

Species of the *collaris* and *impressus* Groups of *Pedilus* (Coleoptera, Anthicidae, Pedilinae)

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Abstract

Species of the genus *Pedilus* distributed in Canada and U.S.A., and belonging to the *collaris* and *impressus* groups are revised in this paper. The *collaris* group is characterized by the gonostyli (=lateral lobes) of males which are short, broadly arcuate, apically tapering and without internal teeth, and includes *collaris* (Say) and *lugubris* (Say). The *impressus* group is distinguished by its excurved gonostyli, outer angles of which may sometimes end in teeth like projections but the inner angles are always teathed subapically. The species included in the *impressus* group are: *impressus* (Say), *elegans* (Hentz), *lewisi* (Horn), *arizonensis* Fall, and *picipennis* Fall.

Introduction

The flower beetle genus *Pedilus*, the only member of the tribe Pedilini, is Holarctic in its present distribution. Nearctic species are distributed in southern Canada and throughout the United States. On the characters of male genitalia and specially the shape of the gonostyli the North American species could be divided into several natural groups. Two such groups including seven species are revised here. The *collaris* group is characterized by its short, broadly arcuate and apically tapering gonostyli which are devoid of internal teeth or barbs (figs. 3, 9). The *impressus* group is distinguished by its excurved gonostyli, the outer angles of which sometimes end in teeth-like projections and the inner surface always has subapical teeth (figs. 15, 22, 29, 35, 41).

There is very little that needs explanation. It may be mentioned that the term last abdominal sternum refers to the last visible sternum which is apparently the sixth (morphologically the eighth) in males and the fifth (morphologically the seventh) in females. All the records of distribution are new except those otherwise stated. Unlocated localities are marked by an asterisk *. In the maps, square symbols represent State records, open circles and

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triangles represent County records, and closed circles and triangles are used for localities within a County.

The following abbreviations are used: AMNH=American Museum of Natural History, New York; BM=British Museum (Natural History) London; CAS=California Academy of Sciences, San Francisco; CDA=California Department of Agriculture, Sacramento; CM=Carnegie Museum, Pittsburgh, Pa.; CNC, Howden=Canadian National Museum, Ottawa; CNHM=Chicago Natural History Museum; CU=Cornell University, Ithaca, N.Y.; DEI=Deutsches Entomologisches Institut, Berlin (East Germany); Harvard=Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; INHS=Illinois State Natural History Survey, Urbana; LACM=Los Angeles County Museum; OSU=Ohio State University, Columbus; ROMZ=Royal Ontario Museum of Zoology; SPBF=State Plant Board of Florida; U. Conn.=University of Connecticut, New Haven; UCB=University of California, Berkeley; UCD=University of California, Davis; U. Ill.=University of Illinois, Urbana; U.K.=University of Kansas, Lawrence; U. Mass.=University of Massachusetts, Amherst; U. Mich.=University of Michigan, Ann Arbor; U. Mo.=University of Missouri, Columbia; USNM=United States National Museum, Washington, D.C.; and W.S.U.=Washington State University, Pullman. The above institutions kindly loaned the specimens upon which the study is based.

I have examined the types of species of *Pedilus* described by Fall and LeConte at the Museum of Comparative Zoology, Harvard University, and by Horn at the Philadelphia Academy of Natural Sciences.

Collaris Group

Antennae serrate or subserrate, with basal two segments entirely rufous or rufous at their apices. Head sparsely, finely punctate. Hind tibiae not arcuate. Front and middle tarsi not swollen. Claws with medium teeth. Pronotum sparsely, finely punctate. Elytra sparsely, coarsely punctate. Elytral apex impressed in male. Mesepisterna meeting in front of mesosternum. Male genitalia with gonostyli broad and arcuate, narrowly produced at apex, without a projection on inner side (figs. 3, 9). Aedeagus swollen and knoblike at apex, divided medially, with feeble dentations (figs. 4, 10).

Key to Species

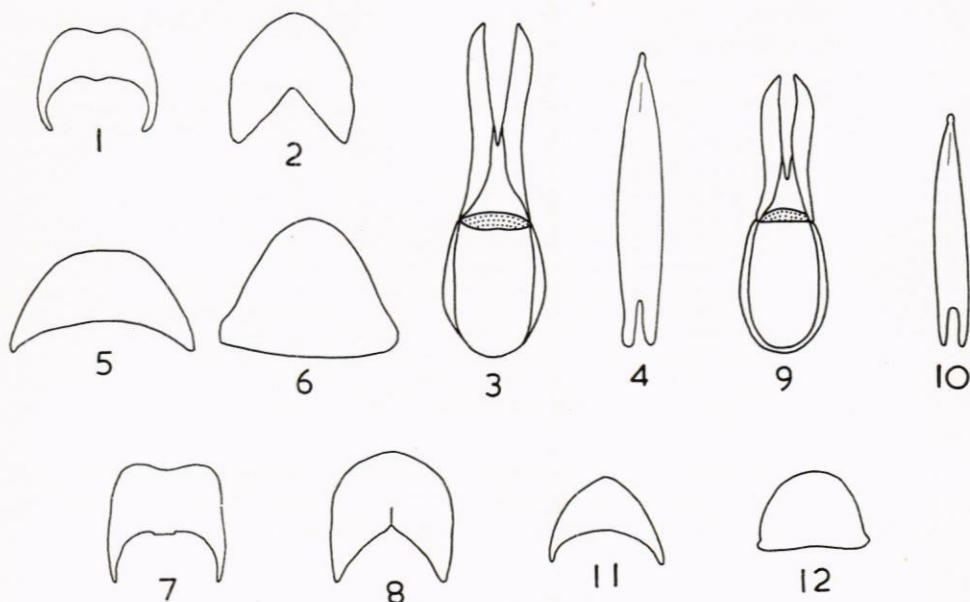
Pronotum rufous; elytral apex relatively shallowly impressed in male *collaris*
 Pronotum black; elytral apex relatively deeply impressed in male *lugubris*

Pedilus collaris (Say)

(Figs. 1—6; Map 1)

- Anthicus collaris* Say, 1827, Jour. Acad. Nat. Sc. Philadelphia, vol. 5, ser. 2, pp. 246—247.
Corphyra collaris, Say, 1835, Boston Jour. Nat. Hist., vol. 1, p. 189; Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, p. 282; Provancher, 1877, Faune Ent. Canada, vol. 1, p. 487; Horn, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 310.
Pedilus rufithorax Newman, 1838, Ent. Mag., vol. 5, p. 375.
Pedilus marginicollis Zeigler, 1846, Proc. Acad. Nat. Sc. Philadelphia, vol. 2, p. 47.
Pedilus infumatus LeConte, 1847, Jour. Acad. Nat. Sc. Philadelphia, vol. 1, ser. 2, p. 83.
Pedilus collaris, LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, pp. 272—273.

Length: 5.5 to 8.0 mm. Antennae serrate in male, subserrate in female, black, slightly shorter than half body length. Head black, shining. Man-



Figs. 1—6. *Pedilus collaris* (Say). 1, last abdominal sternum of male; 2, last abdominal tergum of male; 3, tegmen, ventral view; 4, aedeagus (median lobe) ventral view; 5, last abdominal sternum of female; 6, last abdominal tergum of female.

Figs. 7—12. *Pedilus lugubris* (Say). 7, last abdominal sternum of male; 8, last abdominal tergum of male; 9, tegmen, ventral view; 10, aedeagus (median lobe) ventral view; 11, last abdominal sternum of female; 12, last abdominal tergum of female.

dibles bifid at apex. Clypeus and legs black. Pronotum rufous, shining. Elytral apex in male black, shallowly impressed, impressed area smooth, impunctate. In male, last abdominal sternum broadly emarginate (fig. 1); penultimate abdominal sternum emarginate; last abdominal tergum entire (fig. 2); genitalia as in figures 3 and 4. In female, last abdominal sternum entire (fig. 5); last abdominal tergum entire (fig. 6).

Type Locality: Missouri.

Seasonal Distribution: Specimens were collected from May to July.

Bionomics: Specimens were collected on *Iris* at Sunderland, Massachusetts.

Records: CANADA: Ontario: Province label only (CAS, CNC); East Ontario (CNC); Ottawa (CNC). Quebec: Boucherville, June 9 (CAS); Montreal, June 21 (CNC, LACM).

UNITED STATES: Connecticut: State label only (CAS, INHS); Cornwall, Litchfield County, May 15 to June 28 (CAS, CU, Harvard, LACM); Hartford, Hartford County, May 19 (U. Mo.); Lakeville, Litchfield County, June 11 (UCD); Litchfield, Litchfield County, May 30 to June 28 (AMNH); New Canaan, Fairfield County, May 27 to June 7 (AMNH); Redding, Fairfield County, May 27 (DEI); Storrs, Tolland County, May 23 to July (U. Conn.). Delaware: Newark, New Castle County, May (U. Ill.); "Water Gap,*" (AMNH). District of Columbia: 20 miles northwest Washington, Scheer, May (USNM). Illinois: State label only (CAS, INHS); Algonquin, McHenry County, May 9 to June 3 (CNHM, INHS); Beverly Hill, Cook County, June 10 (USNM); "Bowmanville,*" June 26 to July 3 (CNHM); Chicago, Cook County, May 20 to June 18 (Harvard, U. Mich., U. Mo., WSU); Edgebrook, Cook County, June 1 (USNM), Fort Sheridan, Lake County, July 13 to August 13 (CNHM); Galesburg, Knox County (INHS); Glencoe, Cook County, May 31

(CNHM); "Glendon Park,*" May 22 (U. Mich.); Glen Ellyn, Du Page County, June 5 (CNHM); Glenview, Cook County, May 26 (CAS); Half Day, Lake County, June 10 (INHS); LaGrange, Cook County, July 21 (Harvard); Lake County, June 7 (INHS); Northern Illinois, June (CAS, INHS). *Indiana*: Columbia City, Whitley County, May 19 (INHS); Putnam County (BM); Terre Haute, Vigo County (USNM). *Iowa*: Ames, Story County, May 22 (CNC); Iowa City, Johnson County (CDA). *Kansas*: Onaga, Pottawatomie County, June 9 (CNHM); Topeka, Shawnee County (USNM). *Kentucky*: Easton, Hancock County (CAS). *Massachusetts*: State label only (AMNH, CNHM, CU, Harvard, INHS, USNM); Amherst, Hampshire County, May 18 (Harvard, U. Ill., U. Mass.); Blue Hill, Suff County (Harvard); Chicopee, Hampden County (U. Mo., USNM); Concord, Middlesex County, June (CAS, Harvard, U. Mo.); Dorchester, Suffolk County, June 20 (Harvard); Dover, Norfolk County (Harvard); Framingham, Middlesex County (ROMZ); Hopkinton, Middlesex County, June 25 (CU); Lenox, Berkshire County (AMNH); Milton, Norfolk County, May 27 (Harvard); Mount Washington, Berkshire County, June 29 to July 1 (Harvard); Natick, Middlesex County, May 10 to 25 (CU, Howden); Newton, Middlesex County (Harvard); Norfolk County (Harvard); Northboro, Worcester County; Sherborn, Middlesex County, May 31 (BM, U. Mich.); Southboro, Worcester County, May 17 to June 4 (AMNH, CAS); Springfield, Hampden County, June 8 (CNHM, Harvard, USNM); Stoneham, Middlesex County, May 27 to 28 (CAS); Sunderland, Franklin County, June 23 (U. Mass.); Tyngsboro, Middlesex County (Harvard); Wellesley, Norfolk County, May 30 (Harvard); Westwood, Norfolk County, May 18 (Harvard). *Michigan*: State label only (INHS); Ann Arbor, Washtenaw County, May 16 (Harvard); Beavertown, Ottawa County, May 13 to June 2 (CAS). *Minnesota*: State label only (Harvard); Collegeville, Stearns County (USNM); Duluth, Saint Louis County (LACM); Hennepin County (U. Minn.); Houston County, May 25 to 27 (U. Minn.); "John Latsch State Park*" (CDA); Minneiska, Wabasha County, May 29 (U. Minn.); Kanabec County, July 6 (U. Minn.); Mille Lacs Lake near Vineland, Mille Lacs County, May 24 (U. Minn.); Ramsey County, June 6 (U. Minn.); Zumbro Heights, Wabasha County, May 6 (U. Minn.). *Nebraska*: West Point, Cuming County (USNM). *New Hampshire*: Durham, Strafford County, June 20 (INHS); Hampton, Rockingham County, June 12 (USNM); Manchester, Hillsboro County, June 1 to 14 (INHS); Wilton, Hillsboro County, June 3 (Harvard). *New Jersey*: Boonton, Morris County, June 6 to 11 (USNM); Dunellen, Middlesex County (CU); Great Piece Meadow, Warren County, May 30 (AMNH); Lincoln Park, Morris County, May 15 (USNM); New Brunswick, Middlesex County, June 8 (AMNH); Newfoundland, Morris County, May 30 (CU); Phillipsburg, Warren County, May 24 to June 12 (CAS); Riverdale, Morris County, May 20 (USNM); South Orange, Essex County, May 30 (CDA, USNM). *New York*: State label only (AMNH, UCB); Bronx Park, Bronx County (AMNH); Buffalo, Erie County (USNM); Colden, Erie County, May 25 (CAS); Croton Falls, Westchester County, May 26 (CDA); Elbridge, Onondaga County, May 13 (U. Mich.); "Grittenden*" (UCB); Ithaca, Tompkins County, May 25 (CU, Harvard, USNM); Katonah, Westchester County (USNM); Lewiston, Niagara County, May 30 (CAS); Miller-ton, Dutchess County, June 8 (CU); New York, New York County, May 26 (CDA); Olive-rea, Ulster County, June 8 to 18 (CU); Orangeburg, Rockland County, May 21 (CAS); Patter-son, Putnam County, May 19 to 29 (CU); Ramapo Mountains, Rockland County (AMNH); Slide Mountain, Ulster County, June 15 (CU); Suffern, Rockland County (AMNH); Trenton Falls, Oneida County (BM). *North Carolina*: Black Mountain, Buncombe County, May (Harvard); Bluff Park, Science Highway (Madison County?) June 2 (Howden). *North Dakota*: Fargo, Cass County, June 18 (CU). *Ohio*: State label only (AMNH, USNM); Cincinnati, Hamilton County (CAS, U. Mich.); Clinton, Summit County, May 28 (OSU); Gambier, Knox County, May 16 (UCD); Summit County, June 9 (UK). *Pennsylvania*: State label only (Harvard); Abington, Montgomery County, June 1 (CAS); Allegheny County (CM); Bethlehem, Clearfield County, June 10 (Harvard, U. Mo.); Chestnut Hill, Philadelphia County, May 8 to 19 (OSU, USNM); Crisp, Westmoreland County, July (CM); Darby, Delaware County, May 26 (CNHM); Dauphin County, June 3 (CAS); Easton, North-ampton County, May 18 to June 20 (CAS, UCD); Edge Hill, Montgomery County, May 25 to June 15 (CU, USNM); Frankford, Philadelphia County, May 6 (USNM); Glenolden, Delaware County, May 28 to June 16 (USNM); Glenside, Montgomery County, June 16 (USNM); Lane County, (U. Conn.); Media, Delaware County, May 13 (CU); New Hope, Bucks County, May 30 (AMNH, USNM); Philadelphia, Philadelphia County, May 23 (USNM); Roxborough, Philadelphia County, May 10 to 31 (USNM); "Stoudt's Ferry,*" June 1 (UCD); Tioga County (CNHM); Wyoming, Luzerne County, May 22 (USNM). *South Dakota*: Chamberlain, Brule County, June 21 (CAS); Wolsey, Beadle County, June 2 (CAS). *Tennessee*: Great Smoky Mountain National Park, Sevier County, 2500 feet, May 9

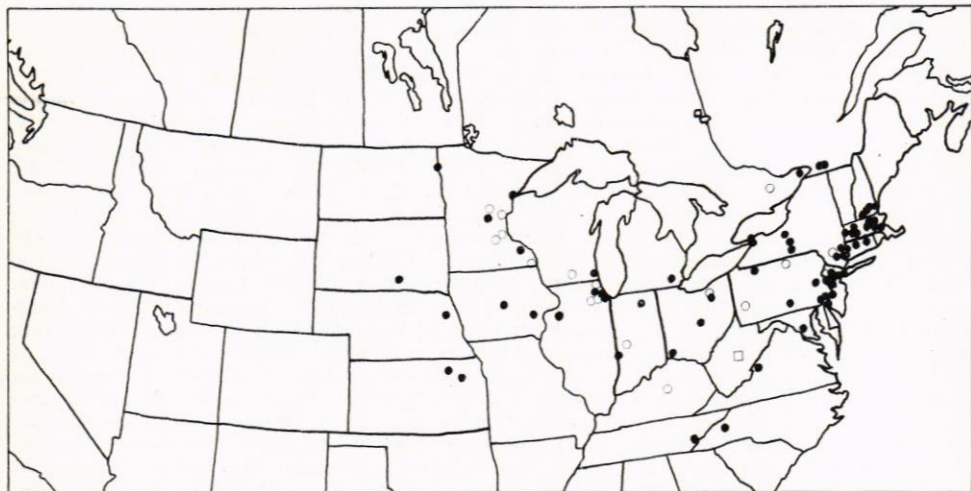


Fig. 1. Geographic distribution of *Pedilus collaris* (Say).

(Howden). *Virginia*: State label only (Harvard); Clifton, Fairfax County, May 14 (USNM); Glen Carlyn, Arlington County, May 19 (CU); "Poolesville Ferry,*" May 19 (USNM); Rosslyn, Arlington County, May 3 (USNM); Skyland, Page County, June 16 (USNM). *West Virginia*: State label only, June (CM); Cheat Mountains (Randolph County?) June (CM). *Wisconsin*: State label only (CDA, CNHM, USNM, WSU); Dane County, May 10 to June 12 (U. Mo., USNM); Milwaukee, June (CAS).

Total Number of Specimens Examined: 661.

Remarks: Some specimens have a black spot on the pronotal disc. The legs are rarely entirely pale.

Pedilus lugubris (Say)

(Figs. 7—12; Map 2)

Anthicus lugubris Say, 1827, Jour. Acad. Nat. Sc. Philadelphia, vol. 5, ser. 2, p. 246.

Corphyra lugubris, Say, 1835, Boston Jour. Nat. Hist., vol. 1, p. 189; Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, p. 280; Provancher, 1877, Faune Ent. Canada, vol. 1, p. 487; Horn, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 306.

Pedilus imus Newman, 1838, Ent. Mag., vol. 5, p. 375; LeConte, 1847, Jour. Acad. Nat. Sc. Philadelphia, vol. 1, ser. 2, p. 83.

Pyrochroa inornata Randall, 1838, Boston Jour. vol. 2, no. 1, p. 23.

Pedilus nigricans Zeigler, 1846, Proc. Acad. Nat. Sc. Philadelphia, vol. 2, p. 46.

Pedilus lugubris, LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, p. 280.

Length: 5.5 to 8.0 mm. Closely resembles *collaris*, but differs as follows: Antennae usually shorter than half body length in female, about equal to half in male. Mandibles entire at apex. Clypeus black, rarely rufous apically. Pronotum black. Elytral apex in male relatively deeply impressed, surrounding area feebly bullate. Last abdominal sternum and tergum of male and female as in figures 7, 8, 11 and 12 respectively. Male genitalia as in figures 9 and 10.

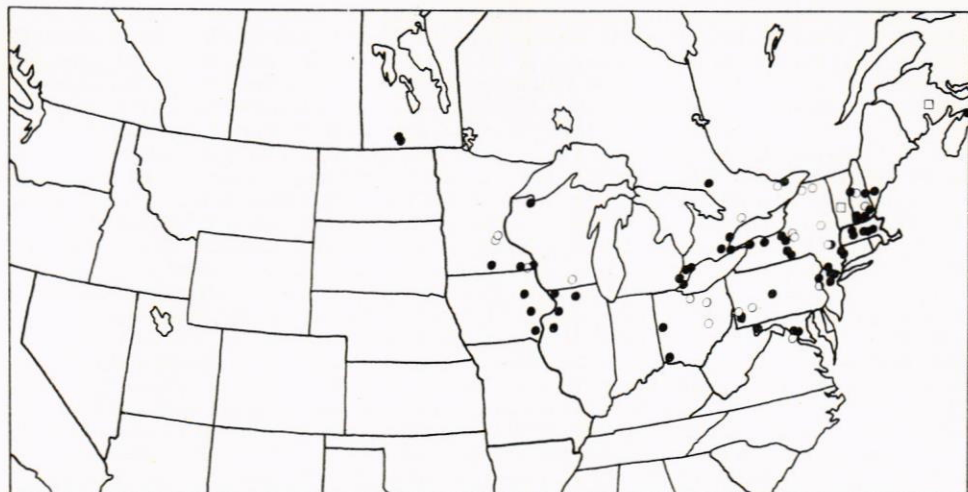


Fig. 2. Geographic distribution of *Pedilus lugubris* (Say).

Type Locality: Near Fort Osage, Missouri.

Seasonal Distribution: Specimens were collected from May to July.

Bionomics: Specimens were collected on *Barbarea vulgaris* at Spencer, New York, and on flowers of *Prunus virginiana* at West Springfield, Massachusetts.

Records: CANADA: Country label only (AMNH, BM, CAS, CM, CNHM, Harvard, U. Minn., USNM). Manitoba: Aweme, July 11 (CNC); Treesbank, July 9 to 11 (CNC). New Brunswick: Tatamagouche, June 17 (CAS). Nova Scotia: Truro, July 4 (CAS). Ontario: "Brittanica,*" June 1 (CNC); "Coldstream,*" May 23 (CNC); Dundas, May 31 (CNC); Emo, June 11 (AMNH, UCD); "Fisher Glen,*" June 12 (CNC); Hamilton (CNHM); Leamington, June 4 to 15 (CNC); London, May 28 (ROMZ); "Mer Bleue,*" June 6 (CNC); "Merivale,*" June 1 to 13 (CNC); Ottawa, April 18 to June 8 (CAS, CNC, Howden, ROMZ); Port Hope (ROMZ, USNM); Rainy River District, June 3 to 8 (CAS); Ridgeway, May 31 (CAS, UCD); Strathroy, June 5 (CNC); Toronto, May 24 to June 8 (CAS, CNC, CNHM, CU).

UNITED STATES: Connecticut: "Ancastor*" (USNM); Canaan, Litchfield County, June 19 to 20 (CU); Cornwall, Litchfield County, June 19 (CU). District of Columbia: Washington, May 23 to 30 (USNM); 9 miles northeast of Washington, May 21 (USNM). Illinois: State label only (INHS); Galena, Jo Daviess County, June 1 to 17 (AMNH, INHS); Galesburg, Knox County (CAS); Grays Lake, Lake County, May 13 (INHS); Oregon, Ogle County, June 19 (INHS); Northern Illinois (INHS); Rock Island, Rock Island County (INHS). Iowa: Independence, Buchanan County, May 15 (USNM); Iowa City, Johnson County, May 17 to 30 (CAS, Harvard, USNM); Mount Pleasant, Henry County, May 6 (U. Mich.). Louisiana: "White Fish Point*" (USNM). Maine: State label only, June (Harvard); Paris, Oxford County, June 21 to 27 (CU, DEI, U. Minn.); Staceyville, Pendoscot County, June 24 (Harvard). Maryland: State label only (U. Minn.); Bowie, Prince Georges County, May 29 (USNM); College Park, Prince Georges County, May 15 (Howden); Marlboro, Prince Georges County, May 13 (USNM); Oakland, Garrett County, July 10 (USNM). Massachusetts: State label only (Harvard); Amherst, Hampshire County, June 6 (DEI); Dracut, Middlesex County (Harvard); Framingham, Middlesex County, May 28 (DEI, Harvard); Newton, Middlesex County (Harvard); Norfolk County (Harvard); Northboro, Worcester County, May 28 (BM); Princeton, 1900 feet, Worcester County, June 17 (Harvard); Sherborn, Middlesex County, June 22 (DEI); Tyngsboro, Middlesex County (Harvard); West Springfield, Hampden County, May 15 (USNM). Michigan: Detroit, Wayne County (USNM); Grand Ledge, Eaton County, June 7 (USNM); "Hayel" (could be Hazel, Iron County) (USNM); Lapeer County, May 30 (CAS); Pine River, Arenac County, (U. Mich.);

Saint Ignace, Mackinac County, June 12 to 21 (U. Mich.). *Minnesota*: Hennepin County (U. Minn.); Highway 26, 3 miles north Hokah, Houston County, May 30 (U. Minn.); Houston County, May 21 (U. Minn.); "Mississippi Bluff," 1—2 miles north state line, Houston County, May 30 (U. Minn.); Preston, Fillmore County, May 28 to June (U. Minn.); Ramsey County (U. Minn.); Winnebago Creek Valley, 3—4 miles northeast of Eitzen, Houston County, May 31 (U. Minn.). *New Hampshire*: State label only (CAS); Antrim, Hillsboro County, June 24 (LACM); Bretton Woods, Coos County, June 1 to 2 (CU, INHS); Claremont, Sullivan County, May 10 (CU); Durham, Strafford County, June 13 (INHS); Franconia, Grafton County (AMNH); Glen, 1500 feet White Mountains, Carroll County, June 2 to 6 (Harvard); Manchester, Hillsboro County, June 1 to 14 (IHNS); "Mount Meosilau-kee,*" July 3 to 9 (Harvard); "Mt. Plst. Hise,*" July 8 (CNHM, U. Mo.); Mount Washington, Coos County, August 27 (CU); North Conway, Carroll County, June 2 (U. Mass.); Rumney, Grafton County, June 12 to 18 (Harvard); Squam Lake, Holderness County, July 9 (CAS); Wilton, Hillsboro County, June 3 (Harvard); "Zealand Camp, West Mountains,*" 1500 feet, June 5 (U. Mass.). *New Jersey*: Boonton, Morris County, June 11 (USNM); Cresskill, Bergen County, June 1 (UK); Dunellen, Middlesex County (CU); Little Falls, Passaic County, June 6 (CU); Phillipsburg, Warren County, May 16 to June 21 (CAS); Riverdale, Morris County, May 20 (USNM); South Orange, Essex County, June 1 (UK). *New York*: State label only (CAS, INHS, U. Minn., USNM); Black Brook, Clinton County, June 10 (CU). Bridgeport (Madison or Seneca County?) July 14 to 15 (USNM); Buffalo, Erie County (Harvard, INHS, UK, USNM); Catskill Mountain, Greene County, June 28 to July 1 (U. Mich.); Cooks Falls, Delaware County (CAS); Elbridge, Onondaga County, May 22 (U. Mich.); Foulton County, May 26 (CU); Greenwood Lake, Orange County (CU); Ithaca, Tompkins County, June 9 (CU); "Kima,*" June 18 (UCD); Lewiston, Niagara County, May 30 (CAS); Oliverea, Ulster County, June 18 (CU); Onondaga County, May 18 (UCD, WSU); Onteora Mountain, Greene County, July 4 (USNM); Peru, Clinton County, June 27 (CU); Piseco Lake, Hamilton County, May 29 (CU); Port Byron, Cayuga County, June 30 (CU); Rampo Mountains, Rockland County (AMNH); Rochester Junction, Munroe County, June 7 (CAS, CU); Spencer, Tioga County, June 4 (CU); Suffern, Rockland County, May 27 (AMNH); Trenton Falls, Oneida County (BM); West Point, Orange County, May 28 (USNM). *Ohio*: State label only (UCB, USNM, WSU); Cincinnati, Hamilton County, June 14 (CAS, USNM); Coshocton County, May 14 (OSU); Erie County (U. Mich.); Saint Marys, Auglaize County (CNHM); Summit County, June 9 (UK). *Pennsylvania*: State label only (Harvard); Allegheny County (CM, INHS, USNM); Belfast, Northampton County, May 27 (CAS); Jeanette, Westmoreland County, May to July (CM); Patton, Cambria County, May 18 (INHS); Pittsburg, Allegheny County, June 16 to 20 (CM). *Vermont*: "Wasatach Mountains,*" June 28 (CAS). *Wisconsin*: State label only (CNHM); Bayfield, Bayfield County (USNM); Dane County, May 22 (USNM); "Waldsboro*" (USNM).

Total Number of Specimens Examined: 684.

Remarks: The species exhibits the following variation in characters: Antennae, mouth parts, legs, and last abdominal tergum entirely rufous in some specimens; pronotum rarely feebly sulcated and piceous; impressed area of male elytral apex rarely slightly rufous; in some females, elytral apex partly faintly yellow.

Impressus Group

Antennae serrate, with basal two segments darker in color at base and rufous apically or entirely rufous. Head sparsely, finely punctate above, punctures sometimes coarser on sides and below. Hind tibiae not arcuate. Front and middle tarsi not swollen. Claws with medium or short teeth. Pronotum sparsely, finely punctate. Elytra sparsely or densely, finely or coarsely punctate. Elytral apex in male impressed or not modified. Mesepisterna meeting in front of mesosternum. Male genitalia with gonostyli broadly arcuate, apex usually excurved; inner surface with a broad or narrow process. Aedeagus knoblike and swollen at apex; divided medially, dentations from opposite side fitting each other; apex slightly curved in the form of a hook.

Key to Subgroups

1. Claws with medium teeth; elytral apex impressed in male 2
Claws with short teeth; elytral apex not modified in male .. *picipennis* Subgroup
2. Elytra sparsely, coarsely punctate; gonostyli in male bearing a broad toothlike process subapically on inner side (figs. 15, 22) *impressus* Subgroup
Elytra densely, finely punctate; gonostyli in male bearing a slender narrow process subapically on inner side (figs. 29, 35) *lewisi* Subgroup

Impressus Subgroup

Antennae with basal two segments partly or entirely rufous. Claws with medium teeth. Elytra sparsely, coarsely punctate. Elytral apex impressed in male. Male genitalia with gonostyli broadly arcuate; apex usually excurved; inner surface bearing a broad toothlike process (figs. 15, 22).

Key to Species

Antennae with first two segments partly rufous; head finely punctate below; pronotum rufous *impressus*
Antennae with first two segments rufous; head coarsely punctate below; pronotum rufous or piceous or black *elegans*

Pedilus impressus (Say)

(Figs. 13—19)

Anthicus impressus Say, 1827, Jour. Acad. Nat. Sc. Philadelphia, vol. 5, ser. 2, p. 248.

Corphyra impressa, Say, 1835, Boston Jour. Nat. Hist., vol. 1, p. 189.

Pedilus impressus, LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, p. 273.

Length: 5.75 to 6.50 mm. Antennae black, slightly longer than half body length, with first two segments partly rufous. Head black, shining, finely punctate below. Mandibles bifid at apex. Clypeus rufous apically; legs black. Pronotum rufous, with a feebly impressed line, shining. Elytra black, rather pruinose. Elytral apex in male yellow, smooth. In male, last abdominal sternum rufous, emarginate (fig. 13); penultimate abdominal sternum rufous, emarginate; last abdominal tergum entire (fig. 14); genitalia as in figures 15 and 16. In female, last abdominal sternum entire, slightly pointed at apex (fig. 17); last abdominal tergum entire, pointed at apex (fig. 18).

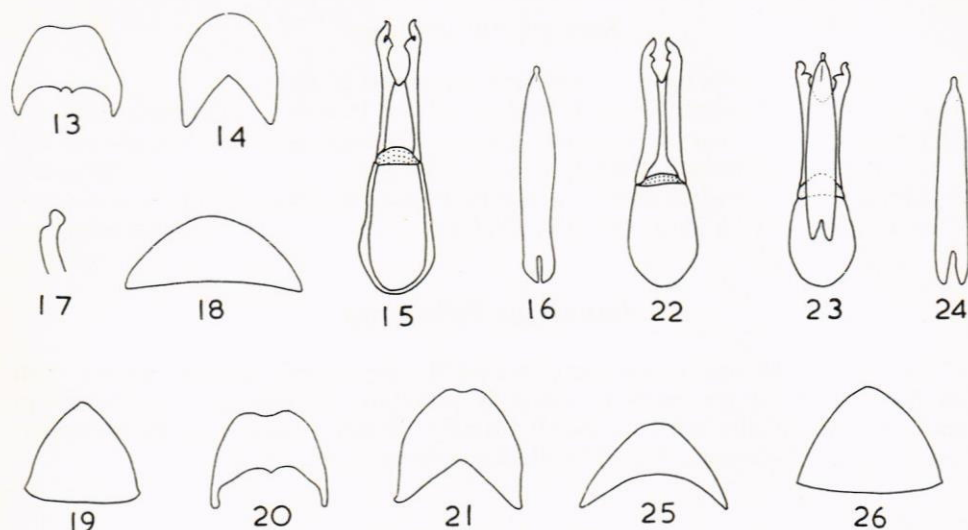
Type Locality: Pennsylvania.

Seasonal Distribution: Specimens were collected in May.

Bionomics: Say's (1827) specimen of *impressus* was found attached to the side of an adult of the blister beetle species *Meloe angusticollis* Say. The meloid beetle was at rest upon the ground when discovered.

Records: UNITED STATES: *Illinois*: State label only (U. Minn.); Northern Illinois (U. Minn.). *Pennsylvania*: Say (1827).

Total Number of Specimens Examined: 10.



Figs. 13—19. *Pedilus impressus* (Say). 13, last abdominal sternum of male; 14, last abdominal tergum of male; 15, tegmen, ventral view; 16, aedeagus (median lobe) ventral view; 17, apex of median lobe, lateral view; 18, last abdominal sternum of female; 19, last abdominal tergum of female.

Figs. 20—26. *Pedilus elegans* (Hentz). 20, last abdominal sternum of male; 21, last abdominal tergum of male; 22, tegmen, ventral view; 23, tegmen, ventral view (with median lobe); 24, aedeagus (median lobe) ventral view; 25, last abdominal sternum of female; 26, last abdominal tergum of female.

Pedilus elegans (Hentz)

(Figs. 20—26; Map. 3)

- Pyrochroa elegans* Hentz, 1830. Trans. Amer. Phil. Soc., vol. 3, p. 275.
Pedilus fulvipes Newman, 1838. Ent. Mag., vol. 5, p. 375; LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, p. 274.
Pedilus lugubris Newman, 1838. Ent. Mag., vol. 5, p. 375.
Pedilus haemorrhoidalis Zeigler, 1846. Proc. Acad. Nat. Sc. Philadelphia, vol. 2., p. 46.
Pedilus ruficollis Zeigler, 1846. Proc. Acad. Nat. Sc. Philadelphia, vol. 2, p. 46.
Pedilus elegans, LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, p. 274.
Pedilus newmani LeConte, 1855, Proc. Acad. Nat. Sc. Philadelphia, vol. 7, p. 274.
Corphyra newmani, Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, pp. 279—280; Horn, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 309.
Corphyra fulvipes, Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, p. 281; Horn, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 309.
Corphyra elegans, Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, p. 282.

Length: 5.0—7.5 mm. Antennae usually rufous; about half as long as body length in male, less than that in female; basal two segments always rufous. Head black, shining, coarsely punctate below. Mandibles bifid at apex. Clypeus and legs partly or entirely rufous or black. Pronotum rufous, piceous or black, rarely rufous with a black spot on disc; shining. Elytra black. Elytral apex in male rufous, bullate, smooth. In male, last abdominal sternum rufous, emarginate (fig. 20); penultimate abdominal sternum rufous, emarginate, apex deflexed downwards; last abdominal tergum rufous, feebly

emarginate at apex (fig. 21); genitalia as in figures 22 and 24, apex of gonostyli usually bent inwards, touching each other in some specimens, but rarely separated far apart mainly due to pulling out of aedeagus (fig. 23). In female, last abdominal sternum and tergum entire. (figs. 25, 26).

Type Locality: Massachusetts.

Seasonal Distribution: Specimens were collected from May to July.

Bionomics: Specimens were collected on hawthorn blossoms at Clearville, Ontario.

Records: CANADA: Country label only (Harvard, USNM). *Manitoba*: Province label only (USNM); Selkirk, June 10 (CNC, UK, U. Mich.); "Saint Norbert,*" June 24 (CU); Winnipeg (UK, USNM). *Ontario*: Belleville (CNHM); "Blackburn,*" June 6 (CNC); Brimley, Prince Edward County, June 8 to 27 (AMNH, CAS, UCD); "Clearville,*" June 3 (CNC); East Ontario (CNC); "Fort Coulogue,*" June 4 to 11 (CNC); "Fisher Glen,*" June 11 to 12 (CNC); "Green's Creek,*" June 5 (CNC); "Grimsby*" (ROMZ); Hillier, Prince Edward County, June 10 (CNC); "Hull,*" June 23 (CAS, CNC); Marmora, May 21 to June 3 (CNC); "Mer Bleue,*" June 1 (CNC); "Merivale,*" June 4 (CNC); Ottawa, May 20 to June 14 (CNC, Howden); Port Hope (CAS); Prince Edward County, June 21 (UCD); Ridgeway, May 31 (CAS, UCB); "Sand Lake, Kearney,*" July 2 (CNC); Toronto, June 26 (CAS, CU, ROMZ, USNM); Trenton, June 4 (CNC). *Quebec*: Aylmer, June 11 (CNC); "Fairy Lake,*" June 1 (CNC); "Kazubazua,*" June 10 (CNC); "Laniel,*" June 16 (CNC); Montreal, May 19 to June (CAS, CM, CU, LACM, U. Mo., USNM); Rigaud, June (CAS, U. Mo.); "Wakefield,*" June 4 to 20 (CAS, CNC); "Wright,*" May 29 (CNC).

UNITED STATES: *Connecticut*: State label only (AMNH); Cornwall, Litchfield County, June 4 (CU); Litchfield, Litchfield County (AMNH); Storrs, Tolland County, March (U. Conn.). *Illinois*: State label only (INHS); Algonquin, McHenry County (INHS); Monticello, Plat County, May 20 (INHS); Putnam County, May 21 (INHS); Saint Joseph, Champaign County, May 4 to 17 (INHS); Southern Illinois (Harvard); Wedron, LaSalle County, June 4 to 27 (INHS). *Iowa*: Ames, Story County, May 2 to 23 (CNC, INHS, USNM); Elma, Howard County, June 6 to 30 (U. Mo., USNM); Iowa, Johnson County (CAS, CNHM). *Maine*: Paris, Oxford County, June 14 to 21 (USNM). *Maryland*: "Rossie,*" June 1 (UCD). *Massachusetts*: State label only (INHS); Amherst, Hampshire County, June 6 (Harvard, U. Mass.); Mount Tom, Hampshire County, May 30 (USNM); Sherborn, Middlesex County (U. Minn.); Springfield, Hampden County (Harvard). *Michigan*: Ann Arbor, First Sister Lake, Washtenaw County, June 15 (U. Mich.); Bay County, July 13 (CAS); Clinton County, May 18 (CAS); Detroit, Wayne County, June (Harvard, USNM); Douglas Lake, Cheboygan County, July 16 to 29 (UK, U. Mich.); Grand Ledge, Eaton County, June 7 (USNM); Lapeer County, May 27 (CAS); Missaukee County, May 29 (CAS); Saint Ignace, Mackinac County, May 30 (U. Mich.); Washtenaw County, May 17 (UK). *Minnesota*: Hennepin County, (U. Minn.); Kittson County, June 15 (U. Minn.); Lake Minnetonka, Hennepin County, June 15 (CDA). *New Hampshire*: State label only (Harvard); Claremont, Sullivan County, May 10 (CU); Franconia, Grafton County (AMNH); "Glen," White Mountains, 1500 feet, Carroll County, June 2 to 6 (Harvard); Manchester, Hillsboro County (INHS); White Mountains, Carroll County (U. Mich.); Wilton, Hillsboro County, June 3 (Harvard). *New Jersey*: State label only (CAS, CU, USNM); Boonton, Morris County, June 1 (USNM). *New York*: State label only (CAS, Harvard, INHS); Canton, Saint Lawrence County, May 26 (UCD); Concord, Erie County, May 18 (UCB); Genesee County, June (CDA); Greenwood Lake, Orange County (CU); Ithaca, Tompkins County, May 13 to 22 (CAS, CU, USNM, WSU); Lancaster, Erie County (UCB); New York, New York County (USNM); Olcott, Niagara County, July 4 (CU); Patterson, Putnam County, May 29 (CU); Suffern, Rockland County (AMNH); Trenton Falls, Oneida County (BM); West Groton, Tompkins County, April 7 to May 30 (CAS, U. Mich.). *Ohio*: State label only (Harvard, INHS, UCB, USNM); Champaign County, June 6 (SPBF); Cincinnati, Hamilton County, June (CM); Greene County, May 12 (OSU); Pike County, May 31 (U. Mich.); Summit County, June 9 (UK). *Pennsylvania*: State label only (CAS, Harvard, INHS, USNM); Doylestown, Bucks County, May 25 (AMNH); Holiday, Tioga County (U. Mo.). *Wisconsin*: State label only (CNHM); Polk County, July (CM).

Total Number of Specimens Examined: 405.

Remarks: I have designated a male specimen bearing a white label which

was LeConte's way of indicating Eastern States and Canada as lectotype of *Pedilus newmani* LeConte. It is in the Museum of Comparative Zoology, Harvard University (#30493, male).

Lewisi Subgroup

Antennae with basal two segments darker in color at base and rufous apically. Claws with medium teeth. Elytra densely, finely punctate. Elytral apex impressed in male. Male genitalia with gonostyli arcuate; apex excurved or not; inner surface bearing a narrow, slender process (figs. 29, 35).

Key to Species

Pronotum rufous; elytral apex in male relatively deeply impressed, with the impressed area black or rufous; apex of gonostyli distinctly excurved in male (fig. 29)

lewisii

Pronotum piceous or black; elytral apex in male relatively less impressed, with the impressed area black; apex of gonostyli not distinctly excurved in male (fig. 35).

arizonensis

Pedilus lewisii (Horn)

(Figs. 27—32; Map 3)

Corphyra lewisii Horn, 1871, Trans. Amer. Ent. Soc., vol. 3, p. 281; Horn, 1883, Trans. Amer. Ent. Soc., vol. 10, p. 308.

Length: 6 mm to 8 mm. Antennae black, less than half body length. Head black, shining. Mandibles entire at apex. Mouth parts partly rufous ventrally. Clypeus and legs black to piceous. Pronotum rufous. Elytra black, shining, sulcated at base for a short distance near humeral angle. Elytral apex in male with area surrounding the impression yellow, rufous or black, slightly bullate; impressed area black, smooth; sutural margins slightly separated at apex. In male, last abdominal sternum emarginate (fig. 27); antepenultimate abdominal sternum emarginate; last abdominal tergum entire, broadly rounded at apex (fig. 28); apex of gonostyli excurved (fig. 29). In female last abdominal sternum and tergum entire (figs. 31, 32).

Type Locality: Colorado.

Seasonal Distribution: Specimens were collected from April to September.

Bionomics: Specimens were collected on *Pinus ponderosa* at Waldo Canyon, Colorado.

Records: UNITED STATES: *Arizona*: State label only (BM, CU, USNM); 3 miles north Alpine, Apache County, June 9 (LACM); Carrizo, Navajo County, May 28 (OSU); Chiricahua Mountains, Cochise County, June 23 (CAS); Diamond Creek, White Mountains, Coconino County, June (CAS, CU); Graham Mountains, Graham County, July (CAS); Greer, 8000 feet, Apache County, July 3 (CU); Kaibab National Forest, Mohave County, June 26 (OSU); McKays Peak, White Mountains, Coconino County, July 10 to 15 (AMNH); Oak Creek, 5500 feet, Coconino County, May 16 to June 19 (CAS, CU); Sierra Ancha Mountains, Gila County, September (CU); White Mountains, Apache County, July 8 to 19 (CAS, UK). *California*: Southern California (INHS). *Colorado*: State label only (BM, CDA, CM, Harvard, INHS, USNM); Arboles, Archuleta County (USNM); Breekenridge, Summit County (CM); Buena Vista, 7900 to 8000 feet, Chaffee County, April 7 (USNM); Coal Creek Canyon, Fremont County (CAS); Colorado Springs, 6000 to 7000 feet, El Paso County, June 9 to

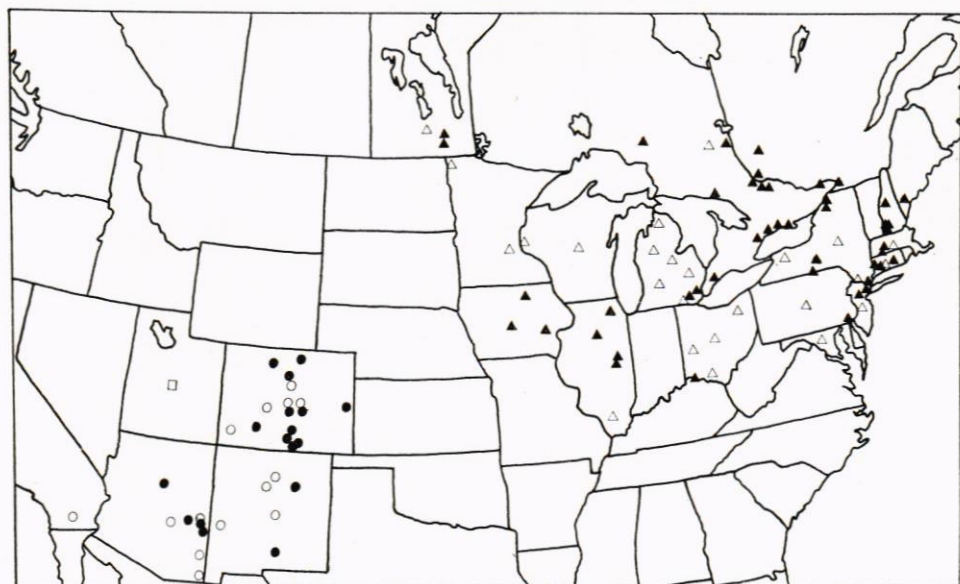


Fig. 3. Geographic distribution of *Pedilus elegans* (Hentz) (triangles) and *P. lewisi* (Horn) (circles and squares).

30 (AMNH, CAS, Harvard); El Paso County, June 29 (UK); Fort Collins, Larimer County (USNM); "Garland,*" June 30 (USNM); Georgetown, 8300 to 8600 feet, Clear Creek County, June 15 to 26 (USNM); Lake City, Hinsdale County, June 29 (UK); La Veta, Huerfano County, April 7 to June 21 (Harvard); "Leavenworth Valley*" (USNM); "Menkhaven,*" June 28 (CAS); "Momiton,*" June 17 to 26 (CAS); North Cheyenne, Cheyenne County, June 25 (CAS); Phillipsburg, Jefferson County, July 3 (WSU); Ragged Mountain, Gunnison County, June 26 (UCD); vicinity of Rico, Dolores County, 10,000 feet, July 19 to 22 (Harvard); Rockey Mountain, Glacier Basin, Adams County, June 6 (U. Mass.); San Luis, Costilla County, April 7 (CAS); Steamboat Springs, 6800 feet, Routt County, July 1 to August 15 (CAS); Custer County (USNM); "Waldo Canyon,*" June 22 to 30 (USNM); "Williams Canyon,*" July 11 (USNM). *New Mexico*: State label only (AMNH, CM, INHS); Clouderoft, Otero County (USNM); Clouderoft goof, Otero County, June 27 (UK, U. Mo.); Jemez Mountains, Sandoval County, June 2 to 22 (CAS); Las Vegas, San Miguel County (INHS); Mogollon Mountains, Catron County, June 22 to 23 (UCD); "Monzano,*" June 26 (UK); Sandia Mountains, Sanadoval County (INHS); Tajique, Torraine County, June 25 (UK). *Utah*: State label only (CU, INHS).

Total Number of Specimens Examined: 188.

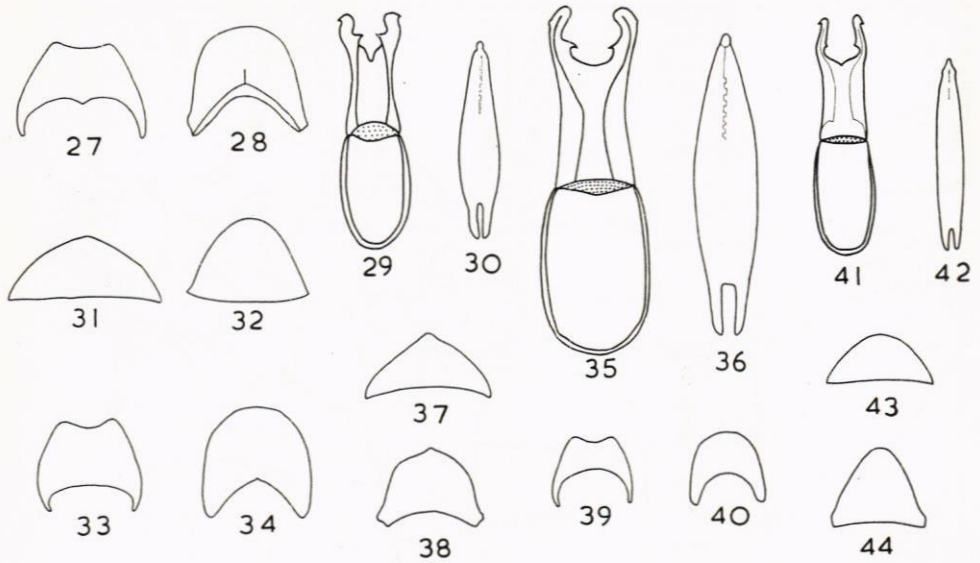
Remarks: A male specimen of the Philadelphia Academy of Natural Sciences has been designated as the lectotype (#3039). A paratype is at the Museum of Comparative Zoology, Harvard University (#8178, male).

Pedilus arizonensis Fall

(Figs. 33—38; Map 4)

Pedilus arizonensis Fall, 1915, Jour. Ent. and Zool., vol. 7, pp. 21—22.

Length: 5.3 to 8.0 mm. This species closely resembles *P. lewisi* but differs in the following characters: Antennae slightly longer than half body length; clypeus and legs black to piceous; elytral apex in male with the



Figs. 27—32. *Pedilus lewisi* (Horn). 27, last abdominal sternum of male; 28, last abdominal tergum of male; 29, tegmen, ventral view; 30, aedeagus (median lobe) ventral view; 31, last abdominal sternum of female; 32, last abdominal tergum of female.

Figs. 33—38. *Pedilus arizonensis* Fall. 33, last abdominal sternum of male; 34, last abdominal tergum of male; 35, tegmen, ventral view; 36, aedeagus (median lobe) ventral view; 37, last abdominal sternum of female; 38, last abdominal tergum of female.

Figs. 39—44. *Pedilus picipennis* Fall. 39, last abdominal sternum of male; 40, last abdominal tergum of male; 41, tegmen ventral view; 42, aedeagus (median lobe) ventral view; 43, last abdominal sternum of female; 44, last abdominal tergum of female.

impressed area less deeper and entirely black; pronotum black or piceous; male genitalia smaller, gonostyli not much excurved at apex (fig. 35). In male, last abdominal sternum and tergum as in figures 33 and 34. In female, last abdominal sternum and tergum as in figures 37 and 38.

Type Locality: Mount Lemon, Santa Catalina Mountains, Pima County, Arizona.

Seasonal Distribution: Specimens were collected in June.

Records: UNITED STATES: Arizona: Santa Catalina Mountains, June 26 (CAS).

Total Number of Specimens Examined: 7.

Remarks: The holotype is in the Museum of Comparative Zoology, Harvard University (#24313, male).

Pecipennis Subgroup

Antennae with basal two segments lighter in color at apex and darker at base. Claws with short teeth. Elytra densely, finely punctate. Elytral apex not modified in male. Male genitalia with gonostyli rather strongly arched, briefly excurved at apex, latter blunt with the outer angle distinct and ending in a toothlike projection; a short broad tooth projecting on either side inward at some distance (fig. 41).



Fig. 4. Geographic distribution of *Pedilus arizonensis* Fall (triangle) and *P. picipennis* Fall (circles and square).

Pedilus picipennis Fall

(Figs. 39—44; Map 4)

Pedilus picipennis Fall, 1915, Jour. Ent. and Zool., vol. 7, pp. 29—30.

Length: 5.0 to 7.5 mm. Antennae rufous, longer than half body length in male, shorter in female. Head black, shining, rarely rufous except eyes. Mandibles entire at apex. Clypeus entirely black or rufous at apex, tibiae and tarsi rufous. Pronotum black to rufous. Elytra pale to black brown, shining. In male, last abdominal sternum emarginate (fig. 39); penultimate abdominal sternum emarginate; last abdominal tergum entire (fig. 40); genitalia as in figures 41 and 42. In female last abdominal sternum and tergum entire (figs. 43, 44).

Type Locality: California.

Seasonal Distribution: Specimens were collected from May to August.

Bionomics: Specimens were collected on alfalfa at Lake City, California.

Records: CANADA: *Alberta*: Cypress Hills, July 10 (CAS). UNITED STATES: *California*: State Label only (AMNH, CU); Brockway, Placer County, June 20 (CAS); Bubbs Creek, Kings River, 9700 feet, Fresno County, July 14 (CAS), Chester, Plumas County, June 25 to July 1 (OSU); "Deer Park Inn,*" July 18 (CAS); Echo Lake, Fallen Leaf Lake, Lake Tahoe, El Dorado County, June 2 to July 10 (CAS, UCD); Floating Island, Tahoe, July 1 (CAS); Gold Lake, Sierra County, July 13 (CAS); Huntington Lake, 8000 feet, Fresno County, July 21 to 27 (UCD); Lake City, Modoc County, May 31 (UCB); "Lassen National Park, Kelly's Resort,*" June 12 (CAS); "Lundy,*" 7000 to 8000 feet, July 8 to 10 (USNM); McCloud, Siskiyou County, June 21 to July 6 (CAS); "Mount Mitchell,*" August (CAS); "Tallac,*" June 18 to July 14 (CAS, CU). *Colorado*: Ouray, 7500 to 8000 feet, Ouray

Entomol. Ts. Arg. 85. H. 1-2, 1964

County, July 1 to 15 (USNM). *Idaho*: Beaver Creek, Clark County, July 23 (USNM). *Montana*: State label only (INHS); Kalispell, Flathead County, June 13 (USNM). *Oregon*: Blue Mountains, Pine Creek, Umatilla County, June 25 (U. Mass.); Crater Lake, Klamath County, July 16 (CAS); Hood River, Hood River County, May 20 (USNM); Union Creek, Jackson County, July 5 (UCD); Wallowa Mountains, Wallowa County, July 4 (CAS). *Utah*: Aspen Grove Camp, Mount Timpangos, 6800 feet, Utah County, July 6 (CAS); Logan Canyon, Cache County, July 15 to 30 (CAS, U. Mass.); Vivian Park, Utah County, July 7 (CAS); Wasatch Mountains, Emery County, June 20 (USNM). *Washington*: Coppei Blue Mountains, Walla Walla County, May 27 (USNM); Deer Park, Spokane County, May 20 (U. Minn.); Lake Marie, near Fall City, King County, June 10 (CAS); Mill Creek, Walla Walla, Walla Walla County, June 9 (CAS), Pullman, Whitman County, May 23 (CAS).

Total Number of Specimens Examined: 85.

Remarks: A few specimens are entirely black. Some others are entirely rufous, including the head with the exception of eyes.

The holotype is in the Museum of Comparative Zoology, Harvard University (#24322, male).

Summary of the Comparative Characters of Species in the *impressus* Group

The species are numbered in their order of presentation, i.e., 1=*impressus*, 2=*elegans*, 3=*lewisi*, 4=*arizonensis*, and 5=*picipennis*. The color of pronotum is rufous in 1 and 3, rufous or piceous or black in 2, piceous or black in 4, and rufous or black in 5. Pronotum is medially impressed in 1 only. Elytra are sparsely punctate in 1 and 2, and densely punctate in 3-5. Elytral punctures are coarse in 1 and 2, and fine in 3-5. Elytral apices of males are impressed in 1-4 and not in 5. Tarsal claws have short teeth (less than half as long as the claw) in 5 and of medium size (nearly half as long as the claw) in others. Size ranges are: 1=5.75-6.50 mm; 2=5.0-7.5 mm; 3=6.8 mm; 4=5.3-8.0 mm; and 5=5.0-7.5 mm.