dark *piceous* to almost black.  
✔ Appendages *rufous, femora* ± darkened.

**Pronotum characteristics**  
✔ Strongly *cordiform*.  
✔ Hind angles *acute*.  
✔ Coarse *punctation at base*.

**Elytra characteristics**  
✔ *Striae* deep, densely and strongly punctured.

**Other identifying features**  
✔ *Dorsal surface of meso- and metatarsi pubescent.*

---

**Omus audouini Reiche 1838**

**Size:** 14–17.5 mm  
**Crop:** AR, TF  
**Occurrence:** April–June; scarce in AR, occasional in TF  
**Diet:** predatory, feeds on a variety of invertebrates

**Coloration**  
✔ Black, dull.

**Pronotum characteristics**  
✔ Narrow thorax that constricts more toward apex.

**Elytra characteristics**  
✔ Fused elytra without obvious *stria*.  
✔ Covered in shallow punctures.

**Other identifying features**  
✔ Large eyes.  
✔ Large, sickle-like *mandibles*.  
✔ *Clypeus* longer than distance between antennae.
**Platynus brunneomarginatus Mannerheim 1843**

Size: 9–11 mm (9–11.5 mm)  
Crop: ARG  
Occurrence: March–June; abundant but restricted to one field  
Diet: unknown

**Coloration**
- ✔ Piceous to almost black.
- ✔ Sides of pronotum and elytra diaphanously rufo-piceous.
- ✔ Appendages somewhat paler, antennae with fourth segment darker than the others.

**Pronotum characteristics**
- ✔ Sides sinuate before the sharp, almost right hind angles.
- ✔ Base impunctate.

**Elytra characteristics**
- ✔ Striae fine, virtually impunctate.
- ✔ Intervals (nearly) flat.
- ✔ Third interval with three dorsal punctures.

**Other identifying features**
- ✔ Third and fourth antennal segment equal in length.
- ✔ Segments 1–3 of metatarsi strongly furrowed on both sides.

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**Poecilus laetulus LeConte 1863**

Size: 9–12 mm  
Crop: ARG, TF  
Occurrence: April–October; common in ARG, common in TF  
Diet: slugs, caterpillars

**Coloration**
- ✔ Black, entire surface with greenish or bluish luster
- ✔ Appendages slightly paler, rufo-piceous.
- ✔ Three basal segments of antennae rufous.

**Pronotum characteristics**
- ✔ Sides slightly sinuate before the nearly right hind angles.
- ✔ Foveae large, form “J” shape.

**Elytra characteristics**
- ✔ Striae shallow and virtually impunctate.
- ✔ Flat intervals.
- ✔ Two or more dorsal punctures.

**Other identifying features**
- ✔ Meso- and metasterna (red and blue solid arrows) and episterna (red and blue broken arrows) as well as sides of abdomen coarsely punctulate.
**Pterostichus algidus LeConte 1852**

Size: 14–15 mm (12–16 mm)  
Crop: ARG, TF  
Occurrence: June–October; scarce in ARG, scarce in TF  
Diet: fly eggs, tree seeds

**Coloration**
- ✔ Deep black and dull.
- ✔ *Palpi*, antennae and *tarsi* ± piceous.

**Pronotum characteristics**
- ✔ Sides with long, shallow *sinuation* behind and minute incision before almost right hind angles.
- ✔ Convex.
- ✔ Inner *lateral* impression long and deep, separated by a pronounced convexity from the small, round *lateral fovea*.

**Elytra characteristics**
- ✔ Deep, convex *striae*.
- ✔ Small shoulder tooth (red arrow).
- ✔ No dorsal punctures.

**Other identifying features**
- ✔ Stiff, erect *setae* underneath last *tarsal* segment.

---

**Pterostichus melanarius LeConte 1852**  
nonnative, introduced from Europe

Size: 14–18 mm (12–19 mm)  
Crop: ARG, TF  
Occurrence: March–October; occasional in ARG, abundant in TF  
Diet: various invertebrates and their eggs, including slugs, caterpillars, leatherjackets

**Coloration**
- ✔ Deep black.
- ✔ Appendages in part piceous.

**Pronotum characteristics**
- ✔ Hind angles *denticulate*.
- ✔ *Basal foveae* with a ± pronounced *tubercle* in center.
- ✔ Strong *lateral carina*.

**Elytra characteristics**
- ✔ *Striae* moderately deep with rudimentary punctures.
- ✔ Intervals moderately convex.
- ✔ Usually two (sometimes three or four on one side) *dorsal* punctures.
**Stenolophus anceps** LeConte 1857

Size: 4–6 mm  
Crop: TF  
Occurrence: June–July; scarce in TF  
Diet: unknown

**Coloration**

✔ Black to dark piceous.  
✔ All margins of prothorax pale.  
✔ First elytral interval, epipleura and apex of elytra rufo-testaceous.  
✔ Palpi, femora, apex of tibia, tarsi infuscated.  
✔ One or two basal segments of antennae pale.

**Pronotum characteristics**

✔ Hind angles suggested but rounded or strongly obtuse.  
✔ Foveae shallow, with surrounding area flat.

**Elytra characteristics**

✔ Subapical sinuation evident.

**Other identifying features**

✔ Metatarsi glabrous dorsally.  
✔ Protibia with two or three spines at outer margin near apex.  
✔ Abdominal sternites with irregularly distributed pubescence.

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**Trechus obtusus** Erichson 1837

nonnative, introduced from Europe

Size: 4 mm (3.6–4.1 mm)  
Crop: ARG, TF  
Occurrence: August–June; scarce in ARG, abundant in TF  
Diet: fly eggs

**Coloration**

✔ Greyish testaceous or brown; head almost black.  
✔ Elytra somewhat iridescent.  
✔ Legs yellow; antennae somewhat infuscated.

**Pronotum characteristics**

✔ Hind angles poorly developed.  
✔ Depressed base limited toward the convex disc by an engraved line.  
✔ Basal margin clearly oblique inside hind angles.

**Elytra characteristics**

✔ Outer striae obliterated.
References


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