

collected. This specimen was found in cow dung at Northwood, North Dakota in late June. The species is common in eastern United States where it was introduced from Europe. It perhaps has not reached its full population potential this far west.

Aphodius haemorrhoidalis (Linnaeus)

Scarabaeus haemorrhoidalis Linnaeus, C. 1758. Systema Naturae. ed. 10. p. 348.

Adult description: Length 4.3 mm. (± 0.3 mm.); width 2.3 mm. (± 0.1 mm.). Dorsoventrally piceous to black, except posterior one-third of elytra which appears dark red. Head punctate throughout. Clypeus nearly entire, middle deflexed; traces of clypeofrontal tubercles present as three transverse, shortened carina. Pronotum punctate with fine and coarse punctures intermingled. Scutellum one-fifth to one-fourth the length of elytra, coarsely punctate. Elytral striae deep and punctate; intervals punctate and shining. Apical metatibial spinules unequal in length.

Larval description: Head capsule width 1.3 mm. (± 0.15 mm.); smooth, light yellow-brown. One posterior seta, one exterior seta, no anterior seta and one seta in anterior angle, on each side of frons. 2-3 pairs of dorsoepicranial setae.

Epipharynx with 14-17 protophobal microsensillae; protophoba bistichous on left, monostichous on right. Dexio- and laeotorma extend cephalad and caudad, somewhat symmetrical. Epipharynx asymmetrical, spatulate.

Maxilla with row of 6-10 stridulatory teeth on stipes; no such teeth on palpifer. Galea dorsally with 5-6 long setae, ventrally with 8-10 short setae along mesal edge. Lacinia dorsally with mesal row of five setae, one short posterior seta.

Two plicae on each abdominal segment 1-5. Prescutum with six setae; scutum with 12-14 setae; scutellum with 8-10 setae. Raster with subquadrate teges of 51-81 setae.

County records: BOTTINEAU CO. 27-V-66 (JK); CASS CO. 26-V-65 (RGH); GRAND FORKS CO. 21-VI-66 (RGH); PEMBINA CO. 28-VII-65 (RGH); RAMSEY CO. 15-VIII-62 (DGA); RANSOM CO. 24-VI-65 (RGH); RICHLAND CO. 17-VI-65 (RGH).

Remarks: This small, "red-tipped" species is common throughout North Dakota from late May to early October. It has been collected only in cow dung.

Aphodius hamatus Say

Aphodius hamatus Say, T. 1823. J. Acad. Nat. Sci. Philadelphia. 3:139-216.

Adult description: Length 7.8 mm. (± 0.2 mm.); width 3.8 mm. (± 0.2 mm.). Head, pronotum, scutellum and venter piceous to black; elytra yellow-brown

with median longitudinally stripes of dark brown in intervals 2-9. Head convex, shining, with fine punctures. Clypeal margin broadly emarginate, reflexed. Pronotum with sparse, coarse punctures; basal marginal line interrupted at middle. Scutellum longitudinally impressed, impunctate; one-fourth the length of elytra. Elytral striae shallow, punctate; intervals alutaceous, punctulate. Fore tibiae serrulate above major teeth. Apical metatibial spinules equal in length. First metatarsal segment as long as next two, no longer.

Larval description: Head capsule width 2.93 mm. (± 0.6 mm.); smooth, yellow. 3-4 pairs of dorsoepicranial setae.

Epipharynx with 18-21 protophobal microsensillae; protophoba bistichous on left and monostichous on right. Both dexio- and laeotorma produced cephalad and caudad and somewhat symmetrical. Epitorma asymmetrical.

Maxilla with row of 9-12 stridulatory teeth on stipes; one or two such teeth on palpifer. Galea dorsally with row of five or six setae, ventrally with mesal row of 11-14 short setae. Lacinia dorsally with mesal row of eight setae.

County records: BOTTINEAU CO. 30-V-66 (JK); RENVILLE CO. 3-VII-66 (DGA).

Remarks: *A. hamatus* Say has been collected only in cow dung in North Dakota. Its range appears limited to the northern areas of the state, apparently associated with the boreal life zone.

Aphodius omissus omissus LeConte

Aphodius omissus omissus LeConte, J. 1850. Agassiz Lake Superior p. 225.

Adult description: Length 7.1 mm. (± 0.7 mm.); width 3.7 mm. (± 0.5 mm.). Dorsoventrally piceous to black. Head convex; sparsely and finely punctate. Clypeal margin sharply, but narrowly reflexed; feebly emarginate; apex strongly thickened, nearly twice the thickness of the rest of margin. Pronotum with interspaced fine and coarse punctures, most sparse on disc; basal margin obsolete. Scutellum one-fourth length of elytra; longitudinally impressed and punctate. Elytral striae punctate; intervals shining with very fine punctures. Apical metatibial spinules equal in length. First segment of metatarsus shorter than next three.

Larval description: Larvae are unknown. Attempts to rear this species on cow dung were unsuccessful.

County records: BENSON CO. 13-VI-64 (DGA); BOTTINEAU CO. 14-VII-66 (RJS & RGH); BOWMAN CO. 7-VI-65 (DGA); BURKE CO. 14-VII-66 (RJS & RGH); CASS CO. 14-VII-66 (RJS & RGH); DIVIDE CO. 14-VII-66 (RJS & RGH); MONTRAILL CO. 6-VII-66 (DGA); PEMBINA CO. 14-VII-66 (RJS & RGH); RICHLAND CO. 14-VII-66 (RJS & RGH); WILLIAMS CO. 14-VII-66 (RJS & RGH).

Remarks: *Aphodius omissus omissus* LeC. is widely distributed in North Dakota. Its habitat is restricted to areas of high moisture (e.g., pond or swamp edge) and soil of high organic content. The larvae and adults appear dependent on the organic materials of the soil for nutrients.

Aphodius omissus torpidus Horn

Aphodius omissus torpidus Horn, G. 1870. Trans. Amer. Ent. Soc. 3:114.

Adult description: The description is the same as that for *A. omissus omissus* except a yellow (unpigmented) strip in the second interval extends the full length of each elytron and broadens to the fifth or sixth interval at the apex.

Larval description: Larvae unknown. Attempts to rear this species on cow dung were unsuccessful.

County records: BENSON CO. 10-VI-64 (DGA); BOTTINEAU CO. 14-VII-66 (RJS & RGH); BURKE CO. 14-VII-66 (RJS & RGH); DIVIDE CO. 14-VII-66 (RJS & RGH); NELSON CO. 14-VII-66 (RJS & RGH); PEMBINA CO. 14-VII-66 (RJS & RGH); RICHLAND CO. 14-VII-66 (RJS & RGH); ROLETTE CO. 14-VII-66 (RJS & RGH); WILLIAMS CO. 14-VII-66 (RJS & RGH).

Remarks: It is very doubtful that *A. omissus torpidus* is a subspecies of *A. omissus*. Populations of *A. omissus omissus* and *A. omissus torpidus* sampled in North Dakota are sympatric throughout the state. The two populations occurred in equal numbers in pit traps placed across the state, with equal ratios of males and females in each population. There are no intermediates between these populations (the elytral stripes being consistent). And, there is no difference in the male genitalia of the two, suggesting no reproductive isolation.

Aphodius pinguis Haldeman

Aphodius pinguis Haldeman, S. 1848. J. Acad. Nat. Sci. Philadelphia 1:103.

Adult description: Length 7.3 mm. (± 0.6 mm.); width 3.6 mm. (± 0.2 mm.). Dorsoventrally shining black, venter and legs sometimes piceous. Head only slightly convex distinctly but finely punctate. Clypeal margin entire, flattened and thickened apically and slightly reflexed. Pronotum widest portion of body, and nearly two-thirds length of elytra, sparsely, finely punctate; basal marginal line distinct, sometimes entire, sometimes narrowly interrupted at middle. Scutellum longitudinally impressed basally and finely punctate. Elytral striae distinct and punctate; intervals shining, indistinctly punctulate. Apical metatibial spinules equal in length. First metatarsal segment as long as next three.

Larval description: Larvae are unknown. Attempts to rear this species on cow dung were unsuccessful.

County records: BILLINGS CO. 30-V-66 (RM); MCKENZIE CO. 14-VII-66 (RJS); PEMBINA CO. 19-VI-66 (LK); RICHLAND CO. 15-VI-66 (RGH & RJS).

Remarks: *Aphodius pinguis* Hald. is common in shelter belts and floodplain forests, apparently feeding in the humus layer.

Aphodius pinguellis Brown

Aphodius pinguellis Brown, W. 1929. Can. Ent. 61:228.

Adult description: Length 5.4 mm. (± 0.9 mm.); width 2.7 mm. (± 0.5 mm.). Dorsoventrally piceous, shining. Head convex, finely sparsely punctate. Clypeal margin emarginate, of uniform thickness. Pronotum with fine and coarse punctures intermixed, shining; basal marginal line obsolete. Elytral intervals shining, finely punctulate; interval with fine but distinct margin on each side at edge of striae; striae with coarse punctures. Apical metatibial spinules equal in length. First metatarsal segment shorter than the next three.

Larval description: Larvae unknown. Attempts to rear this species on cow dung were unsuccessful.

County records: BOTTINEAU CO. 14-VII-66 (RGH & RJS); BURKE CO. 14-VII-66 (RGH & RJS); CASS CO. 14-VII-66 (RGH & RJS); CAVALIER CO. 14-VII-66 (RGH & RJS); DIVIDE CO. 14-VII-66 (RGH & RJS); EMMONS CO. 14-VII-66 (RGH & RJS); LOGAN CO. 14-VII-66 (RGH & RJS); RICHLAND CO. 19-VI-66 (RGH); ROLETTE CO. 14-VII-66 (RGH & RJS); WILLIAMS CO. 14-VII-66 (RGH & RJS).

Remarks: The biology of this species is probably very similar to that of *A. omissus* LeC. since it is collected in the same habitats and same times as *A. omissus* LeC.

Aphodius fimetarius (Linnaeus)

Scarabaeus fimetarius Linnaeus, C. 1758. Systema Naturae. ed. 10. p. 348.

Adult description: Length 6.7 mm. (± 0.5 mm.); width 3.5 mm. (± 0.2 mm.). Head, pronotum (except anterior angles), scutellum and venter black; anterior pronotal angles and elytra red-orange.

Head rugose anteriorly and punctate throughout. Clypeal margin nearly entire (very slightly emarginate), reflexed; crescent-shaped transverse suture usually present. Three frontal tubercles distinct in males, weak in females. Pronotum with fine punctures and coarse punctures limited to sides and base; anterior medial foveae in males; basal marginal line distinct and entire. Scutellum one-eighth elytral length and coarsely punctate. Elytral striae punctate; intervals shining, punctulate. Apical metatibial spinules equal in length. First metatarsal segment as long as next three.

Larval description: Head capsule width 2.1 mm. (± 0.2 mm.); smooth, yellow to red-brown. One posterior seta, one exterior seta, one anterior seta and one seta in anterior angle, one each side of frons. 3-4 pairs of dorsoepicranial setae.

Epipharynx with 17-22 protophobal microsensillae; protophoba bistichous on left and monostichous on right. Dextiotorma slightly sinuate, produced cephalad and caudad; laeotorma straight, produced cephalad. Epitorma asymmetrical, curved right.

Maxilla with row of 14-18 stridulatory teeth on stipes; 2-4 such teeth on palpifer. Galea dorsally with seven setae, ventrally with mesal row of 17 small setae. Lacinia dorsally with mesal row of six setae.

Two plicae on each abdominal segment 1-5. Prescutum with eight setae; scutum with 4-6 short and 3-5 long setae on each side; scutellum with 10-12 setae. Raster with 55-90 curved setae.

County records: BILLINGS CO. 14-VII-65 (RGH); CASS CO. 26-X-65 (RGH); CAVALIER CO. 26-VII-62 (DGA); DUNN CO. 22-IV-65 (RJS); MCKENZIE CO. 16-VII-65 (WK); PEMBINA CO. 28-VII-65 (RGH); RICHLAND CO. 17-VI-65 (RGH), 20-III-66 (RGH); SLOPE CO. 31-VIII-61 (RLP).

Remarks: *A. fimetarius* is one of the most common species of *Aphodius*. It is found in fecal material of all types of herbivorous animals from March to October, most commonly in early June and late July.

Aphodius tenellus Say

Aphodius tenellus Say, T. 1823. J. Acad. Nat. Sci. Philadelphia. 3:213.

Adult description: Length 4.5 mm. (± 0.2 mm.); width 2.1 mm. (± 0.1 mm.). Head, pronotum, (except anterior angles) scutellum and venter piceous to black; anterior pronotal angles and elytra dark red-brown. Head rugose anteriorly and finely punctate throughout. Clypeal margin slightly emarginate; sides reflexed. Frontal tubercles indistinct, but present. Pronotum densely punctate with fine and coarse punctures intermixed throughout; basal marginal line entire. Scutellum one-tenth the length of elytra, punctures scarce. Elytra striae punctate; intervals shining, punctulate. Apical metatibial spinules equal in length. First metatarsal segment as long as next three.

Larvae unknown.

County records: BOTTINEAU CO. 13-V-65 (RDG); RANSOM CO. 2-IV-66 (RGH); RICHLAND CO. 21-IX-66 (RGH).

Remarks: *A. tenellus* Say is not a common species in the state, but the adult is found in association with cow and sheep dung.

Aphodius ruricola Melsheimer

Aphodius ruricola Melsheimer, F. 1846. Proc. Acad. Nat. Sci. Philadelphia 2:136.

Adult description: Length 4.7 mm. (± 0.5 mm.); width 2.4 mm. (± 0.2 mm.). Dorsoventrally dark red-brown to piceous. Head rugose anteriorly with sparse punctures. Clypeal margin slightly emarginate, sides of these broad emarginations reflexed. Three frontal tubercles present in varying degrees. Pronotum with fine and coarse punctures intermixed; basal marginal line entire. Scutellum one-tenth the length of elytra. Elytral striae shallow with wide punctures; intervals shining, sparsely punctulate. Apical metatibial spinules equal in length. First metatarsal segment as long as next two, no longer.

Larval description: The following is an original description based on 25 specimens reared in July, 1966. Specimens are deposited in the North Dakota State University insect collection and the United States National Museum insect collection. Head capsule width 1.3 mm. (± 0.05 mm.); smooth, red-brown. Two posterior setae, one exterior seta, one anterior seta and one seta in anterior angle, on each side of frons. Four pairs of dorsoepicranial setae.

Epipharynx (fig. 30) with 14-18 protophobal microsensillae; protophoba bistichous on left, monostichous on right. Dexiotorma produced cephalad and caudad; laeotorma produced cephalad. Epitorma asymmetrical, curved to right.

Maxilla (fig. 33) with row of 4-10 stridulatory teeth on stipes; one such tooth on palpifer. Galea dorsally with 5-6 setae, ventrally with mesal row of 10-11 setae. Lacinia dorsally with mesal row of five setae.

Two plicae on each abdominal segment 1-5. Prescutum with six setae; scutum with four small and three long setae on each side of scutellum with 8-10 setae. Raster with bilobed teges of 34-41 setae. See fig. 24 and 27.

County records: BILLINGS CO. 14-VII-65 (RGH); BOTTINEAU CO. 17-VI-65 (RGH); CASS CO. 6-VI-62 (DGA); EMMONS CO. 22-VII-64 (RJS); MCKENZIE CO. 16-VII-65 (RGH); RANSOM CO. 1-VII-64 (RLP); RICHLAND CO. 10-VII-65 (RGH); WELLS CO. 25-VI-60 (DK).

Remarks: *A. ruricola* Melsh. is found in fecal material of most large herbivorous mammals in North Dakota. It is one of the most common species in the state and the predominant species collected at light traps.

Aphodius granarius (Linnaeus)

Scarabaeus granarius Linnaeus, C. 1758. Systema Naturae ed. 10. p. 348.

Adult description: Length 4.7 mm. (± 0.6 mm.); width 2.2 mm. (± 0.2 mm.). Dorsoventrally piceous to black. Head rugose anteriorly, punctate posteriorly. Clypeal margin broadly emarginate, middle deflexed. Three frontal tubercles present, sometimes indistinct. Pronotum finely and coarsely punctate, punctures indistinct on disc; basal marginal line entire. Scutellum one-tenth the length of elytra; sparsely punctate. Elytral striae shallow, punctate; intervals shining, punctulate; humeri distinct, almost square. Mesosternum carinate between coxae. Apical metatibial spinules equal in length. First metatarsal segment not longer than next two.

Larval description: Head capsule width 1.55 mm. (± 0.13 mm.); smooth yellow-brown. 3-4 pairs of dorsoepicranial setae.

Epipharynx with 18-21 protophobal microsensillae; protophoba bistichous on left, monostichous on right. Dexio- and laeotorma symmetrical, produced cephalad and caudad. Epitorma asymmetrical, curved toward laeotorma.

Maxilla with row of 7-10 stridulatory teeth on stipes; 1-2 such teeth on palpifer. Galea dorsally with five setae, ventrally with mesal row of 6-7 short setae. Lacinia dorsally with mesal row of six setae.

Two plicae on each abdominal segment 1-5. Prescutum with eight setae; scutum with 3-5 short and 2-4 long setae on each side; scutellum with 11-12 setae. Raster with three palidia surrounded on each side by 24-35 tegular setae.

County records: BILLINGS CO. 25-VI-65 (RJS); CASS CO. 4-VI-41 (HST); EDDY CO. 13-VI-65 (RGH); GOLDEN VALLEY CO. 23-V-22 (RLW); MCKENZIE CO. 16-VII-65 (RGH); MORTON CO. 19-V-22 (RLW).

Remarks: This species is very similar to *A. ruricola* differing mainly in the carinate mesosternum. Unlike *A. ruricola*, however, it is not a common species in North Dakota.

Aphodius vittatus Say

Aphodius vittatus Say, T. 1825. Proc. Acad. Nat. Sci. Philadelphia 5:191.

Adult description: Length 4.2 mm. (± 0.4 mm.); width 1.7 mm. (± 0.3 mm.). Head, pronotum, elytral suture, scutellum, middle-lower portions of elytra and venter black; elytra red-brown. Head slightly rugose anteriorly, punctate posteriorly. Clypeus broadly, feebly emarginate. Frontal tubercles indistinct, but present. Pronotum punctate throughout; basal marginal line entire. Scutellum one-tenth elytra length. Elytral striae very shallow, punctate; intervals shining, punctulate; humeri distinct, nearly square. Mesosternum carinate between coxae. Apical metatibial spinules equal in length. First metatarsal segment as long as next three.

Larval description: Head capsule width 1.18 mm. (± 0.06 mm.); smooth, light yellow-brown. One posterior seta, one exterior seta, no anterior seta and one seta in anterior angle, on each side of frons. 3-4 pairs of dorsoepicranial setae.

Epipharynx with 12-14 protophobal microsensillae; protophoba bistichous on left and monostichous on right. Dextro- and laetorma symmetrical, produced cephalad and caudad. Epitorma asymmetrical, straight on left curved on right.

Maxilla with 5-10 stridulatory teeth on stipes; 1-2 such teeth on palpifer. Galea dorsally with five setae; ventrally with mesal row of eight short setae. Lacinia dorsally with mesal row of five setae.

Two plicae on each abdominal segment 1-5. Prescutum with six setae; scutum with 2-3 long and 4-5 short setae on each side; scutellum with 8-10 setae. Raster with bilobed teges of 51-81 setae.

County records: BILLINGS CO. 25-VI-65 (RJS); CASS CO. 7-VII-66 (RGH); EDDY CO. 13-VI-65 (RGH); GRAND FORKS CO. 21-VI-66 (RGH); MCKENZIE CO. 16-VII-65 (RGH); PEMBINA CO. 7-VII-66 (LK); RICHLAND CO. 19-VI-66 (RGH).

Remarks: *A. vittatus* Say apparently is restricted to cow and buffalo dung. It is collected in light traps, but not in great numbers. It is a common species during late June and early July.

Aphodius alternatus Horn

Aphodius alternatus Horn, G. 1870. Trans. Amer. Ent. Soc. 3:129.

Adult description: Length 4.5 mm. (± 0.3 mm.); width 2.1 mm. (± 0.2 mm.). Head, pronotum, scutellum, elytral suture and sides of elytra black. Elytra with second, fourth and sixth intervals yellow-brown; first, third and fifth black (sometimes any combination of these may be yellow-brown). Head nearly flat; shining; punctate posteriorly, punctate-rugose anteriorly. Clypeal margin feebly emarginate, sides slightly reflexed. Scutellum one-tenth the length of elytra, moderately punctate. Elytral striae deep and closely punctate; intervals shining, with moderate punctures in two irregular rows. Apical metatibial spinules equal in length. First metatarsal segment not longer than next two segments.

Larvae unknown.

County records: BILLINGS CO. 9-VI-65 (WK), 10-VI-65 (DGA); CASS CO. 29-IV-23 (WB), 20-V-39 (OO); DIVIDE CO. 15-VII-66 (RJS); GRAND FORKS CO. 17-VI-65 (RGH); NELSON CO. 4-VI-66 (RGH); WILLIAMS CO. 15-VII-66 (RJS).

Remarks: This species is widely distributed throughout the state, but limited in habitat. The biology of the species is not well understood, but is it commonly collected near the edges of standing water.

Aphodius pseudabusus Cartwright

Aphodius pseudabusus Cartwright, O. 1957. Coleopterists' Bull. 11:60.

Adult description: Length 3.9 mm. (± 0.2 mm.); width 1.9 mm. (± 0.1 mm.). Dorsoventrally piceous to black, shining. Head slightly convex; rugose anteriorly, punctate posteriorly. Clypeal margin emarginate, bidentate. Three frontal tubercles present, but indistinct. Pronotum moderately punctate throughout, shining; basal marginal line entire. Scutellum one-tenth elytral length; punctate. Elytral striae punctate; intervals with sparse, fine punctures appearing in two irregular rows; alutaceous at apex. Apical metatibial spinules equal in length. First metatarsal segment no longer than next two.

Larvae unknown.

County records: BILLINGS CO. 10-VII-66 (RGH); RANSOM CO. 2-VI-62 (JO); RICHLAND CO. 21-III-66 (RGH).

Remarks: This small black species is superficially similar to *A. ruricola* Melsh., but has two distinct clypeal teeth. It is found in both cow dung and prairie dog burrows.

Aphodius lentus Horn

Aphodius lentus Horn, G. 1870. Trans. Amer. Ent. Soc. 3:125.

Adult description: Length 3.1 mm. (± 0.4 mm.); width 1.4 mm. (± 0.2 mm.). Dorsoventrally ferruginous, dull. Head flat, punctate alutaceous throughout. Clypeal margin feebly emarginate. Pronotum alutaceous; coarsely, densely punctate; basal marginal line entire. Scutellum one-tenth elytral length; punctate. Elytral striae shallow, moderately punctate; intervals appear verrucose, with two irregular rows of setae. Mesosternum finely carinate between coxae. Apical metatibial spinules unequal in length. First metatarsal segment as long as next three segments.

Larval description: The following is an original description based on two larvae reared in July, 1966. Head capsule width .95 mm. to 1.0 mm.; smooth, yellow-brown. One posterior seta, one exterior seta, one anterior seta and one seta in anterior angle on each side of frons. Two pairs of dorsoepicranial setae.

Epipharynx (fig. 31) with 14-17 protophobal microsensillae; protophoba bistichous on left and monostichous on right. Dextiotorma produced cephalad and strongly caudad; laeotorma produced cephalad. Epitorma asymmetrical, sinuate.

Maxilla (fig. 34) with 7-11 stridulatory teeth on stipes; no such teeth on palpifer. Galea dorsally with 5-6 setae, ventrally with mesal row of 8-9 short setae. Lacinia dorsally with mesal row of five setae.

Two plicae on each abdominal segment 1-5. Prescutum with six setae; scutum with three long and four short setae on each side; scutellum with ten setae. Raster with subquadrate teges of 25 to 30 stout setae. See fig. 25 and 28.

County records: RANSOM CO. 9-VI-62 (RDF); RICHLAND CO. 7-VI-66 (RGH).

Remarks: *A. lentus* Horn is collected in both cow and sheep dung in North Dakota. It is numerous when encountered, but these encounters are infrequent, the adult life span apparently being rather short. Specimens reared in the laboratory lived from six to eight days.

Aphodius explanatus LeConte

Aphodius explanatus LeConte, J. 1878. Proc. Amer. Phil. Soc. 17:353-472.

Adult description: Length 7.1 mm. (± 0.6 mm.); width 3.2 mm. (± 0.4 mm.). Head (except margins), pronotal disc and venter dark brown to piceous; elytra, pronotal sides, margins of head yellow-brown. Head densely punctate; slightly convex. Clypeal margin angulate and reflexed at sides of emargination, sides straight. Pronotum shining, punctures increasing in size from anterior to posterior, sides explanate, (especially at anterior angles; basal marginal line strongly sinuate, entire. Scutellum one-tenth the length of elytra, coarsely punctate. Elytral striae moderately punctate; intervals feebly alutaceous with two irregular rows of fine punctures. Mesosternum carinate between coxae. Apical metatibial spinules

unequal in length. First metatarsal segment not any longer than next two.

Larvae unknown.

County records: BILLINGS CO. 28-V-66 (RGH).

Remarks: *A. explanatus* LeConte inhabits the burrows of herbivorous burrowing mammals. The series represented in the North Dakota State University collection was collected as the individuals emerged from the burrows of Black-tailed Prairie Dogs, *Cynomys ludovicianus* (Ord.), in late May.

Aphodius iowensis Wickham

Aphodius iowensis Wickham, H. 1913. Psyche. 20:28.

Adult description: Length 7.25 mm.; width 3.5 mm. Most of head, pronotum, scutellum and venter rufopiceous; sides of head and pronotum and elytra red-brown. Head slightly convex, finely granulate anteriorly, finely punctate posteriorly. Clypeal margin broadly emarginate, angles broadly rounded, margin narrowly reflexed. Frontal tubercles broad and low, but distinct. Pronotum impunctate on disc; sparse, coarse punctures confined to sides; sides broadly explanate with posterior impression; basal marginal line faint on each side of middle. Scutellum one-tenth the length of elytra, sparsely punctate. Elytral striae moderate and closely punctate; intervals flat, smooth. Apical metatibial spinules vary in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: RICHLAND CO. 11-VI-61, 20-V-61 (RDG).

Remarks: Only two specimens were collected in the state, both at light traps.

Aphodius criddlei Brown

Aphodius criddlei Brown, W. 1928. Can. Ent. 60:19.

Adult description: Length 6.9 mm. (± 0.3 mm.); width 3.4 mm. (± 0.2 mm.). Dorsoventrally ferruginous. Head rugose anteriorly; punctate posteriorly; shining. Clypeal margin broadly emarginate, sides of emargination reflexed. Pronotum coarsely punctate laterally and posteriorly; sides explanate, with posterior depression on each side. Scutellum one-tenth the length of elytra; very sparsely, coarsely punctate. Elytral striae shallow, closely punctate; intervals finely alutaceous, punctulate, shining. Mesosternum flat between coxae. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: BENSON CO. 4-VIII-66 (RGH); BURLEIGH CO. 13-VII-65 (RGH); PEMBINA CO. 11-VIII-65 (RGH), 3-VIII-66 (LK); RANSOM CO. 7-V-62

(SC); RICHLAND CO. 8-VI-66 (RGH); ROLETTE CO. 28-VII-62 (DGA).

Remarks: This species is collected readily at light traps throughout the state, but its biology is not understood. It is supposed that *A. criddlei* inhabits the burrows of small mammals.

Aphodius haldemani Horn

Aphodius haldemani Horn, G. 1870. Trans. Amer. Ent. Soc. 3:128.

Adult description: Length 9.2 mm.; width 4.3 mm. Entire dorsum very highly polished with a high sheen; most of head, pronotum, and venter black; pronotal sides and elytra dark red. Head finely alutaceous, slightly convex. Clypeal margin broadly emarginate, sides reflexed. Pronotum impunctate on disc; coarse punctures near posterior angles; sides explanate with posterior depression. Scutellum one-tenth elytra length, smooth. Elytral striae very shallow, punctate; intervals with micropunctules, highly polished. Apical metatibial spinules vary in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: RICHLAND CO. 23-IX-66 (DGA).

Remarks: This is an unusually large, shiny species. One specimen was collected in a pit trap in early fall. *A. haldemani* is believed to inhabit the burrows of burrowing mammals.

Aphodius concavus Say

Aphodius concavus Say, T. 1823. J. Acad. Nat. Sci. Philadelphia 5:214.

Adult description: Length 7.7 mm. (± 1.1 mm.); width 3.5 mm. (± 1.1 mm.). Entirely rufopiceous to red. Head slightly convex with mixed fine and coarse punctures at sides. Genae prominent. Clypeus broadly emarginate, rounded and fimbriate. Pronotum shining with punctules and coarse punctures at sides. Scutellum one-tenth elytra length. Elytral striae wide and deep with coarse punctures; intervals punctulate. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: RICHLAND CO. 13-VII-62 (DGA), 17-VI-66 (RGH).

Remarks: *A. concavus* Say is collected at light traps and pit traps in the sandhills of Richland County. It is difficult to distinguish from *A. fucosus* Schmidt but is generally slightly larger.

Aphodius fucosus Schmidt

Aphodius fucosus Schmidt, A. 1922. Aphodiinae, Das Tierreich. Lief. 45.

Adult description: Length 6.7 mm. (± 0.5 mm.); width 3.3 mm. (± 0.2 mm.). Entirely rufopiceous to red. Head slightly convex with mixed fine and coarse punctures at sides. Genae prominent. Clypeus broadly emarginate, rounded and fimbriate. Pronotum shining with punctules and coarse punctures at sides. Scutellum one-tenth elytral length. Elytral striae wide and deep with coarse punctures; intervals punctulate. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: BURLEIGH CO. 13-VII-65 (RGH); CASS CO. 10-VI-62 (DGA); RANSOM CO. 11-VII-62 (JO); RICHLAND CO. 15-VII-66 (RGH).

Remarks: *A. fucosus* Schmidt is very similar to *A. concavus* Say except it is generally smaller. It is somewhat more common in the state. They are collected in light traps and pit traps.

Aphodius consentaneus LeC.

Aphodius consentaneus LeConte, J. 1850. Agassiz Lake Superior p. 255.

Adult description: Length 4.5 mm. (± 0.15 mm.); width 2.0 mm. (± 0.1 mm.). Head, pronotal disc and legs piceous; pronotal sides and elytra fuscous. Head smooth, punctulate and shining. Clypeus nearly entire, broadly rounded at sides. Pronotum evenly punctate with basal margin entire. Scutellum one-tenth elytral length. Elytral striae deep and punctate. Intervals convex, alutaceous and punctulate. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: PEMBINA CO. 7-VII-66 (LK).

Remarks: Only three specimens of *A. consentaneus* LeC. were collected at a light trap in a woodland pasture in Pembina County.

Aphodius dentigerulus Brown

Aphodius dentigerulus Brown, W. 1929. Can. Ent. 61:208.

Adult description: Length 5.0 mm. (± 0.6 mm.); width 2.5 mm. (± 0.3 mm.). Entirely black and shining. Head regularly punctate, rugose anteriorly. Clypeus with a subacute tooth inside each side of angulate emargination; fimbriate. Genae prominent and fimbriate. Pronotum with close, coarse punctures, basal marginal line entire. Scutellum one-tenth elytral length. Elytral striae shallow and moderately punctate; intervals flat and finely punctate. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two.

Larvae unknown.

County records: BILLINGS CO. 29-V-66 (RGH).

Remarks: At the time the above specimens were caught hundreds were emerging from the entrance of Black-tailed Prairie Dog, *Cynomys ludovicianus* (Ord.), burrows.

Aphodius coloradensis Horn

Aphodius coloradensis Horn, G. 1870. Trans. Amer. Ent. Soc. 3:130.

Adult description: Length 6.2 mm. (± 0.7 mm.); width 3.2 mm. (± 0.2 mm.). Dorsoventrally piceous to black, shining. Head moderately punctate; slightly convex. Clypeal margin broadly emarginate, sides angulate, reflexed; tips of emargination thickened and dentiform. Pronotum with sparse, moderate punctures on disc, sides more dense with coarse punctures; basal marginal line entire. Scutellum one-tenth elytra length, very sparsely punctate. Elytral striae shallow, moderately punctate; intervals flat, finely punctate, shining. Apical metatibial spinules varying in length. First metatarsal segment no longer than next two.

Larvae unknown.

County records: BOTTINEAU CO. 17-VI-65 (RGH); CASS CO. 13-VI-59 (DN), 16-VI-62 (DGA); MCKENZIE CO. 16-VII-65 (RGH); PEMBINA CO. 7-VII-66 (LK); RANSOM CO. 25-VI-62 (DGA); RICHLAND CO. 18-VI-66 (RGH).

Remarks: *A. coloradensis* Horn is common in cow dung and often collected at light traps throughout the state.

Aphodius distinctus (Muller)

Aphodius distinctus Muller, O. 1776. Zoologiae Danicae Prodrromus.... Hafniae. p. 53.

Adult description: Length 5.0 mm. (± 1.0 mm.); width 2.4 mm. (± 0.4 mm.). Head, pronotum and scutellum black, legs rufopiceous; elytra yellow-brown with five extremely variable black spots, one on the side of the elytra, two at the base and two at apex. Head verrucose anteriorly, punctate posteriorly. Clypeal margin narrowly reflexed; broadly emarginate. Three frontal tubercles distinct. Pronotum sparsely and indistinctly punctate, very smooth, basal marginal line entire. Scutellum one-tenth elytral length, punctate. Elytral striae with close, coarse punctures; intervals flat, shining, with two irregular rows of indistinct punctules. Mesosternum anterior of coxae with four longitudinal carinae grouped medially. Apical metatibial spinules vary in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: BURLEIGH CO. 14-X-58 (RLP); CASS CO. 26-X-65 (RGH); RICHLAND CO. 31-X-65 (RGH); 13-V-66 (RJS).

Remarks: This species is collected quite commonly in early spring and late fall when it is attracted to fresh fecal deposits in large numbers. They were collected in cow, sheep, deer and buffalo dung.

Aphodius leopardus Horn

Aphodius leopardus Horn, G. 1870. Trans. Amer. Ent. Soc. 3:124.

Adult description: Length 5.7 mm. (± 0.5 mm.); width 2.8 mm. (± 0.3 mm.). Head, pronotal disc and venter piceous to black, sides of pronotum, scutellum and elytra red-yellow. Head slightly rugose anteriorly, punctate throughout. Clypeus very broadly emarginate, reflexed at emarginal sides. Three frontal tubercles indistinct. Pronotum shining, coarse and fine punctures mixed densely throughout; basal marginal line entire. Scutellum one-tenth elytra length, one to three punctures. Elytral striae closely punctate; intervals finely alutaceous, sparsely punctate. Apical metatibial spinules vary in length. First metatarsal segment no longer than next two segments.

Larvae unknown.

County records: BILLINGS CO. 15-VIII-66 (RGH); GRAND FORKS CO. 27-VIII-62 (RP), 5-VIII-65 (RGH); RAMSEY CO. 15-VIII-62 (DGA); RICHLAND CO. 20-VIII-65 (DGA).

Remarks: *A. leopardus* is a short-lived species frequenting cow and sheep dung the first few weeks of fall and is collected occasionally at light traps.

Aphodius walshi Horn

Aphodius walshi Horn, G. 1870. Trans. Amer. Ent. Soc. 3:132.

Adult description: Length 4.8 mm. (± 0.6 mm.); width 2.3 mm. (± 0.3 mm.). Head, pronotal disc, scutellum, and venter black; pronotal sides and elytra fuscous. Head sparsely, finely punctate, shining. Clypeus slightly emarginate; margin narrowly reflexed. Frontal tubercles indistinct. Pronotum shining, finely punctate with few coarse punctures; basal marginal line entire; sides fimbriate, with long setae. Scutellum one-tenth elytra length, punctate. Elytral sides pubescent; striae deep, moderately punctate; intervals convex, alutaceous, punctulate. Fore tibiae with uppermost tooth obsolete or nearly so. Apical metatibial spinules vary in length. First metatarsal segment as long as next three.

Larvae unknown.

County records: EDDY CO. 10-VI-65 (RGH); RANSOM CO. 2-VI-62 (JO); RICHLAND CO. 6-V-62 (RDF), 17-VI-65 (RGH).

Remarks: This species is common in cow dung in late spring and early summer. It does not, however, oviposit in the dung. Results from pit traps in areas of rather thick humus indicate *A. walshi* may oviposit in humus.

Genus *ATAENIUS* Harold, 1867

Species of this genus closely resemble some *Aphodius*, but entirely lack the transverse carinae of the meso- and metatibia. The accessory spinule of the metatibia (a spiniform prolongation of the outer apical metatibial angle) is unique to the *Ataenius*. The biology of *Ataenius* is only vaguely understood. Apparently the larvae develop in soils of rich organic content (Jerath, 1960). The adults are active in early spring and are commonly attracted to light traps.

KEY TO SPECIES OF *ATAENIUS*

1. Clypeus broadly rounded at emargination and sides...*spretulus*
1'. Clypeus dentiform at emargination; angulate at sides...*texasus*

Ataenius spretulus (Haldeman)

Aphodius spretulus Haldeman, S. 1848. J. Acad. Nat. Sci. Philadelphia. 2:95-110.

Adult description: Length 4.75 mm. (± 0.15 mm.); width 2.0 mm.; shining piceous. Head rugulose anteriorly, finely punctate posteriorly. Clypeus very broadly emarginate; wide, round edges of emargination reflexed. Pronotum with sparse, coarse punctures intermingled with fine punctures; sides fimbriate. Elytral striae deep with indistinct, wide punctures; intervals flattened, punctulate; humeri dentate. Meso- and metatibia without traces of transverse carinae. Outer apical angle of metatibia spiniform. First segment of metatarsus longer than next three.

Larvae unknown.

County records: CASS CO. 6-VI-62 (DGA); PEMBINA CO. 17-VI-66 (LK); RICHLAND CO. 7-VII-66 (RGH).

Remarks: *Ataenius spretulus* Harold is most commonly collected at light traps in eastern North Dakota. It has been collected in aged cow dung.

Ataenius texasus Harold

Ataenius texasus Harold, E. 1874. Coleopterologische Hefte. 11:23.

Adult description: Length 3.6 mm.; width 1.4 mm. Entirely piceous. Head rugulose anteriorly, coarsely punctate posteriorly. Clypeus with dentiform emargination, angulate at sides. Pronotum with dense, coarse punctures; sides not fimbriate. Elytral striae deep with wide punctures; intervals convex, shining, with one row of moderate punctures; humeri dentate. Meso- and metatibia without traces of transverse carinae. Outer angle of metatibia spiniform. First metatarsal segment longer than next three.

Larvae unknown.

County records: PEMBINA CO. 7-VII-66 (LK).

Remarks: Only two specimens of this species were collected in the upper northeast corner of North Dakota. They were collected at a U.V. light trap along with specimens of *Ataenius spretulus* (Hald.).

Genus *DIALYTES* Harold, 1869

Dialytes criddlei Brown

Dialytes criddlei Brown, W. 1929. Can. Ent. 61:210.

Adult description: Length 3.6 mm. (± 0.2 mm.); width 1.6 mm. (± 0.1 mm.); opaque, piceous to black. Head punctate; clypeus obtusely emarginate, with a small reflexed tip (tooth) at sides of emarginations; genae rounded. Pronotum coarsely punctate; a median, longitudinal groove apparent the length of pronotum; sides parallel; base sinuate at sides. Elytral intervals broadly carinate; striae limited on each side by a fine small carinule which is interrupted by strial punctures; humeri dentate. Sternum coarsely punctate, alutaceous. Anterior femur coarsely punctate posteriorly, enlarged. Meso- and metatibiae with only traces of transverse carinae (not more than one-third circumference of tibia). First segment of metatarsus longer than next three.

Larvae unknown.

County records: DUNN CO. 12-VII-64 (RDG); RICHLAND CO. 10-VI-66 (RGH).

Remarks: Cartwright (personal communication) states that the specimens collected in North Dakota are the first records of *Dialytes criddlei* Brown in the United States. They are exclusively limited to deer feces.

Genus *RHYSSEMUS* Mulsant, 1842

Rhyssemus sonatus LeConte

Rhyssemus sonatus LeConte, J. 1881. Trans. Kansas Acad. Sci. 7:77.

Adult description: Length 3.7 mm. (± 0.1 mm.); width 1.7 mm. (± 0.1 mm.); rufopiceous to piceous (usually covered, in various degrees, with clay incrustation). Head convex, surface moderately verrucose. Clypeus acute each side of emargination; sides rounded, reflexed. Genae fimbriate with 1-4 setae each. Pronotum tuberculate, with four furrows and three distinct ridges (third medially sinuate); fourth ridge very narrow, interrupted, often indistinct; sides and base crenate and fimbriate with clavate-spatulate setae. Elytral striae moderately deep; intervals with two rows of irregular tubercles. Pygidium fimbriate. Metasternum shining with median groove. Abdominal sternites alutaceous. Metatibial spur as long as first tarsal segment, not as long as first two.

Larvae unknown.

County records: BARNES CO. 2-V-64 (RDG); BILLINGS CO. 10-VI-64 (RGH), 17-VIII-66 (RGH); BOTTINEAU CO. 17-IX-66 (JK).

Remarks: *Rhyssemus sonatus* LeC. was collected in pit traps placed in open fields. The most abundant numbers have come around animal burrows, especially the Black-tailed Prairie Dog, *Cynomys ludovicianus* (Ord.).

Genus PSAMMODIUS Fallen, 1807

Psammobius mimeticus (Fall)

Psammobius mimeticus Fall, H. 1932. J. New York Ent. Soc. 40:199.

Adult description: Length 3.8 mm.; width 1.6 mm.; dull to shining red-brown to rufopiceous. Head convex, surface verrucose. Clypeus emarginate; sides rounded, reflexed and slightly arcuate. Genae fimbriate and indistinct. Pronotal surface verrucose with four transverse furrows; ridges distinct, the last being variously interrupted; sides and base crenate and fimbriate. Elytra as wide at base as pronotum; striae deep and wide; intervals convex, alutaceous shining. One small tooth on each humerus. Mesosternum shining, with a deep median groove; abdominal sternites alutaceous, crenate in front, slightly margined posteriorly. Pygidium fimbriate apically. Metatibial spur at least as long as first two tarsal segments. First tarsal segment triangular and expanded.

Larvae unknown.

County records: GRANT CO. 18-V-64 (RDG).

Remarks: Cartwright (1959) recently revised this genus for North America. Of the several species included in that paper, only *P. mimeticus* has been collected in North Dakota. However, intensified investigation of the ecology of *Psammobius* should yield several more species. They are reported to be associated with sand areas of beaches and rivers (Cartwright 1959).

Genus AEGIALIA Latreille, 1807

The biology of the *Aegialia* is poorly understood. The few specimens caught in North Dakota were taken in wind and light traps. It is apparent from these traps and from fecal investigation that these species are not associated with the more common fecal deposits (cow, sheep and deer), but are perhaps more closely associated with humus in the floodplains of North Dakota rivers. The three species collected are represented by one specimen each.

In the latest revision of this genus Brown (1931) distinguished *Aegialia* from other Aphodiinae by the dorsally exposed mandibles (the clypeus is not expanded).

KEY TO NORTH DAKOTA SPECIES OF AEGIALIA

1. Frons punctate, punctures dense and coarse; pronotum coarsely and closely punctate.....*lacustris*
- 1'. Frons impunctate, usually granulate; pronotum finely, sparsely punctate.....2
2. Pronotum with fine punctures; elytra wider than pronotum....
.....*conferta*
- 2'. Pronotum with very coarse and fine punctures; elytra as wide as pronotum.....*rufescens*

Aegialia lacustris LeConte

Aegialia lacustris LeConte, J. 1850. Agassiz Lake Superior. p. 225.

Adult description: Length 4.2 mm.; width 2.1 mm. Dorsally dark red-brown, lighter ventrally. Head with dense, fine granules; clypeus not covering mandibles. Frons coarsely punctate. Pronotum coarsely punctate; small fovea in each lateral declivity; slightly narrower than elytra. Elytra with striae of dense, coarse punctures; intervals smooth, slightly convex. Metatibiae with strong transverse ridges on distal edge. Metatibial spurs slender, sharply pointed.

Larval description: The following larval description is taken from Jerath (1960). The larvae he described were collected in soil under willows.

Larval head capsule width 1.36 mm. (± 3.5 mm.). Cranium yellow-white, smooth. Frons with two small depressions on each side. 3-4 microsensillae and 5-6 setae on each side of dorsoepicranium. Prophoba with 15-17 basal microsensillae. Maxilla with 15-20 stridulatory teeth. Galea with five stout, dorsal setae. Lacinia with six such setae. Abdominal segments 1-5 dorsally with 2 plicae each. Raster with teges of approximately 55 setae. Anal lobe entire.

County records: WILLIAMS CO. 23-V-64 (RDG).

Remarks: The state record for this species is in the collection of R. D. Gordon.

Aegialia conferta Horn

Aegialia conferta Horn, G. 1871. Trans. Amer. Ent. Soc. 3:293.

Adult description: Length 4.2 mm.; width 2.0 mm. Color shining red-brown. Entire head with dense, fine granules. Pronotum finely and sparsely punctate; distinct fovea in the middle of each lateral declivity. Elytra wider than pronotum; finely striate with moderate to coarse, dense punctures; intervals flat, smooth. Metatibiae stout, with feeble transverse ridge apically. Metatibial spurs foliaceous, less than twice as long as wide.

Larvae unknown.

County records: MORTON CO., Mandan, North Dakota.

Remarks: Brown (1931) cited a reference to a specimen of *A. conferta* collected in Mandan, North Dakota. No other data was given.

Aegialia rufescens Horn

Aegialia rufescens Horn, G. 1887. Trans. Amer. Ent. Soc. 14:99.

Adult description: Length 4.0 mm.; width 1.8 mm. Entirely ferruginous, shining. Head granulate, granules close. Frons impunctate. Pronotum sparsely, but very coarsely and deeply punctate; disc with indistinct fovea each side of lateral declivity; posterior angles deflexed. Elytra as wide as pronotum; humeri distinct, not dentate; striae deep with coarse punctures; intervals slightly convex, punctulate. Metatibial spurs stout, wider at middle than base.

Larvae unknown.

County records: GRAND FORKS CO. 6-VI-66 (RGH).

Remarks: One specimen of *A. rufescens* was collected in a wind trap 11 feet high at Northwood, North Dakota.

SUBFAMILY GEOTRUPINAE

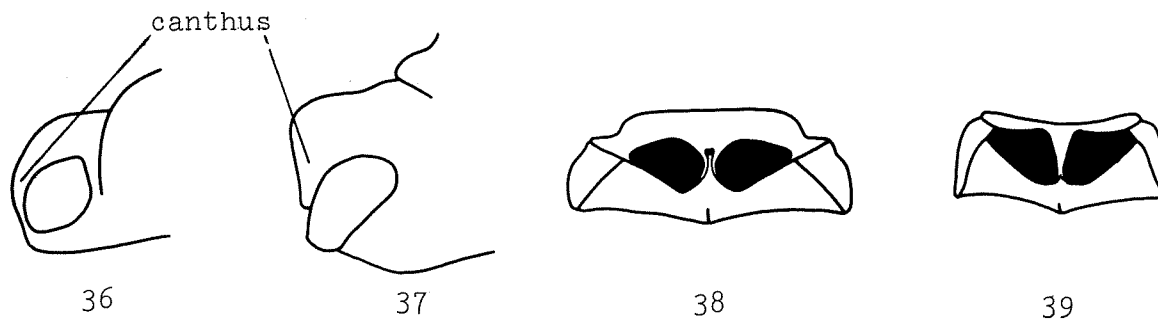
Howden (1955) offers the most complete and recent study of the North American Geotrupinae. His study gives needed information on the biology and taxonomy of these secretive beetles and indicates the need for more study in the biology of saprophagous Scarabaeidae.

North Dakota species are most commonly collected at light traps or pit traps. Adults construct a deep burrow in which they spend a majority of their life. They line this burrow with fecal material or humus for larval food. The Geotrupinae do not roll a fecal ball.

The most distinctive feature of the Geotrupinae is the 11-segmented antennae. These are the only saprophagous Scarabaeidae larvae with a three-segmented antenna.

KEY TO THE GENERA OF GEOTRUPINAE

- 1. Antennal club approximately as long as the first eight antennal segments, rounded.....2
- 1'. Antennal club only half the length of the first eight antennal segments, flattened.....*Geotrupes*
- 2. Eyes completely separated by canthus (fig. 36, pg.49).....3
- 2'. Eyes partly separated by canthus (fig. 37, pg. 49)..*Eucanthus*
- 3. Mesocoxae slightly separated by thin mesosternal projection; basic color orange-brown with areas of black to dark brown (fig. 38, pg. 49).....*Bolbocerosoma*
- 3'. Mesocoxae contiguous; color uniform brown to black (fig. 39, pg. 49).....*Bolboceras*



- Figures 36. Left eye of *Bolboceras filicornis* (Say) showing canthus completely dividing the eye (dorsal aspect).
 37. Left eye of *Eucanthus greeni* Rob. showing canthus only partially dividing the eye (dorsal aspect).
 38. Mesosternum of *Bolbocerosoma bruneri* D. & McC. showing mesocoxae separated by this mesosternal projection.
 39. Mesosternum of *Bolboceras falli* (Wallis).

KEY TO THE GENERA OF GEOTRUPINAE LARVAE
 (from Howden 1955)

1. Metathoracic legs much reduced; tenth abdominal segment obliquely flattened.....*Geotrupes*
 1'. Metathoracic legs fully developed; tenth abdominal segment rounded.....2
 2. Legs without claws; single conical sense organ on second antennal segment; single ventral anal lobe.....*Bolboceras*
 2'. Legs with claws; two or more conical sense organs on second antennal segment; pair of ventral anal lobes.....3
 3. Second antennal segment with two conical sense organs; legs 4-segmented.....*Bolbocerosoma*
 3'. Second antennal segment with three or more conical sense organs; legs 3-segmented.....*Eucanthus*

Genus *BOLBOCEROSOMA* Shaeffer, 1906

Bolbocerosoma bruneri Dawson and McColloch

Bolbocerosoma bruneri Dawson, R. W. and McColloch, W. J. 1924. Can. Ent. 56:9-15.

Adult description: Length 11.5 mm. (± 3.0 mm.); width 8.0 mm. (± 1.5 mm.). Dorsally orange with black markings on entire head, posterior pronotal margin, scutellum, elytral suture and posterior third of elytra. Clypeus punctate; males with protuberance as high as length of clypeus, females with a transverse carina. Canthus completely dividing eye. Pronotum deeply and coarsely punctate; males with lateral carinae anteriorly, deep groove mesad of the lateral carinae, and a medial transverse carina widely separated and bifurcate; females with small lateral carinae, slight grooves and small transverse carina. Elytra with seven coarsely punctate striae between humeral unbone and elytral suture. Mesosternum with well developed prominence in front and between mesocoxae, which is anteriorly grooved, raised well above mesosternal surface.

Larvae unknown.

County records: BILLINGS CO. 10-VII-66 (RGH); CASS CO. 30-VI-65 (RGH); DUNN CO. 10-VI-65 (WK); EDDY CO. 26-VII-65 (RGH); RANSOM CO. 5-VII-62 (DGA); WALSH CO. 15-VII-66 (RGH).

Remarks: The biology of this species is practically unknown. The adults are collected with light traps or pit traps in areas of thick leaf litter or humus layers in grassland regions. They burrow as do all the Geotrupinae.

Genus *BOLBOCERAS* Kirby, 1818

Wallis (1928) revised this genus, then recognized as *Odontaeus* Dej., to include ten United States species, two of which occur in North Dakota.

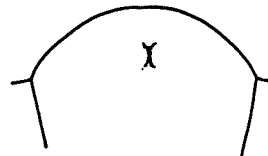
In North Dakota, shelter belts and floodplain forests offer adequate habitats where adult *Bolboceras* construct burrows in soil with a thick humus layer. Most male *Bolboceras* have a long, thin frontal horn which extends to the mid-pronotum. This feature is unique among the North Dakota saprophagous Scarabaeidae. Unlike *Eucanthus*, the eye is completely divided by a canthus in *Bolboceras* as well as *Bolbocerosoma*. The larvae have a two-segmented leg with no claws. None of the North Dakota species have yet been described as larvae.

KEY TO SPECIES OF *BOLBOCERAS*

- 1. Medial clypeal carina meets emarginate (flattened) apex of clypeus; color red-brown to light brown, never black; size small, about 7 mm. but variable; males with movable clypeal horn (fig. 40).....*filicornis*
- 1'. Medial clypeal carina absent, medial tubercle sometimes present, but never fused to entirely rounded clypeal margin; color black (red-brown in teneral specimens); size large, about 10 mm. but variable; male with fixed clypeal horn (fig. 41).....*falli*



40



41

- Figures 40. Clypeus of *Bolboceras filicornis* (Say) showing flattened apex and medial carina (dorsal aspect).
41. Clypeus of *Bolboceras falli* (Wallis) showing entire clypeal margin (dorsal aspect).

Bolboceras falli (Wallis)

Odontaeus falli Wallis, J. 1928. Can. Ent. 60:151-152.

Adult description: Length 9.0 mm. (± 2.0 mm.); width 6.5 mm. (± 1.5 mm.). Dorsally shining black, piceous brown below (entirely red-brown in teneral specimens). Clypeus entirely rounded; acutely margined; with small medial longitudinal tubercle never meeting anterior clypeal margin; surface irregularly intersected by deep rugosities. Frontal horn of males fixed and over half the length of pronotum; females with transverse frontal carina. In male, pronotum sparsely, coarsely punctate; deep foveae mesad of well developed lateral carinae, with two small medial tubercles; in females, the characters much less distinct, medial tubercles form slight transverse carina. Elytral striae normally impressed and coarsely punctured.

Larvae unknown.

County records: BILLINGS CO. 14-VII-65 (RGH); CASS CO. 10-VII-66 (RJS); GRAND FORKS CO. 4-VIII-66 (RGH); PEMBINA CO. 7-VII-66 (RLP); ROLETTE CO. 14-VII-66 (RGH); SLOPE CO. 13-VII-65 (RGH).

Remarks: This species does not come to light traps, but numerous specimens were caught with pit traps in wooded areas of North Dakota.

Bolboceras filicornis (Say)

Geotrupes filicornis Say, T. 1823. J. Acad. Nat. Sci. Philadelphia 3:136-216.

Adult description: Length 8.0 mm. (± 1.5 mm.); width 4.5 mm. ($\pm .5$ mm.). Dorsally red-brown, slightly lighter beneath. Clypeus slightly rounded at the sides, but distinctly flattened anteriorly; acutely margined; medial carina appears to join apical clypeal margin; surface irregularly intersected by deep rugosities. Frontal horn of male "movable," extending half the length of pronotum; female with transverse frontal carina, no horn. In males, pronotum sparsely, coarsely punctate; deep foveae mesad of well developed lateral carinae; with two small medial tubercles; in females, these characters much less distinct, medial tubercles form transverse carina. Elytral striae weakly impressed and coarsely punctated.

Larvae unknown.

County records: MCKENZIE CO. 16-VII-65 (RGH); PEMBINA CO. 28-VII-65 (RGH); RANSOM CO. 10-VII-62 (DGA); RICHLAND CO. 15-VII-66 (RGH); WELLS CO. 8-VII-60 (DK).

Remarks: *Bolboceras filicornis* (Say) is readily collected at light traps placed near wooded areas or in grassland regions.

Genus *EUCANTHUS* Westwood, 1848

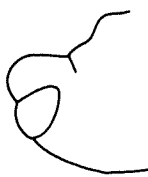
The two North Dakota species of *Eucanthus* are readily collected at light traps from May to late July. They tend to prefer the more sandy, humus covered soils of the state, which agrees with Ritcher's (1947) find-

ings. The two species, *Eucanthus lazarus* (Fabricius) and *E. greeni* Robinson are morphologically quite similar. The geographical variation of *Eucanthus lazarus* (Fabricius) is quite pronounced from east to midwestern United States.

Eucanthus have the eye partially divided by a canthus; a transverse bifurcate clypeal tubercle is as high as wide; similar tubercle on vertex. Larvae have three pairs of fully developed legs and three or more sense organs on the second antennal segment.

KEY TO SPECIES OF EUCANTHUS

1. Outer third of anterior pronotal margin arcuate or sinuate; anterior pronotal angle acute; anterior angle of canthus rounded (fig. 42).....*lazarus*
- 1'. Outer third of anterior pronotal margin nearly straight; anterior pronotal angle obtuse; anterior angle of canthus angulate (fig. 43).....*greeni*



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- Figures 42. Head of *Eucanthus lazarus* (Fab.) showing rounded anterior angle of canthus (dorsal aspect).
 43. Head of *Eucanthus greeni* Rob. showing angulate anterior angle of canthus (dorsal aspect).

Eucanthus lazarus (Fabricius)

Scarabaeus lazarus Fabricius, 1775. *Systema entomologiae*. p. 11.

Adult description: Length 10.0 mm. (± 1.5 mm.); width 5.2 mm. (± 0.7 mm.). Dorsally red-brown; ventrally lighter. Head with clypeus coarsely punctate and quadrate; males with a short wide horn, females with transverse carina. Canthus enlarged anteriorly; angulate to round; partially covering eye anteriorly. Clypeofrontal suture distinct. Frons coarsely punctate with a strong transverse carina. Anterior pronotal angles acute; anterior pronotal margin sinuate; lateral tubercles and median transverse carina indistinct, but present. Elytral striae strong, coarsely punctate. Ventral side covered by dense, long setae.

Larval description: The larva of this species was described by Ritcher (1947).

County records: BOTTINEAU CO. 8-VII-62 (DGA); BOWMAN CO. 3-VIII-65

(RGH); BURLEIGH CO. 21-VI-65 (RGH); CASS CO. 1-VII-62 (DGA); RANSOM CO. 10-VII-62 (DGA); SLOPE CO. 18-VI-65 (JOB); WARD CO. 15-V-59 (RN); WELLS CO. 7-VII-60 (DK).

Remarks: *E. lazarus* (Fab.) is commonly collected at light traps especially in sandy grasslands in late June and July. Its range, in North Dakota, is sympatric with the very similar *E. greeni* Robinson.

Eucanthus greeni Robinson

Eucanthus greeni Robinson, M. Trans. Amer. Ent. Soc. 74:29-36.

Adult description: Length 10.0 mm. (± 1.0 mm.); width 5.8 mm. (± 0.7 mm.). Dorsally red-brown, ventrally lighter. Clypeus coarsely punctate and quadrate; males with a short, wide horn; females with transverse carina. Canthus enlarged anteriorly; fore angle 90° or less, partially covering eye anteriorly. Clypeofrontal suture distinct. Frons coarsely punctate with a strong transverse carina. Anterior pronotal angles obtuse. Anterior pronotal margin only slightly sinuate. Lateral pronotal margins explanate and coarsely punctured. Lateral tubercles and median transverse carina indistinct, but present. Elytral striae strong, coarsely punctate. Ventral side covered by dense, long setae.

Larvae unknown.

County records: BOWMAN CO. 3-VIII-65 (RGH); PEMBINA CO. 7-VII-66 (LK); RAMSON CO. 10-VII-62 (DGA); SLOPE CO. 21-VII-66 (JOB).

Remarks: Howden (1955) questioned the validity of *E. greeni*, feeling that the species should perhaps be relegated to a subspecies. Later, Howden (1964), recognized *E. greeni* as a distinct species.

In North Dakota, *E. lazarus* and *E. greeni* are sympatric. Gradient characters between the two at first seemed apparent, e.g., total body length, and size and shape of anterior or pronotal angle. However, the body lengths of twenty specimens were carefully measured and the anterior pronotal angles carefully compared. The mean body length of *lazarus* is 9.4 mm. with a standard deviation of ± 0.742 mm. and a range of 10.5 mm. to 8.2 mm. (See Table VIII). The anterior pronotal angle is acute (although varying somewhat) and its anterior margin is sinuate in varying degrees. The mean body length of *greeni* is 10.9 mm. with a standard deviation of ± 0.678 mm. and a range of 9.5 mm. to 12.0 mm. (See Table VIII). The anterior pronotal angle is obtuse and its margin straight. The aedeagus in both species were compared (the genital capsule is not sclerotized enough to show consistent characters in *Eucanthus*) to determine if a mechanical isolation exists between the species. Six lateral aedeagal hooks on each lobe were consistent in *lazarus*, with the longest teeth on the ventral lobe being .4 mm. long. In *greeni* there are nine lateral aedeagal hooks on each lobe and the longest teeth on the ventral lobe are .25 mm. long. The apex of the aedeagus in *greeni* is ventrally cleft and has many small spines; the apex of the aedeagus in *lazarus* is entire and has very few spines.

TABLE VIII.

COMPARISON OF TOTAL BODY LENGTHS OF *EUCANTHUS*
LAZARUS AND *EUCANTHUS GREENI*

	<i>Eucanthus lazarus</i>		<i>Eucanthus greeni</i>	
1	10.5 mm	9.5 mm	10.0 mm	10.2 mm
2	8.4	10.2	11.4	9.5
3	9.8	9.4	11.3	11.4
4	9.5	10.5	10.4	12.0
5	9.1	10.0	10.8	10.8
6	8.2	9.1	12.0	10.2
7	10.0	9.2	11.0	10.3
8	8.5	8.7	11.5	11.2
9	10.3	8.2	11.6	10.4
10	8.7	10.0	10.5	11.5
range	10.5 mm to 8.2 mm		9.5 mm to 12.0 mm	
mean	9.4 mm		10.9 mm	
stand. dev.	±.742 mm		±.678 mm	

Although these two populations are sympatric, they are morphologically different and reproductively isolated (mechanically) and therefore two distinct species.

Genus *GEOTRUPES* Latreille, 1796*Geotrupes semiopacus* Jekel

Geotrupes semiopacus Jekel, H. 1865. Annales Societe Entomologique de France. 5:513-618.

Adult description: Length 16.0 mm. (± 3.5 mm.); width 9.5 mm. (± 1.5 mm.). Dorsally dull iridescent green to purple with base color black; ventrally black with some iridescence; antennae red-brown. Head variously punctate. Clypeus entirely margined; clypeal suture entire, arcuate anteriorly. Canthus well developed and margined. Pronotum convex; coarsely punctated along margins. Elytral striae well developed, anteriorly devoid of punctures. Meso- and metatibiae each with three transverse carinae, the inner carina sometimes indistinct. Mesotarsal claw and last tarsal segment of males distinctly enlarged.

Larval description: Description of the third instar is based, mainly, on Howden's (1964) recent description. Head capsule 5.2 mm. wide. Six setae on disc of labrum. One posterior seta on each side of frons, three setae in each anterior angle. Third antennal segment half as long as second, reduced. Torma united mesally. 10-11 short setae anterior to

pedium. 6-8 maxillary stridulatory teeth on stipes, two or three on palpifer. Legs three-segmented, metathoracic legs reduced, with stridulatory teeth.

County records: GRAND FORKS CO. 5-VII-66 (RGH); RICHLAND CO. 20-VII-64 (DKM), 16-VI-66 (RGH); TRAILL CO. 15-III-61 (RLP).

Remarks: *Geotrupes semiopacus* Jekel is rather widespread in the extreme eastern third of North Dakota. At one location in Richland County several pit traps were placed across a shelter belt. Thirty individuals were captured in one trap and none in the other traps. An attractant is possibly involved in the male-female relationship.

SUBFAMILY OCHODAEINAE

Ochodaeus musculus Say

Balboceras musculus Say, T. 1837. Boston Journ. N. H. 1:178.

Adult description: Length 5.8 mm. (± 0.8 mm.); width 3.4 mm. (± 0.2 mm.). Entirely ferruginous to rufopiceous. Head granulate with a transverse carina. Clypeus small, distinct, no tubercles. Genae expanded laterally. Pronotum convex, granulate setigerous; sides fimbriate. Elytra with feebly impressed striae and striae punctured; intervals with two irregular rows of setigerous granules. Antennae ten-segmented. Mentum flat; as long as wide; longitudinally impressed. Meos- and metatibia without transverse carinae. Metafemora of male with apical uniform tooth (this wears with use and may be indistinct).

Larvae unknown.

County records: BOTTINEAU CO. 21-VI-62 (DGA); BOWMAN CO. 3-VIII-65 (RGH); BURLEIGH CO. 13-VII-65 (RGH); CASS CO. 10-VII-62 (DGA); MORTON CO. 1-VII-65 (RGH); PEMBINA CO. 28-VII-65 (RGH); RANSOM CO. 4-VII-65 (RGH); RENVILLE CO. 7-VII-63 (DGA); RICHLAND CO. 18-VI-66 (RGH); ROLETTE CO. 28-VII-62 (DGA); SLOPE CO. 18-VI-65 (Job); WELLS CO. 9-VI-60 (DK); WILLIAMS CO. 14-VII-61 (KB).

Remarks: *Ochodaeus musculus* (Say) is commonly collected at light traps throughout the state, most abundantly during the same months as the photophilic Geotrupinae (pg. 15). It is the only species of *Ochodaeus* in northern United States, although there are many southern species.

SUBFAMILY DYNASTINAE

In some parts of the United States these species are economically important because larvae may feed on roots of plants. North Dakota species often feed on deteriorated fecal material, especially cow manure, although they may feed on any rich organic medium. Most of the manure piles inspected on farms throughout North Dakota were inhabited by one of the two species of *Bothynus*, the only genus of Dynastinae in North Dakota.

The expanded, leaf-like mandibles, variously denticulate, are characteristic only of the Dynastinae. Larvae are large, with no sensorial appendage on the penultimate segment of the four-segmented antennae.

Genus *Bothynus* Hope, 1837

Much confusion in the nomenclature of this genus existed until Cartwright (1959) published a detailed study of the nine United States species of *Bothynus*. Casey (1915) described 32 species and five genera, based on "minor variation" in *Bothynus*. *Bothynus* have the head with distinct transverse carina; clypeus triangular, dentate; pronotum often with short apical tubercle and anterior depression; scutellum exposed; elytra with four pairs of oblique germinate striae. Only two species of *Bothynus* are reported in North Dakota.

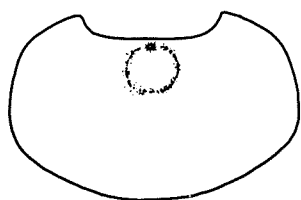
KEY TO SPECIES OF *BOTHYNUS*

Adults

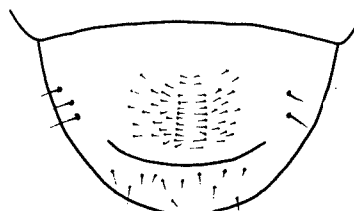
- 1. Pronotum anteriorly with a small, but distinct, median tubercle anterior at the base of a wide depression (fig. 44)...*gibbosus*
- 1'. Pronotum anteriorly smooth, lacking tubercle or depression
.....*relictus*

Larvæ

- 1. Raster with teges (no palidia) of approximately 50 setae; cranial surface smooth to reticulate.....*gibbosus*
- 1'. Raster with palidia and tegillia of 5 to 7 irregular rows of setae; cranial surface coarsely punctate (fig. 45)...*relictus*



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Figures 44. Pronotum of *Bothynus gibbosus* (DeGeer).
45. Raster of *Bothynus relictus* (Say).

Bothynus relictus (Say)

Scarabaeus relictus Say, T. 1825. J. Acad. Nat. Sci. Philadelphia 5:194.

Adult description: Length 20.5 mm. (± 3.5 mm.); width 11.5 mm. (± 1.5 mm.). Dorsoventrally piceous. Clypeus bidentate, surface rugose. Frontal carina interrupted, not extended to side margins. Pronotum convex, anterior portion smooth, lacking tubercle and depression; surface moderately

punctate. Elytra finely punctate between annular punctures of striae. Underside moderately pilose anteriorly, prosternal process smooth or only sparsely pilose.

Larval description: Larval head capsule 6.5 mm. (± 0.5 mm.). Cranium red-brown, coarsely punctate. Single exterior frontal seta caudad of each precoilus. No anterior and posterior frontal setae. Anterior frontal angle each with 2-3 setae. Each half of dorsocranium with 3 to 5 setae. Left labral margin angulate. Left mandible without a tooth. Few chaetoparal sensilla. Raster with palidia and tegillia of 5 to 7 irregular rows of setae.

County records: BURLEIGH CO. 24-V-59 (RLP); CASS CO. 13-VI-56 (RLP); GRAND FORKS CO. 19-IX-60 (SC); RANSOM CO. 20-V-62 (JO); RICHLAND CO. 3-VI-62 (JO); SLOPE CO. 18-VI-65 (JOB); WELLS CO. 12-VI-60 (DK); WILLIAMS CO. 29-VIII-61 (RLP).

Remarks: *Bothynus relictus* (Say) is the more common species of *Bothynus* in North Dakota. It is collected at light traps from late May through August. Larvae are often abundant in old bovine fecal deposits. Larvae burrow down to 18 inches below the soil surface to pupate, or may simply pupate in the fecal source.

Bothynus gibbosus (DeGeer)

Scarabaeus gibbosus DeGeer, C. 1774. Memoires pour servir a l'histoire des insectes. 4:322.

Adult description: Length 13.5 mm. (± 3.5 mm.); width 8.5 mm. (± 2.5 mm.). Dark red-brown dorsoventrally. Clypeus bidentate, surface rugose. Frontal carina thin, sinuate; surface of frons rugose. Pronotum convex, moderate anterior median tubercle at base of distinct, wide depression; surface punctate. Elytra with fine punctures between the annular punctures of striae. Undersurface pilose, distinct prosternal process entirely pilose.

Larval description: Larval head capsule width 4.5 mm. (± 0.25 mm.). Cranium yellow-brown, reticulate to smooth. Single exterior frontal seta caudad of each precoilus. Pair of posterior frontal setae. Anterior frontal angles each with 3 to 5 setae. Each half of dorsoepicranium with 2 setae. Labral margin entire, rounded. No chaetoparal sensilla. Left mandible with one small tooth. Raster with triangular tegera of approximately 50 stout setae.

County records: BURLEIGH CO. 14-VII-64 (RJS); CASS CO. 26-VI-62 (DGA); RANSOM CO. 26-VI-62 (DGA).

Remarks: *Bothynus gibbosus* (DeGeer) is the smaller and less common species of this genus in North Dakota. It is collected at light traps in the same areas and during the same period as *B. relictus*.

ABBREVIATIONS OF COLLECTORS' NAMES

DGA	David G. Aarhus	RN	R. Nelson
WB	William Brandvik	DN	David Noetzel
KB	Karen Brevick	JOB	James Oberfoell
SC	Student Collection	JO	Jerome Onsager
RDF	Richard D. Frye	OO	O. Osteros
RDG	Robert D. Gordon	RP	Robert Poole
RGH	Robert G. Helgesen	RLP	Richard L. Post
LK	Larry Kotchman	RJS	Richard J. Sauer
JK	James Knudson	HST	H. S. Telford
DK	Donald Kuske	RLW	R. L. Webster
CDM	C. D. Mampe	SW	Shannon Wilson
DKM	Dean K. McBride		

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SUMMARY

1. Saprophagous Scarabaeidae were collected throughout much of North Dakota during the summer of 1965 and 1966.
2. Specimens were obtained by direct capture, in light traps and in pit traps. The effectiveness of these methods varied with species' habits.
3. Scarabaeinae, Aphodiinae and Geotrupinae had both dung-feeding and humus-feeding species. Thirty species were dung-feeders and twelve species were humus-feeders.
4. Dung-feeding species were commonly limited to a microhabitat (a fecal deposit) where they encountered spatial competition from Diptera larvae and predation by Histeridae, Hydrophilidae and Staphylinidae.
5. Humus-feeders in the Geotrupinae constructed burrows in which they stored a food supply for larvae. Other humus-feeders appeared to be free-living.
6. Major morphological differences in adults were the clypeal margin, tibial structure and vestitures.

7. Major morphological differences in larvae were the raster setation, epipharyngeal and maxillary structure, as well as antennal and leg structure.
8. Of the fifty species distinguished in this study, fifteen species were widespread and abundant. Eleven species were uncommon, perhaps because of limited distribution or rare occurrence, or sampling deficiencies.
9. *Aphodius omissus torpidus* Horn was considered a variant of the species *Aphodius omissus* LeC. because *A. omissus omissus* LeC. and *A. omissus torpidus* Horn are sympatric throughout North Dakota and no reproductive isolation could be found between these two populations.
10. *Eucanthus greeni* was considered a distinct population from *E. lazarus* based on morphological and reproductive differences.
11. *Dialytes criddlei* Brown was reported in the United States for the first time.
12. The larvae of *Aphodius lentus* Horn and *A. ruricola* Melsh. were described for the first time.