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Revision of the rove-beetles of the genus *Megarthrus* of America north of Mexico

(Coleoptera, Staphylinidae, Proteininae)

By Giulio Cuccodoro and Ivan Löbl

Abstract

The species of the genus *Megarthrus* Curtis, 1829 of America north of Mexico are revised. Twelve species are recognised, six of which are described as new: *M. ashei* sp.n., *M. borealis* sp.n., *M. newtoni* sp.n., *M. occidentalis* sp.n., *M. pecki* sp.n. and *M. smetanai* sp.n.. *Megarthrus angulicollis* Maklin is removed from the synonymy with *M. sinuatocollis* LACORDAIRE and the lectotypes are designated for *M. americanus* Sachse, *M. angulicollis* Maklin, *M. atratus* Maklin and *M. pictus* Motschulsky. Each species is described, its diagnostic characters are illustrated, bionomic and distributional data are presented, and distributional records are mapped. Keys for identification of the species are given.

Introduction

Megarthrus Curtis, 1829 is the largest genus of the subfamily Proteininae. The genus at present contains 113 named species considered valid. It is widely distributed throughout the New and Old Worlds, but is apparently absent from the temperate southern South America.

The first North American species of *Megarthrus*, *M. pictus*, was described by Motschulsky (1845). Sachse (1852), Maklin (1852), Leconte (1863) and Hatch (1957) added five species: *M. americanus*, *M. angulicollis*, *M. atratus*, *M. excisus* and *M. arcuatus*. Fauvel (1872) placed one of them, *M. angulicollis*, in synonymy with the European *M. sinuatocollis*. Thus, currently six species of *Megarthrus* are recorded from America north of Mexico. None of them has been adequately treated by taxonomists.

The present revision follows that of the Afrotropical (Cuccodoro & Löbl 1993) and Japanese (Cuccodoro 1996) *Megarthrus* species. Its aim is to elucidate the taxonomy rather than distribution. Therefore only taxonomically significant material has been chosen for examination.

With this study, the number of known North American species of *Megarthrus* is raised to twelve, and, hopefully, a basis is given for further, more detailed work on the genus.

Material and methods

This revision is based exclusively on adults (1732 specimens). Methods used for dissecting specimens and citing records follow mainly Cuccodoro & Löbl (1995). Under synonymy, only primary references are given, except for that of Fauvel (1872) which recorded *M. sinuatocollis* from America for the first time.

The term frons, as used in the present study, refers to the area anterior of the U-shaped impression, the vertex to the area behind it. The presence of the patches of sensilla on the antennomeres 6 to 10 is observed on slides. Abdominal sternites and tergites are counted from the first morphological segment. Measurements and ratios are defined as follows: length of specimens = interval from middle of anterior pronotal margin to inner apical angle of elytron; width of specimens = maximum pronotal width; AL = antennal length / pronotal length; EL = elytral sutural length / pronotal length; ET = elytral sutural length / shortest interval between sutural margin and lateral edge of elytron in dorsal view; EW = shortest interval between sutural margin and outer apical angle of elytron in dorsal view / shortest interval between sutural margin and humeral angle of elytron in dorsal view; EY = interval between posterior ocular margin and apex of frons

in dorsal view / interval between anterior and posterior ocular margins in dorsal view; GT = posterior width of gula / median length of gula; GW = width of neck / posterior width of gula; HW = maximum pronotal width / interval between posterior ocular margins in dorsal view; ML = median metasternal length / median mesosternal length; MP = length of segment 4 of maxillary palpus / length of segment 3 of maxillary palpus; PT = maximum pronotal width / pronotal length; SP = maximum width of abdominal sternite 8 / width of the basal projection; TPF = interval between basal angle and tip of medioapical projection of female abdominal tergite 8 / lateral length of medioapical projection of female abdominal tergite 8. The absence of that projection is indicated as "abs".

All material mentionned in the text was examined and is deposited in the following collections:

BMNH	The Natural History Museum, London;
CAS	California Academy of Sciences, San Francisco;
CNCI	Canadian National Collection of Insects, Ottawa;
DEI	Deutsches Entomologisches Institut, Eberswalde;
FMNH	Field Museum of Natural History, Chicago;
MHNG	Muséum d'histoire naturelle, Geneva;
MCZ	Museum of Comparative Zoology, Cambridge;
MZM	Zoological Museum, Moscow;
SEMK	Snow Entomological Museum of Kansas, Lawrence.
ZMUH	Zoological Museum, University, Helsinki.

Key to males

1 Elytra bicolorous (Fig. 23a) ..... *M. pictus* Motschulsky
– Elytra unicolorous 2

2 Anterior portion of prothoracic hypomeron with an oblique ridge 3
– Anterior portion of prothoracic hypomeron without an oblique ridge 4

3 Apical portion of aedeagus evenly ventrally recurved in lateral view (Fig. 6c) ..... *M. arcuatus* Hatch
– Apical portion of aedeagus sinuate in lateral view (Fig. 24b) ..... *M. smetanai* sp.n.

4 Peg-like setae on mesotrochanter forming a field (Fig. 18h) ..... *M. occidentalis* sp.n.
– Peg-like setae on mesotrochanter arranged in 1 or 2 rows 5

5 Peg-like setae on mesotrochanter arranged in 2 rows (Fig. 12h) ..... *M. borealis* sp.n.
– Peg-like setae on mesotrochanter arranged in 1 row (Fig. 4f) 6

6 Metatrochanter without, or with upto 3 peg-like setae (Fig. 20k) 7
– Metatrochanter with more than 3 peg-like setae (Fig. 10h) ..... *M. atratus* Maklin

7 Peg-like setae on metatibia absent, or arranged in a single row (Fig. 4c, d) 8
– Peg-like setae on metatibia forming a field (Fig. 14a) 9

8 Abdominal sternite 8 2.0-3.3x as wide as its basal projection (Fig. 4i) ..... *M. angulicollis* Maklin
– Abdominal sternite 8 3.4-4.5x as wide as its basal projection (Fig. 20b) ..... *M. pecki* sp.n.

9 Metafemur bearing peg-like setae (Fig. 14i) ..... *M. excisus* Leconte
– Metafemur lacking peg-like setae 10

10 Metatibia straight (Fig. 8c) 11
– Metatibia arcuate (Fig. 2d) ..... *M. americanus* Sachse

11 Aedeagal valve symmetrical (Fig. 16a, b) ..... *M. newtoni* sp.n.
– Aedeagal valve asymmetrical (Fig. 8a, b) ..... *M. ashei* sp.n.

Key to females

1 Elytra bicolorous (Fig. 23a) ..... *M. pictus* Motschulsky
– Elytra unicolorous 2

2 Anterior portion of prothoracic hypomeron with an oblique ridge 3
– Anterior portion of prothoracic hypomeron without an oblique ridge 4

3 Abdominal sternite 8 flat (Fig. 7f) ..... *M. arcuatus* Hatch
– Abdominal sternite 8 medianly ridged (Fig. 25f) ..... *M. smetanai* sp.n.

4 Abdominal tergite 8 with a medioapical projection (Fig. 3f, h) 5
– Abdominal tergite 8 without a medioapical projection (Fig. 9g, h) 10

5 Genital segment with 3 annular sclerites (Fig. 11c) ..... *M. atratus* Maklin
– Genital segment without annular sclerites (Fig. 13d) 6

6 Coxites flattened dorsoventrally (Fig. 3b, c) ..... *M. americanus* Sachse
– Coxites almost cylindrical (Fig. 5b, c) 7

7 Mesal flange of valvifers forming subbasal lobes (Fig. 15a) 8
– Mesal flange of valvifers abruptly narrowed subbasally, not forming lobes (Fig. 5b) ..... *M. excisus* Leconte

8 Antennomere 10 as wide as 8 (Fig. 13a). ..... *M. borealis* sp.n.
– Antennomere 10 wider than 8 (Fig. 19a) 9

9 Abdominal tergite 8 5.2-5.8x as long as its medioapical projection ..... *M. occidentalis* sp.n.
– Abdominal tergite 8 6.0-7.5x as long as its medioapical projection ..... *M. angulicollis* Maklin

10 Lateral edges of pronotum angular anteriorly (Fig. 17k) 11
– Lateral edges of pronotum rounded anteriorly (Fig. 21f) ..... *M. pecki* sp.n.

11 Coxites with a median ridge (Fig. 17b, c) ..... *M. newtoni* sp.n.
– Coxites lacking a median ridge (Fig. 9b, c) ..... *M. ashei* sp.n.

The species

Megarthrus americanus Sachse
(Figs 2a-i, 3a-i, Map 4)

Megarthrus americanus Sachse, 1852: 149.

Type material. Lectotype, ♀: "Georgia", DEI. Paralectotypes (3♀): same data as lectotype, DEI, by present designation.
Additional material (191). USA: ALABAMA, Jackson Co., Scottsboro, 4-8.4.1967 (Peck) 1♂ in FMNH; Jefferson Co., Birmingham, 15.4.1955 (Steeves) 1♀ in FMNH; same data, but 17.3.1958 1♀ in FMNH; Lee Co., Auburn, 21.3-8.4.1968 (Kiteley) 1♂ and 1♀ in CNCI; same data, but 31.3-12.4.1969 1♀ in CNCI; same data, but 6.3.1971, ex fungus, 2♂ and 2♀ in CNCI; same data, but 29.3.1972, 2♂ in CNCI; same data, but 27.1.1974, 2♂ and 3♀ in CNCI; Lee Co., Opelika, 4.3.1974 (Kiteley) 2♂ and 1♀ in CNCI; same data, but 7-20.3.1974, 1♂ and 2♀ in CNCI & MHNG; Marshall Co., Grant, near River Cave, 25.5.1968 (Steeves) ex floor debris light zone at entrance, 1♀ in FMNH; Shelby Co., Calera, 18.6.1959 (Suter) ex oak tree fork, 1♂ in FMNH; Walker Co., Jasper, 28.5.1978 (King) ex leaf mold, 1♀ in FMNH. ARKANSAS, Washington Co., Lake Wedington, 19.5.1986 (Leschen) 1♂ in CNCI. DISTRICT OF COLUMBIA, Takoma Park, 2.11.1951 (Kissinger) 1♂ and 2♀ in CNCI. FLORIDA, Walton Co., Ft.Walton Bch., 28.2.1974 (Kiteley) 1♀ in CNCI; Leon Co., 8 mi Tallahassee, near Little Dismal Sink, 27.2.1978 (Healy) ex oak & hickory litter, 1♂ in FMNH; Leon Co., Tall Timbers Res. Sta., Woodyard Hammock, 31.5.1977 (O'Brien & Wibmer) ex beech-*Magnolia* litter, 1♀ in FMNH. GEORGIA, Clarke Co., Athen, 15.9.1959 (Suter) ex pine live oak, pseudocrotch, 3♀ in FMNH; Decater Co., 11 mi NE

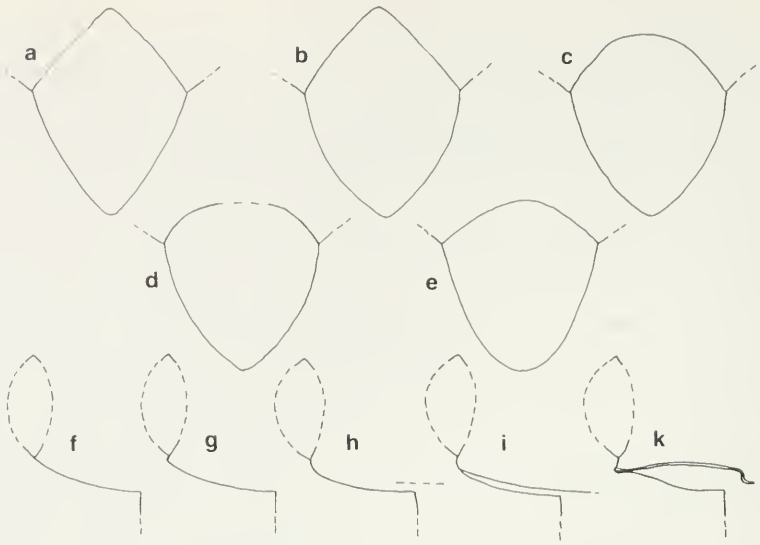


Fig. 1. Scutellum: a-e; Temple and occipital ridge: f-k. Schematic. *Megarthrus angulicollis*: b, f; *M. arcuatus*: e, i; *M. ashei*: h; *M. atratus*: a, g; *M. excisus*: c; *M. pictus*: k.

Bainbridge, 28.2.1977 (O'Brien & Marshall) ex acrub oak, 1♂ in FMNH. ILLINOIS, Union Co., Pine Hills Field Station, 15-22.5.1967 (Campbell) 1♂ and 3♀ in CNCI. INDIANA, LaPorte Co., Smith, 20.9.1942 (Seevers) 1♂ in FMNH; LaPorte Co., Smith station, 19.5.1956 (Dybas) ex leaf litter at base of mushrooms by stump 1♂ in FMNH; Porter Co., Tremont Indiana Dunes St. Pk., 7.10.1958 (Dybas) 1♂ and 1♀ in FMNH. KENTUCKY, Edmonson Co., Mammoth Cave N.P., 20.4.1983 (Suter) ex log litter, 1♀ in FMNH; Trigg Co., Devils Elbow, 6.5.1986 (Campbell) 1♂ in CNCI. LOUISIANA, Natchitoches Co., Vowell's Mill, 1♂ in FMNH. MICHIGAN, Berrien Co., Lakeside, Warren Woods, 27.9.1958 (Dybas) beech maple floor debris near old beech log, 17♂ and 2♀ in FMNH & MHNG; same data, but 18.9.1976 (Suter) ex litter at beech log with polypores, 2♂ and 3♀ in FMNH; same data, but 28.4.1984 (Watrous) ex litter at log, 3♂ and 5♀ in FMNH. MISSISSIPPI, Madisson Co., 12 mi E Canton, 28.5.1976 (Suter) stump buttress, 1♂ in FMNH. MISSOURI, Cape Girardeau Co., N of Cape Girardeau, Neely's Landing, 22.9.1946 (Dybas) 1♀ in FMNH. NEW YORK, Essex Co., N Elba, 1.10. (Leng) 1♀ in FMNH. NORTH CAROLINA, C.W. Leng Collection, 1♂ in FMNH; Macon Co., 8 mi N Franklin, 18.3.1976 (Watrous) berlese leaf litter in swamp area, 1♀ in FMNH; Rockingham Co., Reidsville, 12-15.10.1981 (Ashe) 1♂ and 1♀ in SEMK; same data, but ex leaf pile under rotting vegetables, 10♂ and 8♀ in SEMK; same data, but 27.10.1975, ex *Polyporus frondosus*, 9♂ and 11♀ in MHNG & SEMK; same data, but under a large *Polyporus frondosus*, 5♂ and 6♀ in SEMK; Wake Co., Raleigh, 1.9.1964, ex *Polyporus*, 1♂ in SEMK; same data, but 22.1.1964 (Matuza) under bark of dead pine, 1♂ in SEMK; Watauga Co., Boone, 29.10.1973 (Ashe) 1♀ in SEMK. OKLAHOMA, Latimer Co., 4.1984 (Stephan) 1♂ and 1♀ in CNCI; same data, but ex tree hole oak, 1♂ in CNCI; same data, but 1.1985, 1♂ and 4♀ in CNCI, 1♀ in SEMK; same data, but 12.1986, 1♀ in SEMK; same data, but 2.1987, 5♂ and 1♀ in SEMK; same data, but 3.1987, 1♂ and 2♀ in SEMK; same data, but 11.1987, 1♂ in SEMK; same data, but 10.1988, 1♀ in SEMK; Latimer Co., Red Oak area, 1-15-5.1983 (Suter) ex floor litter, 1♂ in FMNH. SOUTH CAROLINA, Pickens Co., Clemson, 21.3.1962 (Payne) 1♂ and 2♀ in CNCI; same data, but 2.4.1963, ex pig adv. decay, 2♂ in CNCI; same data, but 25.10.1966, ex pig carcass, 14♂ and 4♀ in BMNH; Pickens Co., Table Rock State Park, 11.7.1988 (Moulton) 2♂ and 2♀ in SEMK. TEXAS, Nacogdoches Co., S. F. Aust. Expt. For., 11.2.1984 (Field) ex hardwood buttress, 1♀ in FMNH; same data, but 24.2.1984 (Suter) ex pine pseudofork, 1♂ and 1♀ in FMNH.

Distribution. *Megarthrus americanus* occurs from New York south to northern Florida and west to eastern Texas (Map 4).

Biology. Found in carrion, in and under fungi, in leaf litter and other debris, on mold, in rotten logs, tree holes and under bark in forests and swamps.

Description. Length 1.2-1.4 mm; width 0.8-0.9 mm. Body predominantly red-brown, or dark brown, vertex and sutural margins of elytra darkened, appendages paler. Dorsal pubescence fairly uniform, sparser on elytra, denser near apical margin of abdominal tergite 7. Anteriomedian portion of frons with setae

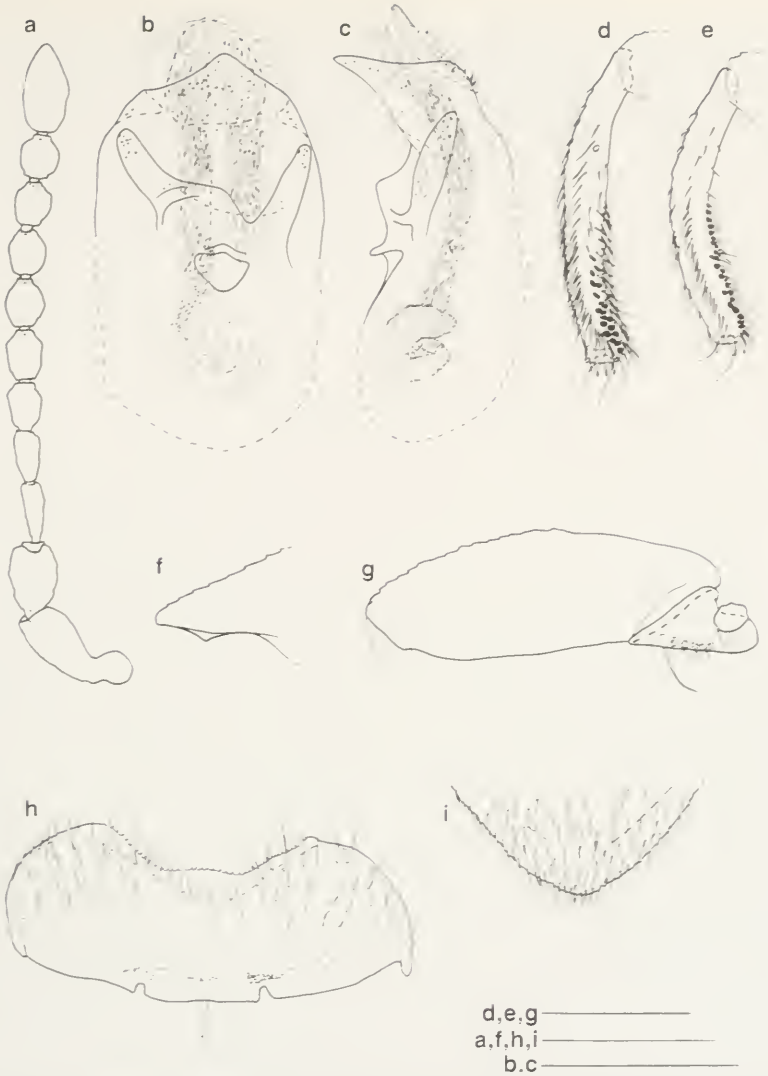


Fig. 2. *Megarthrus americanus*; a: antenna; b, c: aedeagus, ventral and lateral; d: male, metatibia, e: male, mesotibia; f, i: male, apex of abdominal tergite 8, lateral and dorsal; g: male, mesotrochanter and mesofemur; h: male, abdominal sternite 8. Scale bars = 0.2 mm.

orientated backward. Elytral setae straight, recumbent. Metasternal setae shorter than prosternal setae, becoming sparser posteriomedianly. Abdominal pubescence parallel, uniform on sternites 4-7, but with a pair of long subapical setae on each sternite. Punctation fine on anterior portion of hypomeron and posteriomedian portion of metasternum. Frons raised above level of vertex forming a ridge above clypeus, frontal ridge sharp, fine. Anterior frontal edge evenly convex. Frontal impression shallow. Eye strongly convex, with highest point slightly below, or reaching, level of vertex; supra-ocular margin sinuate in dorsal view. Temple similar to that in Fig. 1f. Occipital ridge indistinct. Submentum weakly convex. Antenna (Fig. 2a) without patches of sensilla; scape not flattened; antennomeres 3-4 slightly asymmetrical; short and dense pubescence present on antennomeres 5-11. Pronotum (Fig. 3g) weakly convex in frontal view, with mesal portion almost straight in lateral view. Pronotal disc with shallow depression along entire, or limited to the area near posterior portion of lateral edge; median groove shallow, parallel-sided.

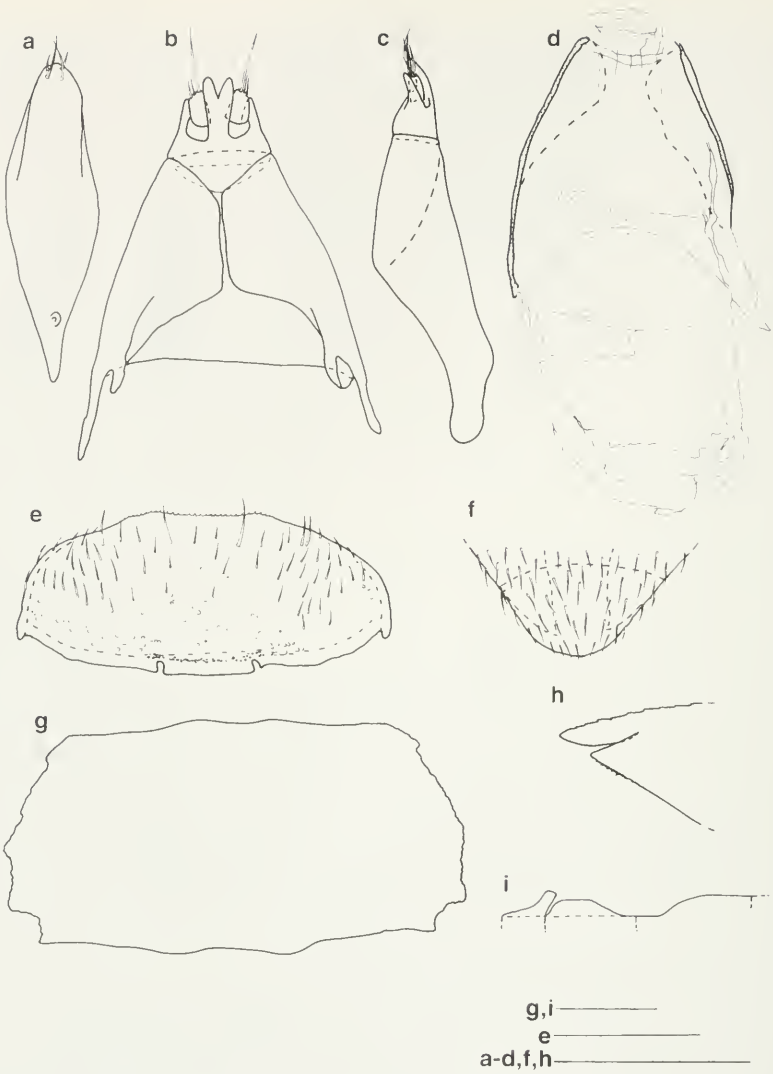


Fig. 3. *Megarthrus americanus*; a: male, abdominal sternite 9; b-d: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (d) ventral; e: female, abdominal sternite 8; f, h: female, apex of abdominal tergite 8, dorsal and lateral; g: pronotum; i: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

Hypomeral groove absent. Median prosternal ridge present anteriorly, fine and straight; anterior prosternal margin bordered by an irregular row of fine longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge straight, then bifid. Scutellum similar to that in Fig. 1c. Elytron not narrowed basally; base gradually inclined, then overhanging. Humeral callus low. Elytral disc with low swellings, shallowly depressed along apical portion of lateral edge; lateral edge finely carinate, straight in dorsal view; sutural area straight basally, slightly arcuate apically in lateral view; apical margin straight, or convex, near suture; inner apical angle obtuse. Metasternum with femoral line arcuate in middle; median ridge present posteriorly, fine and low. Abdominal tergite 3 almost flat. Sternites 2 and 3 with median processes as in Fig. 3i, process of sternite 3 straight. Sternite 4 with anterior portion flat, then strongly transversely vaulted.

Ratios: AL 1.6-1.8; EL 1.7-1.9; ET 1.7-1.9; EW 1.1-1.3; EY 2.2-2.4; GT 1.9-2.2; GW 1.8-2.0; HW 1.6-1.8; ML

1.6-1.8; MP 1.5-1.8; PT 1.8.-2.1; SP 3.0-4.0; TPF 4.0-4.5.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur about as long as mesofemur (Fig. 2g). Metatibia (Fig. 2d) longer than mesotibia (Fig. 2e). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protrochanter, protibia, metatrochanter and metafemur; arranged in a single row on mesotrochanter (Fig. 2g); grouped to form a field on metatibia and mesotibia. Apex of abdominal tergite 8 as in Fig. 2f, i. Sternite 8 as in Fig. 2h. Sternite 9 (Fig. 3a) bearing a small subbasal protuberance (Fig. 3a). Aedeagus as in Fig. 2b, c.

♀. Abdominal tergite 8 (Fig. 3f, h) with medioapical projection. Sternite 8 as in Fig. 3e. Genital segment as in Fig. b-d.

Comments. *Megarthrus americanus* may be easily distinguished from the other Nearctic species by the denticulate lateral edges of pronotum, in combination with the flattened female coxites and the strongly arcuate male metatibia.

Megarthrus angulicollis Mäklin
(Figs 1b & f, 4a-i, 5a-m, Map 1)

Megarthrus angulicollis Maklin, 1852: 325.
M. sinuatocollis; Fauvel, 1872: 28 (nec Lacordaire, 1835).

Type material. Lectotype, ♀: "Sitka", DEI, by present designation.

Additional material (363). CANADA: ALBERTA, Banff N.P., Cirrus Mt, 1650 m, 16.6.1968 (Campbell & Smetana) 1♂ in CNCI; same data, but Consolidation Lk., 2200 m, 15.6.1968, 1♂ in CNCI; Elk Island N.P. Trail 6, 13.5.1982 (Anderson) ex moose dung, 1♂ and 1♀ in SEMK; George Lake <53°57'N; 114°06'W> 1.6.1980 (Ashe) berlese, spruce bog, 6♂ and 10♀ in MHNG & SEMK; same data, but 16.6.1980, ex berlese of litter in spruce bog 1♂ and 1♀ in SEMK; same data, but 8.4.1976 (Ashe & Frania) ex rotting under fallen wasp, 1♀ in SEMK; Jasper, 1928 (Cameron) 2♂ and 1♀ in BMNH; Jasper N.P., Mt Edith Cavell, 1800 m, 22.8.1971 (Campbell) 2♂ and 4♀ in CNCI; Lust Creek, Kananaskis F.E.S., 14.7.1971 (Campbell) 2♂ and 3♀ in CNCI; Marmot Creek Bassin, 2000 m, SW Kananaskis F.E.S., 13.7.1971 (Campbell) 2♂ in CNCI; Sibbald Flats Rec. Area, 18-19.8. 1981 (Anderson) ex flight trap, 1♂ and 1♀ in SEMK; Waterton Lks. N.P., 1300 m, 10-15.6.1973 (Redner & Starr) 1♂ in CNCI; Waterton Lks. N.P., Cameron L., 18.6.1956 (Peck) 1♂ in CNCI; same data, but 1400 m, 24-28.6.1980 (Campbell & Smetana) ex interception trap, 1♀ in CNCI; Waterton Lks. N.P., Mi 3, Chif Mt Hwy, 1400 m, 14-17.6.1980 (Campbell) 1♂ in CNCI; same data, but Km 9, 19-24.6.1980, 2♂ in CNCI; same data, but 17.7.1980 (Teskey) 1♂ and 3♀ in CNCI; same data, but 10.7.1980, 1♂ in CNCI; Waterton Lks. N.P., Rowe Cr. Tr., 1600-1700 m, 15.6.1980 (Campbell) ex pan trap dung, 2♂ and 2♀ in CNCI. BRITISH COLUMBIA, 10.5.1958 (Howden) 1♂ in CNCI; 7 mi E Terrace, 26-27.6.1968 (Campbell & Smetana) 2♂ in CNCI; Mt Revelstoke N.P., Eva Lk., 2000 m, 25.7.1971 (Campbell) 1♂ in CNCI; Prince George, 24.5.1968, 2♂ in CNCI; Slide Mt, 10 mi E Barkerville, 1350 m, 24.6.1968 (Campbell & Smetana) 2♂ and 1♀ in CNCI & MHNG; Two Sisters Mt, 15 mi E Barkerville, 1350 m, 23.6.1968 (Campbell & Smetana) 2♂ in CNCI; Woodbury Ck., 1-3.7.1980 (Anderson) flight intercept, 1♂ and 1♀ in CNCI; near Hope, Skagit Valley, 8-28.7.1980 (Anderson) 1♂ in CNCI; Yoho N.P., Amiskwi R., 1800 m, 7.8.1971 (Campbell) 1♂ in CNCI; same data. but Lk. Oesa, 2100 m, 27.7.1971, 1♀ in CNCI; same data, but Otterhead R., 1700 m, 3.8.1971, 1♀ in CNCI; same data, but 1900 m, 5.8.1971, 1♀ in CNCI. NEW BRUNSWICK, Kouchibouguac N.P., N.B., 29.8.1977 (Calderwood) 1♀ in CNCI. NORTHWEST TERRITORIES, Arctic Red River, 18.8.1964 (Peck) taiga, ex carrion, 1♂ in CNCI; Ft. Simson, 15.6.1972 (Smetana) 2♂ and 4♀ in CNCI & MHNG. NOVA SCOTIA, Cape Breton H.N.P., Lone Shieling, 29-31.5.1983 (Masner & Goulet) 4♀ in CNCI; same data, but 100 m, 3-13.6.1983 (Goulet) malaise trap, 4♂ and 5♀ in CNCI; same data, but 28.6.1983 (Vockeroth) pans, malaise, 3♀ in CNCI; same data, but 1-4.7.1983, malaise trap, 9♂ and 12♀ in CNCI & MHNG; same data, but 6-13.6.1983 (Goulet) malaise forest, 3♂ and 11♀ in CNCI; same data, but 11-13.6.1983, forest malaise, 1♂ in CNCI; same data, but 16-22.6.1983 (Bousquet) interception, 3♂ and 4♀ in CNCI; same data, but pan trap, 2♀ in CNCI; same data, but 25.7.1983, pan trap, 3♂ in CNCI; same data, but 8.6.1984 (Smetana) 1♂ in CNCI; same data, but 18-21.7.1983 (Bright) 1♀ in CNCI; Cape Breton H.N.P., Still Brook, 5.7.1983 (LeSage) ex temporary stream spruce forest, 1♂ and 2♀ in CNCI. ONTARIO, Lk. Superior Prov. Pk., Sand R., 6.6.1973 (Campbell & Parry) 1♂ and 6♀ in CNCI & MHNG; Ottawa, Mer Bleue, 11.8-1.9.1972 (Dondale & Redner) 1♀ in CNCI; Ottawa, forest W Kanata, 5.6.1984 (Masner) car net, 1♀ in CNCI. QUEBEC, 4 mi S Rivière à Claude, 18.7.1972 (Campbell) 1♂ and 2♀ in CNCI; Kazubazua, 6-10.6.1927 (Brown) 1♂ in CNCI; Mt Lyall, 500 m, 4.8.1933 (Brown) 1♀ in CNCI; Park de Gaspesie, 5.6-23.7.1980 (Dondale & Redner) ex grass-fir pantrap, 2♂

in CNCI; Park de Gaspesie, Mt Albert, 300 m, 8.7.1972 (Campbell) 1♂ in CNCI; same data, but 14.7.1972 (Campbell) 1♂ and 1♀ in CNCI. YUKON TERRITORY, Dawson City, 16.7.1968 (Campbell & Smetana) 4♂ and 7♀ in CNCI & MHNG; Dempster Hwy, Mi 35, 900 m, 15.7.1968 (Campbell & Smetana) 3♂ and 2♀ in CNCI; same data, but Mi 29.5, 24.7.1978, 1♂ in CNCI; same data, but Mi 45, 1000 m, 18-23.7.1976 (Campbell) 1♀ in CNCI; USA, 1♀ in BMNH; (Apel) n 2455, 1♂ in FMNH. USA: ALASKA, 8 mi NW Haines, 3.7.1978 (Campbell & Smetana) 1♀ in CNCI; Kenai Mts, 2 mi S Moos Pass, 150 m, 30.5.1978; (Smetana & Becker) 4♂ and 2♀ in CNCI; Kenai Mts, Tern Lake, 200 m, 13.6.1978 (Smetana & Becker) 1♂ in CNCI; Kenai Pen., 7 mi S Moos Pass, 150 m, 16.6.1978 (Smetana & Becker) 4♀ in CNCI; Kenai Pen., 8 mi SE Kasilof, 9.6.1978 (Smetana) 1♂ and 4♀ in CNCI; Kenai Pen., Anchor R., at Hwy1, 150 m, 4.6.1978 (Smetana & Becker) 3♂ and 4♀ in CNCI & MHNG; same data, but 5.6.1978, 2♂ in CNCI; Kenai Pen., Anchor R., Cpgd. 12 mi N Homer, 150 m, 5.6.1978 (Smetana & Becker) 3♂ and 1♀ in CNCI; Kenai Pen., Clam Gulch, 6.6.1978 (Smetana & Becker) 1♂ in CNCI; Kenai Pen., Kenai, 24.6.1951 (Brown) 4♂ and 3♀ in CNCI; Prudhoe Bay Rd., Bonanza Crk. <150°40'W; 66°40'N> 250 m, 9.7.1978 (Campbell & Smetana) 5♂ in CNCI; same data, but (Smetana) 5♂ in CNCI; same data, but 2.7.1978 (Campbell & Smetana) 1♂ in CNCI; Prudhoe Bay Rd., Fish Cr. <150°50'W; 66°32'N> 250 m, 9.7.1978 (Campbell & Smetana) 4♂ and 7♀ in CNCI; Prudhoe Bay Rd., S Fork Koyukuk R. <150°07'W; 67°12'N> 300 m, 8.7.1978 (Campbell & Smetana) 1♂ and 1♀ in CNCI; Sitka, 1♂ and 1♀ in BMNH; Wales Hwy, Mi 24, Hess Cr. <149°10'W; 65°40'N> 200 m, 10.7.1978 (Campbell & Smetana) 1♀, in CNCI. ARIZONA, Big L., 22 mi SW Eagar, 2700 m, 15.7.1976 (Hammond) 1♂ in BMNH; Apache Co., Apache N.F., Escudilla Mt, 9 mi NE Alpine, 2840 m, 17.7.1976 (Campbell) 1♂ and 1♀ in CNCI; same data, but (Hammond) ex cow dung, 3♂ and 1♀ in BMNH & MHNG; same data, but ex squirrel midden, 1♀ in BMNH; same data, but 8 mi NE Alpine, 2730 m, 1♀ in BMNH; Cochise Co., Chiricahua Mt, Rustler Park, 2550 m, 3.8.1979 (Smetana) 1♂ in CNCI; Coconino Co., San Francisco Mt, near Snow Bowl, 2800-3200 m, 27-28.7.1976 (Hammond) 1♂ in BMNH. COLORADO, Larimer Co., Estes Park, 15.9.1990 (Ashe) ex rotting gilled mushrooms, 1♂ and 1♀ in SEMK. MAINE, 700 m, 5.7.1968 (Olivier) 1♀ in CNCI. MONTANA, Carbon Co., Palisade Cmpg., 3 mi W Red Lodge, 1600 m, 6.8.1981 (Campbell) 1♀ in CNCI; Parc Co., 7 mi NE Cooke Ct, near Mud Lake, 2700 m, 3.8.1981 (Campbell) ex pile of squirrel midden, 3♂ in CNCI. NEW MEXICO, Lincoln Co., Sierra Blanca, 2900 m, 26.6.1979 (Peck) ex spruce-fir, stream, 5♂ and 2♀ in CNCI & MHNG; Sandoval Co., Sandia Mt, Cibola N.F., 3100 m, 7.7.1969 (Smetana) 1♂ in CNCI; same data, but Sandia Crest, 3000-3200 m (Smetana) 1♂ and 2♀ in CNCI; same data, but Las Huertas Ck., 2100 m, 8.7.1969, 1♂ in CNCI; same data, but Tree Spr. Trail, 2600 m, 6.7.1969, 1♂ and 2♀ in CNCI; Taos Co., 3.7 km E Tres Ritos, 8.7.1976 (Ashe) ex squirrel midden, 1♀ in SEMK; Taos Co., Agua Piedra Cpdg., near Tres Ritos, 2800 m, 3-5.7.1972 (Newton) on gilled mushrooms, 1♂ in FMNH. OREGON, Grant Co., Dixie Summit, Hwy 26, 1600 m, 22.7.1981 (Campbell) 2♀ in CNCI; Grant Co., Malheur N.F., Strawberry Camp, 1750 m, 25.7.1981 (Campbell) ex human dung traps, 1♀ in CNCI; Union Co., Blue Mts, Hwy 204, 12 km NW Elgin, 950 m, 26.5.1989 (Smetana) 18♂ and 10♀ in CNCI & MHNG; same data, but 27.5.1989, 16♂ and 15♀ in CNCI; Wallowa Co., 24 km S Lostine, Lostine Rd., 1800 m, 26.7.1981 (Campbell) 1♂ in CNCI. SOUTH DAKOTA, Custer Co., Jewel Cave N.M., Lithograph Cyn., 1600 m, 15.2.1975 (Peck) ex pin-grass car., 1♂ in CNCI; Lawrence Co., Elmore, Jackass Gulch, 22.5.1980 (Suter) 1♂ and 1♀ in FMNH. UTAH, Wayne Co., Manti-Lasal N.F., Geiser Pass, 3050-3070 m, 9-10.7.1976 (Hammond) 3♀ in BMNH. WYOMING, Albany Co., 5 mi W Centennial, Medecine Bow N.F., 3.8.1993 (Suter) midden at spring, 3♂ and 1♀ in FMNH.

Distribution. *Megarthrus angulicollis* has a typical boreal distribution pattern in North America, ranging (Map 1) from Cap Breton Island, Nova Scotia, west to Kenai Peninsula, Alaska, and south along the Rocky Mountains to Arizona, Colorado and New Mexico.

Biology. Found in dung, gilled mushrooms, carrion, leaf litter and decaying plant matter at elevations ranging from 100 m to 3500 m. Collected by sifting, or using pan, dung, malaise, and flight interception traps.

Description. Length 1.2-1.4 mm; width 0.8-1.0 mm. Body predominantly dark brown, head and sutural margins of elytra darkened, appendages paler. Dorsal pubescence fairly uniform, sparser on elytra. Anteriomedian portion of frons with setae orientated backward. Elytral setae straight, recumbent. Metasternal setae shorter than prosternal setae, sparser posteriomedianly. Abdominal pubescence parallel, uniform on sternites 4-7, but with a pair of long subapical setae on each sternite. Punctation fine on anterior portion of hypomeron; posteriomedian portion of metasternum impunctate. Frons raised above level of vertex, forming a blunt ridge above clypeus. Anterior frontal edge evenly convex. Frontal impression shallow. Eye strongly convex, with highest point slightly below, or reaching, level of vertex; supra-ocular margin sinuate in dorsal view. Temple as in Fig. 1f. Occipital ridge indistinct. Submentum weakly convex. Antenna (Fig. 5a) without patches of sensilla; scape not flattened; antennomeres 3-4 slightly asymmetrical; short and dense pubescence present on antennomeres 5-11. Pronotum (Fig. 5k) weakly convex in frontal view, with mesal portion almost straight in lateral view. Pronotal disc with shallow depression along entire, or limited to the area near posterior portion of lateral edge; median groove shallow, parallel-sided. Hypomeral groove absent. Median prosternal ridge absent; anterior prosternal margin bordered by an irregular row of fine longitudinal ridges.

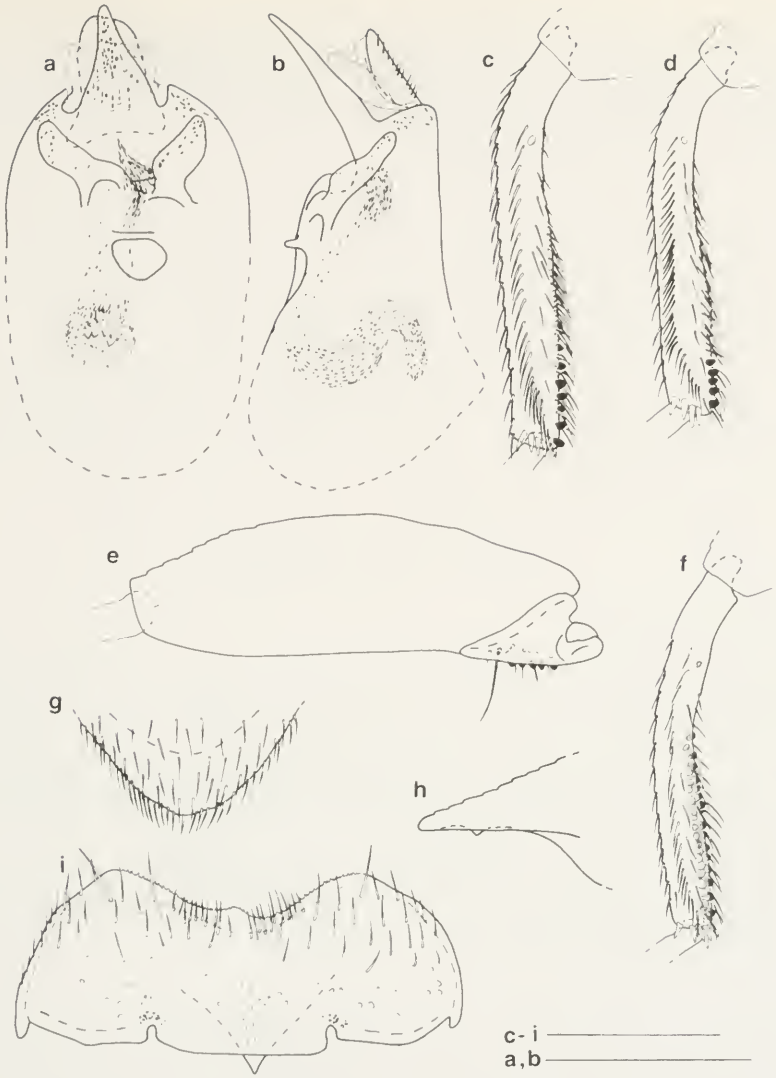


Fig. 4. *Megarthrus angulicollis*, male; a, b: aedeagus, ventral and lateral; c, d: metatibia; e: mesotrochanter and mesofemur; f: mesotibia; g, h: apex of abdominal tergite 8, dorsal and lateral; i: abdominal sternite 8. Scale bars = 0.2 mm.

Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge straight, then bifid. Scutellum as in Fig. 1b. Elytron not narrowed, or weakly narrowed basally; base gradually inclined, then overhanging. Humeral callus low. Elytral disc with low swellings, shallowly depressed along apical portion of lateral edge; lateral edge finely carinate, straight, or weakly convex, in dorsal view; sutural area straight basally, slightly arcuate apically in lateral view; apical margin convex near suture; inner apical angle obtuse. Metasternum with femoral line arcuate in middle; median ridge present posteriorly, fine and low. Abdominal tergite 3 almost flat. Sternites 2 and 3 with median processes as in Fig. 5m, process of sternite 3 straight. Sternite 4 with basal portion flat, then slightly transversely vaulted.

Ratios: AL 1.8-2.0; EL 1.5-1.7; ET 1.6-1.9; EW 1.1-1.3; EY 2.4-2.7; GT 2.1-2.3; GW 1.6-1.8; HW 1.5-1.7; ML 1.6-1.8; MP 1.5-1.8; PT 2.0-2.1; SP 2.0-3.0; TPF 6.0-7.5.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protar-

somere 1 with tenent setae. Metafemur longer than mesofemur (Fig. 4e). Metatibia (Fig. 4c, d) longer than mesotibia (Fig. 4f). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protrochanter, protibia, metatrochanter and metafemur; arranged in a single row on mesotrochanter (Fig. 4e); grouped to form a field on mesotibia. Metatibia bearing a single row of 4-10 peg-like setae. Apex of abdominal tergite 8 as in Fig. 4g, h. Sternite 8 as in Fig. 4i. Sternite 9 (Fig. 5d) bearing a very small subbasal protuberance. Aedeagus as in Fig. 4, b.

♀. Abdominal tergite 8 (Fig. 5g-i) with medioapical projection. Sternite 8 as in Fig. 5f. Genital segment as in Fig. 5b,c,e.

Comments. The name of this species has been considered over a century a junior synonym of the European *M. sinuatocollis* (e.g. Fauvel, 1878; Leng, 1920; Everts, 1922; Scheerpeltz, 1933; Hatch, 1957). The type material of *M. sinuatocollis* has not been traced. However, *M. angulicollis* is absent from collections made in Europe, as shown by a completed revision of the Palaearctic *Megarthrus*.

The shape of the female abdominal tergite 8 and the number of the peg-setae on the male metatibia are conspicuously variable. In general, western specimens tend to have a larger number of peg-setae and the female sternite 8 more narrowed apically (including the lectotype) than the specimens from eastern areas. However, intermediate forms do occur and both conditions may be present in specimens from the same locality (e.g. specimens from Cape Breton, Nova Scotia, and from 12 km NW Elgin, Union Co., Oregon).

Megarthrus arcuatus Hatch
(Figs 1e & i, 6a-i, 7a-k, Map 5)

Megarthrus arcuatus Hatch, 1957: 107.

Type material. Holotype, ♀: "British Columbia, Fernie, 5.6.1934, Leech / #13741", CAS.

Additional material (23). CANADA: ALBERTA, Waterton Lks., Cameron Cr., 1500 m, 13.6.1980 (Campbell) ex river debris, 1♀ in CNCI. BRITISH COLUMBIA, 20 mi E Hope, Manning Pk., 21.7.1968 (Campbell & Smetana) 5♂ and 5♀ in CNCI & MHNG. NOVA SCOTIA, Cape Breton H.N.P., Lone Shieling, 100 m, 6.1983 (Bousquet) 6♀ in CNCI & MHNG. USA: CALIFORNIA, Monterey Co., 11.8.1918 (Reynolds) 3♀ in FMNH. NEW HAMPSHIRE, Coos Co., Glen Fall, near Gorham, 15.8.1976 (Hammond) 1♀ in BMNH. OREGON, Baker Co., Pine Creek, Blue Mts, near Baker, 2.6.1957 (Dybas) 1♀ in FMNH; Klamath Co., 7.5 mi SW Fort Klamath, 8.5.1968 (Campbell & Smetana) 1♀ in CNCI.

Distribution. *Megarthrus arcuatus* has markedly disjunct distribution (Map 5), occurring in eastern North America from Cape Breton Island, Nova Scotia, south to New Hampshire, and in western North America from southern British Columbia and Alberta south to California.

Biology. Found at elevations ranging from 100 m to 1400 m.

Description. Length 1.2-1.4 mm; width 0.8-0.9 mm. Body uniformly dark brown, appendages paler, sutural margins of elytra usually darkened; antennomeres 1-4 paler than antennomeres 4-11. Dorsal pubescence fairly uniform, sparser on elytra, becoming denser near humeral area. Anteriomedian portion of frons with setae orientated backward. Elytral setae curved, recumbent, or semi-erect. Metasternal setae as long as prosternal setae, becoming denser medianly. Abdominal pubescence converging on tergites 4-6, uniform on sternites 4-7. Punctation coarse on anterior portion of hypomeron, fine on posteriomedian portion of metasternum. Frons raised above level of vertex, evenly deflexed toward clypeus. Anterior frontal edge weakly convex in middle, oblique, or sinuate, laterally. Frontal impression shallow in middle, deep laterally. Eye almost hemispherical, with highest point slightly below, or reaching, level of vertex; supraocular margin sinuate in dorsal view. Temple and occipital ridge as in Fig. 1i; occipital ridge straight in middle, sinuate laterally. Submentum almost flat. Antenna (Fig. 6a) without patches of sensilla; scape not flattened; antennomere 3 slightly asymmetrical, antennomere 4 symmetrical; short and dense pubescence present on antennomeres 5-11. Pronotum (Fig. 7i) strongly convex in frontal view, with mesal portion slightly arcuate in lateral view. Pronotal disc with depressions deep along apical portion of lateral edge, shallow beside median groove; median groove parallel-sided. Hypomeral ridge present anteriorly, oblique. Median prosternal ridge fine, straight; anterior prosternal margin bordered by a regular row of conspicuous longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge straight, then bifid. Scutellum as in Fig. 1e. Elytron not narrowed, or weakly narrowed basally; base gradually inclined, then overhanging. Humeral callus low. Elytral disc with low swellings, shallowly depressed along lateral

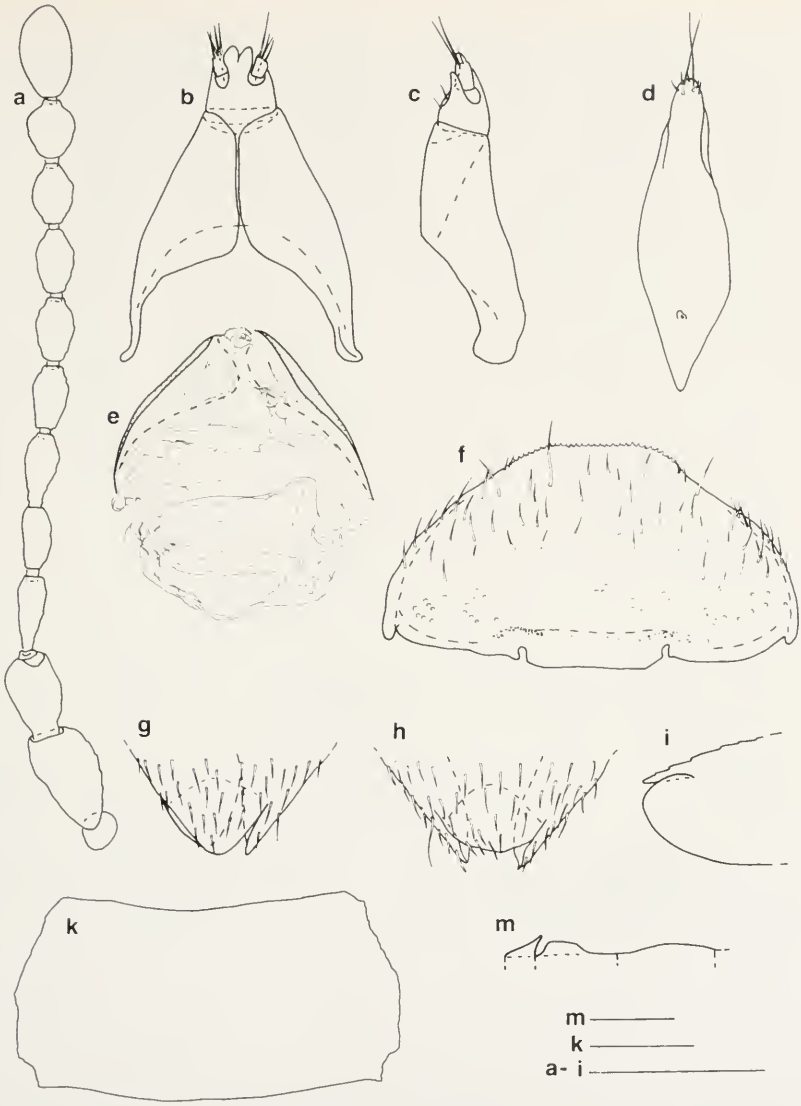


Fig. 5. *Megarthrus angulicollis*; a: antenna; b, c, e: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (e) ventral; d: male, abdominal sternite 9; f: female, abdominal sternite 8; g-i: female, apex of abdominal tergite 8, (g, h) dorsal and (i) lateral, (g, i) lectotype; k: pronotum; m: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

edge; lateral edge finely carinate, weakly convex, or straight, in dorsal view; sutural area straight basally, slightly arcuate apically in lateral view; apical margin convex near suture; inner apical angle obtuse. Metasternum with femoral line arcuate in middle; median ridge absent. Abdominal tergite 3 slightly transversally vaulted. Sternites 2 and 3 with median processes as in Fig. 7k, process of sternite 3 widened apically. Sternite 4 flat.

Ratios: AL 1.9-2.2; EL 1.8-2.0; ET 1.9-2.1; EW 1.2-1.3; EY 2.6-2.9; GT 1.9-2.3; GW 1.6-1.7; HW 1.7-1.8; ML 1.4-1.7; MP 1.6-1.8; PT 1.8-2.0; SP 2.3-2.7; TPF abs.

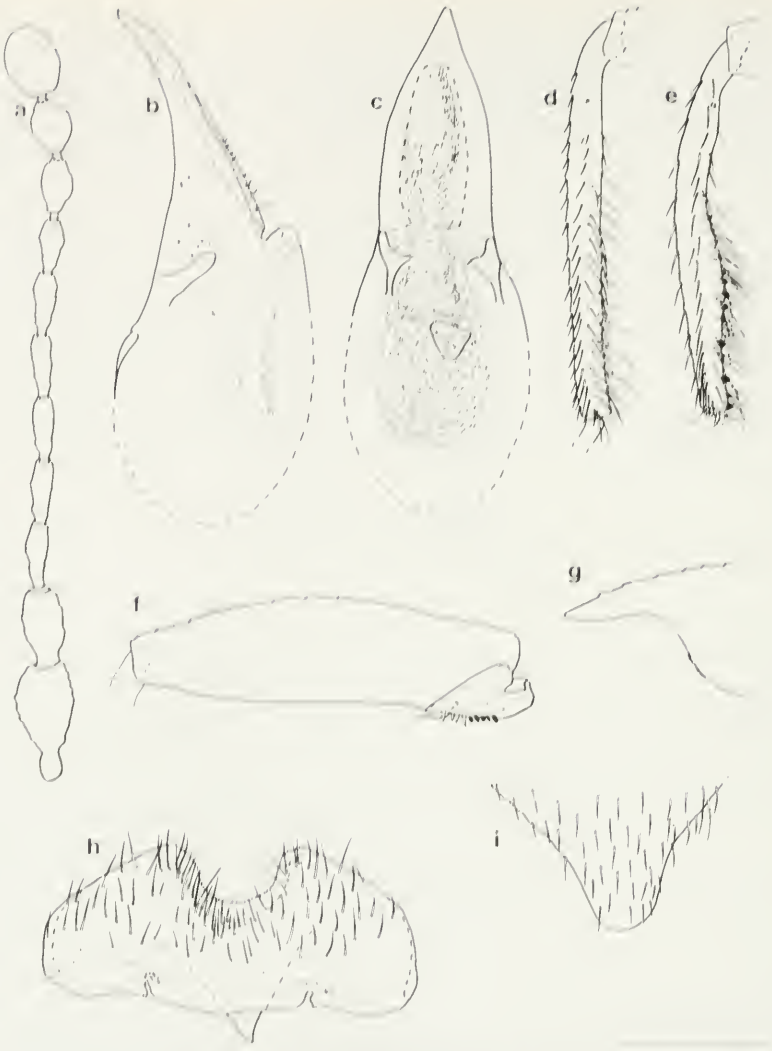


Fig. 6. *Megarthrus arcuatus*; a, antenna; b, c, aedeagus, lateral and ventral; d, male, metatibia; e, male, mesotibia; f, male, mesotrochanter and mesofemur; g, i, male, apex of abdominal tergite 8, lateral and dorsal; h, male, abdominal sternite 8. Scale bar = 0.2 mm

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 lacking tenent setae. Mesofemur (Fig. 6f) longer than metafemur. Mesotibia (Fig. 6e) shorter than metatibia (Fig. 6d). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg like setae absent from protrochanter, protibia, metatrochanter, metafemur and metatibia; arranged in a single row on mesotibia, grouped to form a field on mesotrochanter (Fig. 6f). Apex of abdominal tergite 8 as in Fig. 6g, i. Sternite 8 as in Fig. 6h. Sternite 9 (Fig. 7e) with a large subbasal protuberance. Aedeagus (Fig. 6b, c) with apical portion of ventral wall of median lobe canaliculate.

♀. Abdominal tergite 8 (Fig. 7e, h) without mediapical projection. Sternite 8 as in Fig. 7f, g. Genital segment as in Fig. 7a, b, d.

Comments. *Megarthrus arcuatus* differs from the other species of America north of Mexico, *M. smetanai* excepted, by the grooved hypomeron. These two species, which may be distinguished by the characters used in the key, are very similar to the Japanese *M. montanus* Sawada.

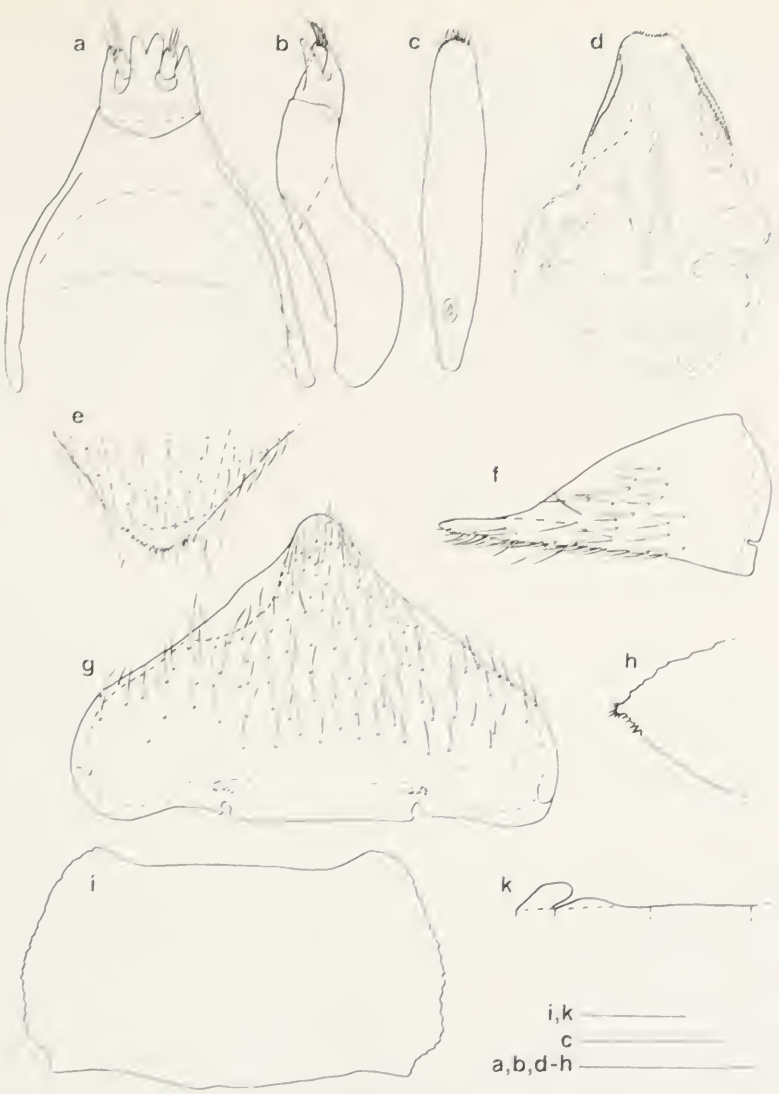


Fig. 7 *Megarthrus arcuatus*; a, b, d: female, genital segment, sternites (a) dorsal, (b) lateral and tergites (d) ventral; c: male, abdominal sternite 9; e, h: female, apex of abdominal tergite 8, dorsal and lateral; f, g: female, abdominal sternite 8, lateral and ventral; i: pronotum; k: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

Megarthrus ashei sp.n.
(Figs 1h, 8a-h, 9a-k, Map 3)

Type material. Holotype, ♂: USA, ARIZONA, Apache Co., Escudilla Mt, 8 mi NE Alpine, 2730 m, 17.7.1976 (Hammond) ex leaf litter, BMNH. Paratypes (61): same data as holotype, 2♂, 1♀ in BMNH; same data, but 2840 m, ex cow dung, 1♂ in BMNH; same data, but ex squirrel midden, 1♂ in BMNH; USA: ARIZONA, Apache Co., Big L., 22 mi SW Eagar, 2700 m, 15.7.1976 (Hammond) ex squirrel midden, 1♂ in BMNH, Cochise Co., Rustlers Pk., Chiricahua Mts, 2550 m, 14.8.1965 (Dybas) ex mushrooms on conifer logs, 1♀ in BMNH; same data, but 3.8.1979 (Smetana) 3♂ and 6♀ in CNCI; Coconino Co., San Francisco Mts, 10 mi NW Flagstaff, 2900 m, 18-24.6.1979 (Peck) malaise trap, 1♀ in CNCI; Coconino Co., San Francisco Mts, Arizona Snow

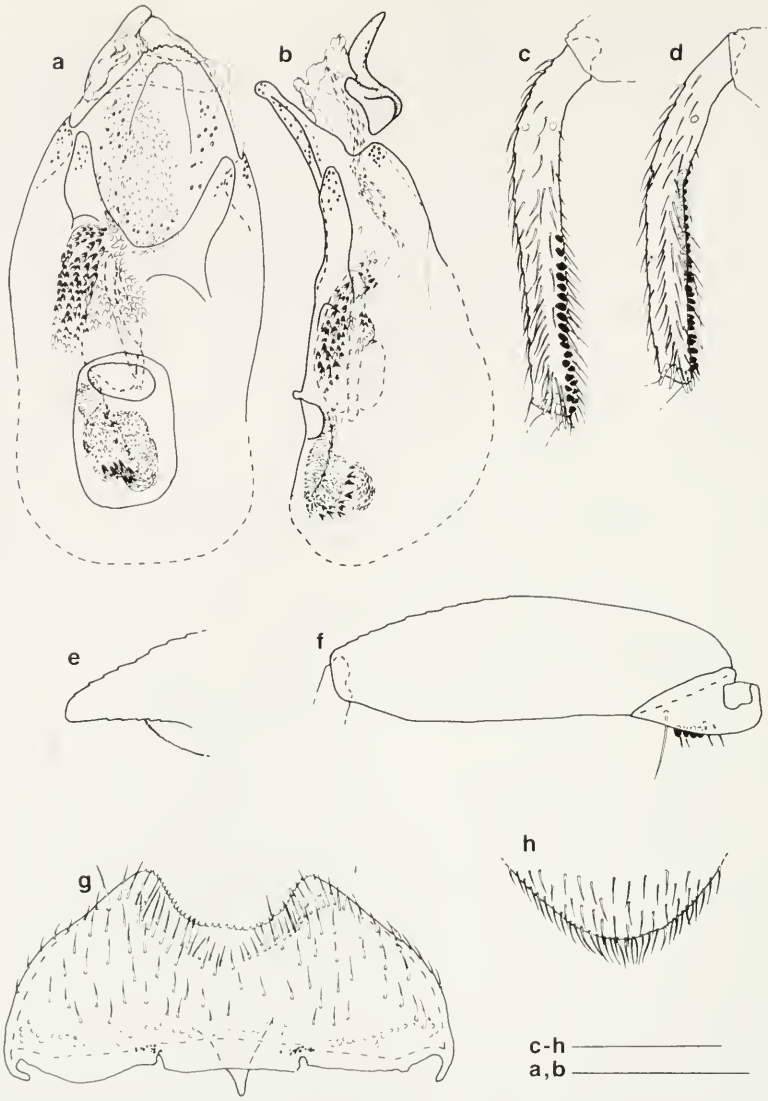


Fig. 8. *Megarthrus ashei*, male; a, b: aedeagus, ventral and lateral; c: metatibia; d: mesotibia; e, h: apex of abdominal tergite 8, lateral and dorsal; f: mesotrochanter and mesofemur; g: abdominal sternite 8. Scale bars = 0.2 mm.

Bowl, 2743m, 10.7.1992 (Ashe) under rotting *Russula*, 4♂ and 5♀ in MHNG & SEMK; Graham Co., Pinaleno Mts, Wet Canyon, 1800 m, 22.7.1977 (Chandler) ex oak litter & rotten wood, 1♂ in FMNH; Graham Co., Pinaleno Mts, 4 mi NW Colombine, 2600 m, 28.7.1969 (Smetana) 7♂ and 4♀ in CNCI & MHNG; same data, but Grant Crk., 1♂ and 1♀ in CNCI; Navajo Co., Willow Spring Cny., Sitgreaves N.F., 2160 m, 14.7.1976 (Campbell) ex squirrel midden, 1♂ in CNCI; Pima Co., Mt Lemmon, 2100 m, 26.7.1924 (Van Duzee) ex fungus, 1♂ and 1♀ in CNCI; Pinal Co., St. Catalina Mts, 2400 m, 27.7.1968, 1♂ and 3♀ in FMNH; same data, but 2600 m, 30.8.1969, 1♀ in FMNH. NEW MEXICO, Otero Co., Cloudcroft, 2600 m, 21-26.7.1973 (Campbell) 5♂ and 5♀ in CNCI; Otero Co., Lincoln N.F., 2 mi SE Cloudcroft, 2600 m, 13.7.1969 (Smetana) 1♀ in CNCI; same data, but 4 mi S Cloudcroft, 2600 m, 16.7.1969, 2♂ and 1♀ in CNCI; same data, but 2.4 km E Cloudcroft, 22.7.1976 (Ashe) ex squirrel midden, 1♀ in SEMK; same data, but under rotting fungus, 2♂ and 1♀ in SEMK; same data, but 11.2 km E Cloudcroft 28.9.1975, ex mushrooms, 2♀ in SEMK.

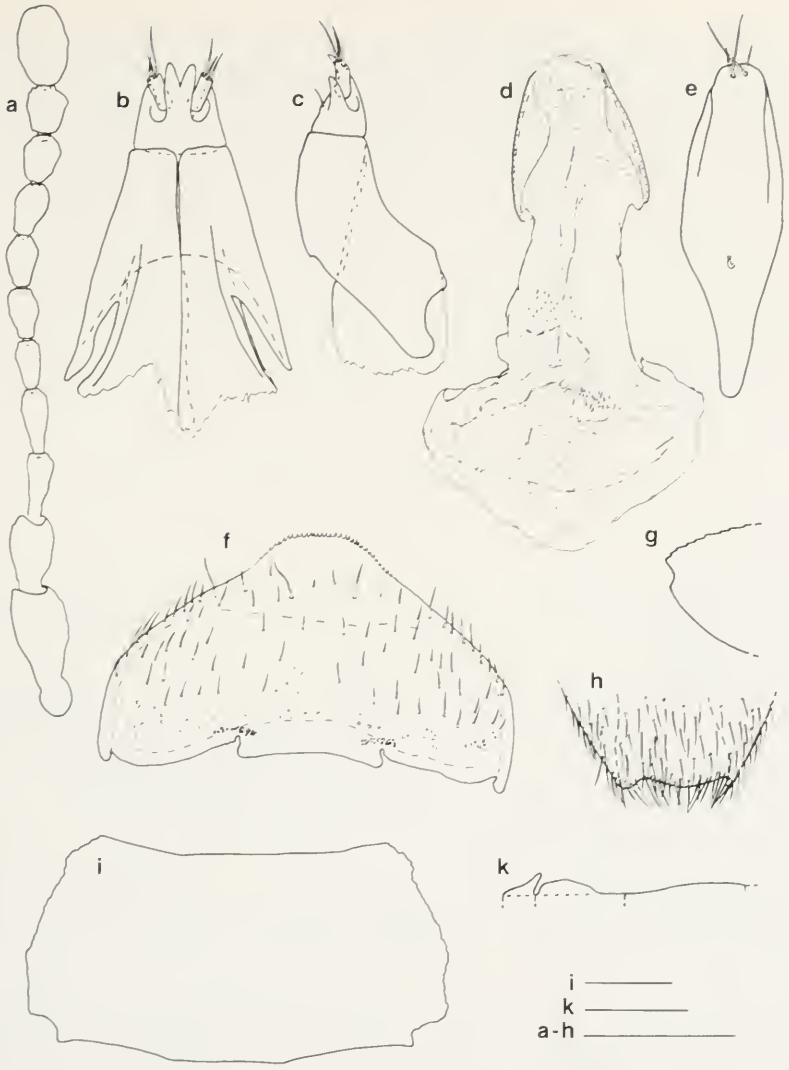


Fig. 9. *Megarthrus ashei*; a: antenna; b-d: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (d) ventral; e: male, abdominal sternite 9; f: female, abdominal sternite 8; g, h: female, apex of abdominal tergite 8, lateral and dorsal; i: pronotum; k: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

Distribution. *Megarthrus ashei* is known only from high elevations in Arizona and New Mexico (Map 3).
Biology. Found in cow dung, fungi, leaf litter, logs, rotten wood, squirrel middens and under rotting *Russula* at elevations ranging from 1800 m to 2900 m.

Description. Similar to *M. newtoni* from which it differs as follows: Abdominal pubescence uniform, but with a pair of long subapical setae on each sternite. Posteriomedian portion of metasternum finely punctate, or impunctate. Frontal ridge sharp, fine. Anterior frontal edge evenly convex. Temple as in Fig. 1h. Antenna as in Fig. 9a. Pronotum as in Fig. 9i. Anterior prosternal margin bordered by an irregular row of fine longitudinal ridges. Scutellum similar to that in Fig. 1a. Median metasternal ridge present posteriorly, fine and low. Sternites 2 and 3 with median processes as in Fig. 9k. Sternite 4 with anterior portion flat, then slightly transversely vaulted.

Ratios: ML 1.6-1.9; PT 2.0-2.1; SP 2.7-3.4; TPF abs.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur about as long as mesofemur (Fig. 8f). Metatibia (Fig. 8c) longer than mesotibia (Fig. 8d). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae arranged in a single row on metatibia and mesotrochanter (Fig. 8f); in two rows on mesotibia; absent from protrochanter, protibia, metatrochanter and metafemur. Apex of abdominal tergite 8 as in Fig. 8e, h. Sternite 8 as in Fig. 8g. Sternite 9 (Fig. 9e) bearing a small subbasal protuberance (Fig. 9e). Aedeagus as in Fig. 8a, b.

♀. Abdominal tergite 8 (Fig. 9g, h) without medioapical projection. Sternite 8 as in Fig. 9f. Genital segment as in Fig. 9b-d.

Comments. *Megarthrus ashei* is the only species from North America north of Mexico possessing an asymmetrical aedeagal valve. It resembles *M. altivagans* Bernhauer from Mexico, from which it may be distinguished by the male sexual characters on the metatibia and on the frons.

Etymology. The species is named in honor of one of the collectors, Prof. James S. Ashe, Lawrence, Kansas.

Megarthrus atratus Maklin
(Figs 1a & g, 10a-i, 11a-i, Map 4)

Megarthrus atratus Maklin, 1852: 325.

Type material. Lectotype, ♀: "Sitka, pr. Müh. [unreadable] / #2142", ZMUH, by present designation.
Additional material (36). CANADA: ALBERTA, Jasper, 1928 (Cameron) 1♂ in BMNH; Waterton Lks N.P., Cameron L., 18.6.1956 (Peck) 1♀ in CNCI; Waterton Lks., Berta Falls trail, 1400 m, 21.6.1980 (Smith) 2♂ and 6♀ in CNCI and MHNG; Waterton Lks., Km 9 Chief Mt Hwy, 1350 m, 17.7.1980 (Teskey) 1♂ in CNCI; same data, but 19-24.6.1980 (Campbell) 1♀ in CNCI; Coleman, 24-26.6.1980 (Anderson) flight interception, 2♂ and 2♀ in CNCI & MHNG; Kananaskis F.E.S., 14.7.1971 (Campbell) 1♂ in CNCI. BRITISH COLUMBIA: Atlin, 700 m, 14.7.1955 (Huckel) 1♀ in CNCI; Garibaldi P.P., Diamond Head Tr., 1100 m, 25.7.1973 (Smetana) 1♀ in CNCI; Queen Charlotte Is., Moresby Is., 600 m, 25.7.1983 (Campbell) ex bear dung, 3♀ in CNCI. USA, ALASKA, Aleutian Is., Unalaska I., Dutch Harbor, 30.6.1907 (Van Dyke) 1♂ in CNCI; Kenai, 1♀ in BMNH; Kenai Mt, 2 mi S Moose Pass, 150 m, 30.5.1978 (Smetana & Becker) 2♂ and 3♀ in CNCI & MHNG; Kenai Pen., 8 mi SE Kasilof, 9.6.1978 (Smetana & Becker) 5♂ and 1♀ in CNCI & MHNG; without locality data: 1♂ in BMNH.

Distribution. *Megarthrus atratus* ranges from Unalaska Island, Alaska, along the Pacific coast south to areas around Vancouver and east to southwestern Alberta (Map 4).

Biology. Found at elevations ranging from 160 to 2200 m.

Description. Length 1.3-1.6 mm; width 0.8-1.0 mm. Body predominantly dark brown, or blackish, pronotum, elytra and appendages somewhat paler, sutural margins of elytra darkened; antennomeres 1-4 paler than antennomeres 5-11. Dorsal pubescence fairly uniform, becoming somewhat denser near apical margin of abdominal tergite 7. Anteriomedian portion of frons with setae orientated backward. Elytral setae straight, recumbent. Metasternal setae shorter than prosternal setae, sparser posteriomedianly. Abdominal pubescence parallel, uniform on sternites 4-7, but with a pair of long subapical setae on each sternite. Punctation fine on anterior portion of hypomeron; posteriomedian portion of metasternum impunctate. Frons slightly raised above level of vertex, forming a blunt ridge above clypeus. Anterior frontal edge evenly convex. Frontal impression shallow, or indistinct. Eye strongly convex, with highest point below level of vertex; supra-ocular margin sinuate in dorsal view. Temple as in Fig. 1g. Occipital ridge indistinct. Submentum weakly convex. Antenna (Fig. 11d) with patches of sensilla on antennomeres 6-8; scape not flattened; antennomere 3 slightly asymmetrical, antennomere 4 strongly asymmetrical; short and dense pubescence present on antennomeres 5-11. Pronotum (Fig. 11h) weakly convex in frontal view, with mesal portion almost straight in lateral view. Pronotal disc with shallow depression along basal portion of lateral edge; median groove very shallow, parallel-sided. Hypomeral ridge absent. Median prosternal ridge absent; anterior prosternal margin bordered by an irregular row of fine longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge straight, then bifid. Scutellum similar to that in Fig. 1a. Elytron not narrowed basally; base gradually inclined, then vertical. Humeral callus low. Elytral disc with low swellings, shallowly depressed along apical portion of lateral edge; lateral edge finely carinate, straight in dorsal view; sutural area straight

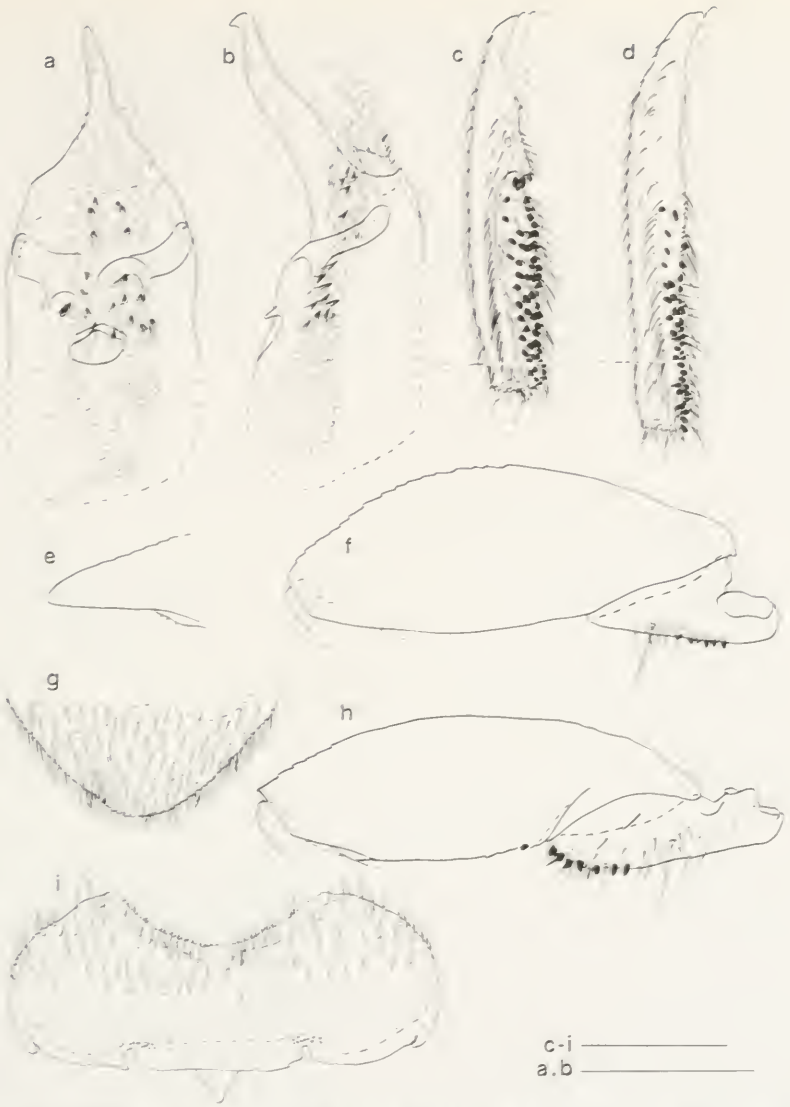


Fig. 10. *Megarthrus strates*, male: a, b: aedeagus, ventral and lateral; c: mesotibia; d: metatibia; e, g: apex of abdominal tergite 8, lateral and dorsal; f: mesotrochanter and mesofemur; h: metatrochanter and metafemur; i: abdominal sternite 8. Scale bars = 0.2 mm.

basally slightly arcuate apically in lateral view; inner apical angle right-angled. Metasternum with femoral line arcuate in middle; median ridge present posteriorly, fine and low. Abdominal tergite 3 slightly transversally vaulted. Sternites 2 and 3 with median processes as in Fig. 11i, process of sternite 3 straight. Sternite 4 with basal portion flat, then slightly transversely vaulted.

Ratios: AL 1.6-1.9; EL 1.7-1.9; ET 1.9-2.1; EW 1.1-1.2; EY 2.4-2.6; GT 2.0-2.2; GW 1.7-1.9; HW 1.6-1.7; ML 1.5-1.7; MP 1.5-1.7; PT 1.7-1.9; SP2 2.5-3.0; SP3 3.0-3.5; TPP 6.5-8.5.

♀. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4–6 unmodified. Frontal pubescence parallel. Apical margin of elytron weakly convex, or straight, near suture. Protarsomere 1 with tenent setae. Metafemur (Fig. 10h) as long as mesofemur (Fig. 10f), without or with a single peg-like seta. Metatibia (Fig. 10d) longer than mesotibia (Fig. 10c). Metatarsomere 1 about as long as combined length

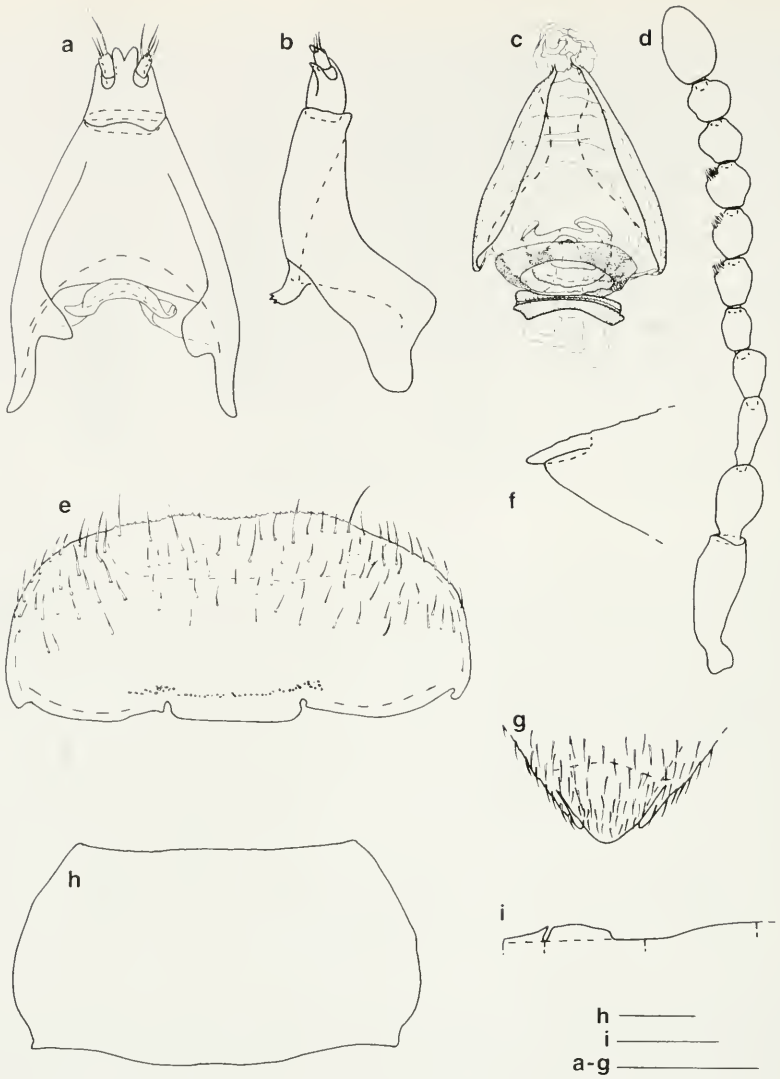


Fig. 11. *Megarthrus atratus*; a-c: female, genital segment, sternites (a) dorsal, (b) lateral and tergites (c) ventral; d: antenna; e: female, abdominal sternite 8; f, g: female, apex of abdominal tergite 8, lateral and dorsal; h: pronotum; i: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

of metatarsomeres 2-4. Peg-like setae absent from protrochanter and protibia; arranged in a single row on mesotrochanter (Fig. 10f); grouped to form a field on mesotibia, metatrochanter (Fig. 10h) and metatibia. Apex of abdominal tergite 8 as in Fig. 10e, g. Sternite 8 as in Fig. 10i. Sternite 9 lacking subbasal protuberance. Aedeagus as in Fig. 10a, b.

♀. Frontal pubescence converging. Apical margin of elytron somewhat sinuate near suture. Abdominal tergite 8 (Fig. 11f, g) with medioapical projection. Sternite 8 as in Fig. 11e. Genital segment as in Fig. 11a-c.

Comments. *Megarthrus atratus* may be easily distinguished from the other Nearctic species by the rounded lateral margins of the pronotum, in combination with the stout male metatibia, and by the presence of a medioapical projection on the female abdominal tergite 8.

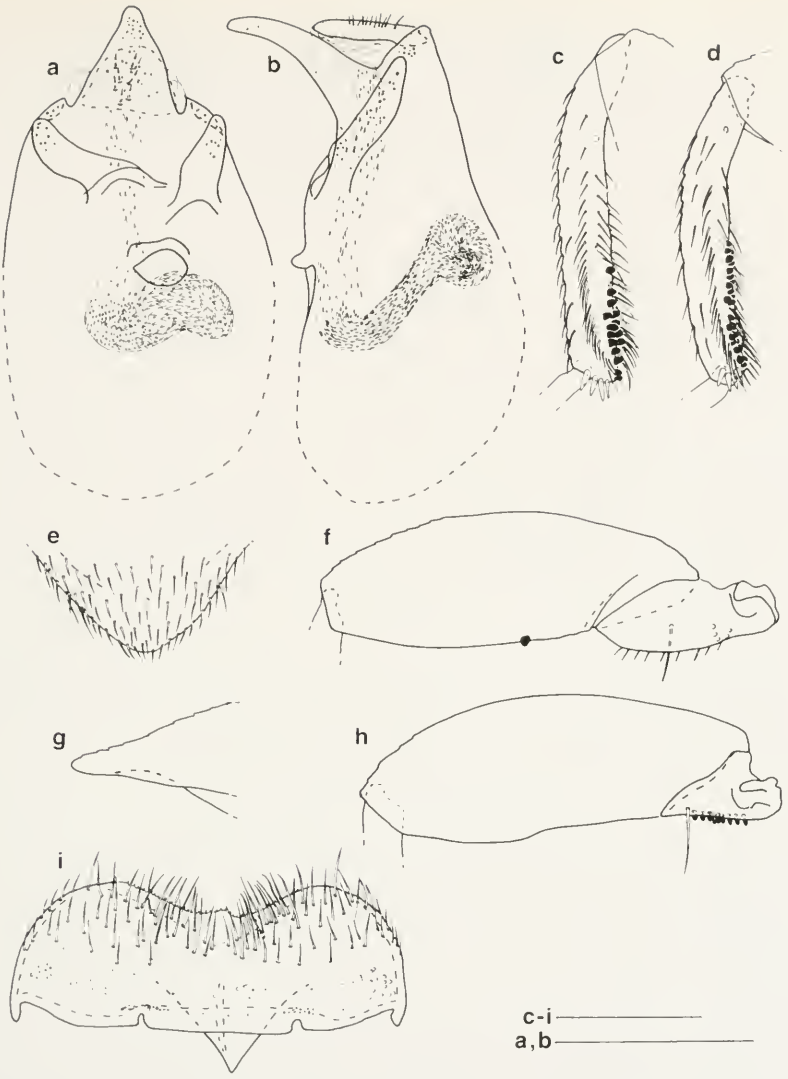


Fig. 12. *Megarthrus borealis*, male; a, b: aedeagus, ventral and lateral; c: metatibia; d: mesotibia; e, g: apex of abdominal tergite 8, dorsal and lateral; f: metatrochanter and metafemur; h: mesotrochanter and mesofemur; i: abdominal sternite 8. Scale bars = 0.2 mm.

Megarthrus borealis sp.n.
(Figs 12a-i, 13a-i, Map 5)

Type material. Holotype, ♂: USA, ALASKA, Prudhoe Bay Rd., Fish Cr. <150°50'W; 66°32'N> 250 m, 9.7.1978 (Smetana & Campbell) in CNCI. Paratypes (18): same data as holotype, 4♂ and 2♀ in CNCI; USA, ALASKA, Prudhoe Bay Rd., Bonanza Cr. <150°40'W; 66°40'N> 250 m, 9.7.1978 (Smetana & Campbell) 4♂ and 5♀ in CNCI & MHNG; Prudhoe Bay Rd., S Fork Koyukuk R. <150°07'W; 67°12'N> 300 m, 8.7.1978 (Smetana & Campbell) 3♂ in CNCI.

Distribution. *Megarthrus borealis* is known only from central Alaska (Map 5).

Biology. Taken by sifting moist leaf litter and other debris along edges of small forest ponds and lakes, and by sifting rotting strawbails (Bonanza Creek) (A. Smetana, pers. comm.).

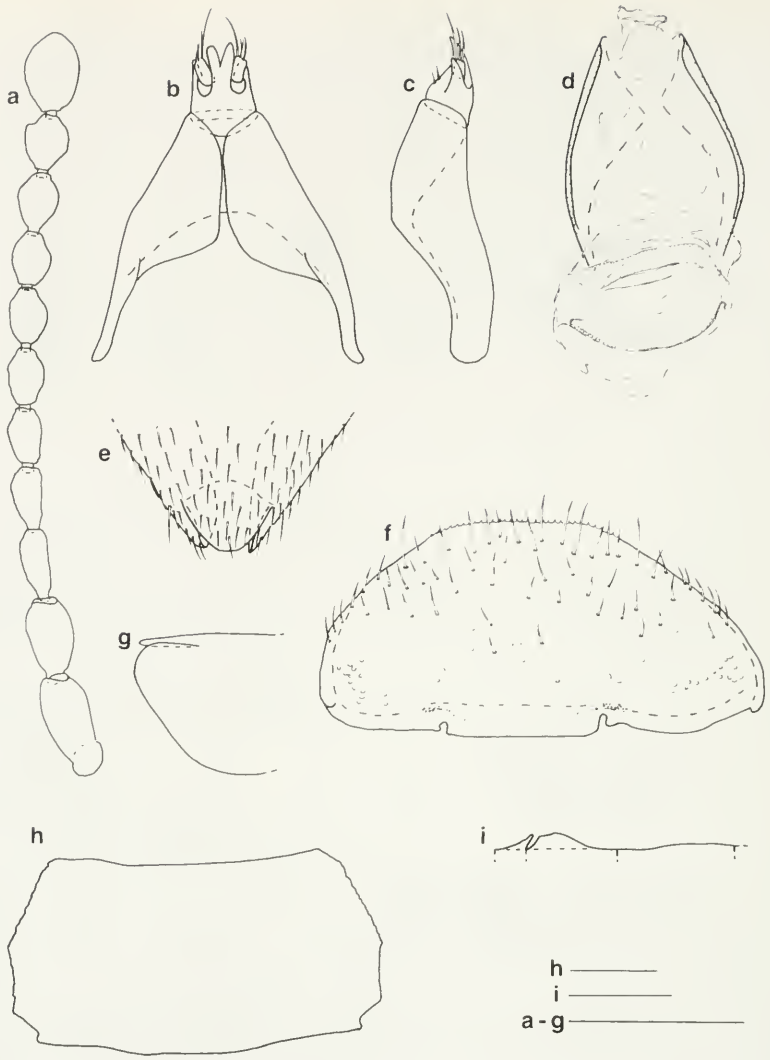


Fig. 13. *Megarthrus borealis*; a: antenna; b-d: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (d) ventral; e, g: female, apex of abdominal tergite 8, dorsal and lateral; f: female, abdominal sternite 8; h: pronotum; i: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

Description. Similar to *M. angulicollis* from which it differs as follows: Length 1.3-1.5 mm; width 0.8-0.9 mm. Dorsal pubescence fairly uniform, becoming denser near apical margin of abdominal tergite 7. Antenna as in Fig. 13a. Pronotum (Fig. 13h) with depression shallow limited to the area along posterior portion of lateral edge. Lateral edge of elytron finely carinate, straight, or sinuate, in dorsal view. Sternites 2 and 3 with median processes as in Fig. 13i.

Ratios: AL 1.7-1.8; EL 1.7-2.0; ET 1.9-2.2; PT 1.8-1.9; SP 2.5-3.1; TPF 6.0-7.5.

♂. Frontoclypeal area unmodified. Protarsomere 1 with tenent setae. Metafemur (Fig. 12f) about as long as mesofemur (Fig. 12h) without, or with upto 2 peg-like setae. Metatibia (Fig. 12c) longer than mesotibia (Fig. 12d). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protrochanter, protibia and metatrochanter (Fig. 12f); arranged in two rows on mesotrochanter (Fig. 12h); grouped to form a field on mesotibia and metatibia. Apex of abdominal tergite 8 as in Fig. 12e, g. Sternite 8 as in Fig. 12i. Sternite 9 without subbasal protuberance. Aedeagus as in Fig. 12a, b.

♀. Abdominal tergite 8 (Fig. 13e, g) with medioapical projection. Sternite 8 as in Fig. 13f. Genital segment as in Fig. 13b-d.
Comments. The shape of the aedeagus is diagnostic for this species.

Megarthrus excisus Leconte
(Figs 1c, 14a-k, 15a-i, Map 2)

Megarthrus excisus Leconte, 1863: 58.

Type material. Holotype, ♂: "Lake Superior / #6603" in MCZ.
Additional material (448). CANADA: ALBERTA, 1 mi Hondo, 13.8.1968 (Raske & Dahl) ex fungus, 1♀ in CNCI; Calgary, Toad stool, 1976 (Brinley) 1♀ in CNCI; Edmonton, S bank of Saskatchewan River, 12.7.1961 (Ashe) ex under rotting *Coprinus* sp., 1♂ and 1♀ in SEMK; George Lake <53°57'N; 114°06'W> 2.8.1978 (Ashe) ex *Cortinacius* sp., 1♂ in SEMK; same data, but 9.8.1980, ex large rotting *Russula* sp., 1♂ in SEMK; same data, but 26.7.1976, ex rotting mushrooms, 1♂, in SEMK; Lust Creek Kananaskis F.E.S., 14.7.1971 (Campbell) 1♂ and 1♀ in CNCI; Waterton Lks. N.P., Hwy 5, near Bison Paddok, 25.6.1980 (Smith) recently aband. beaver nest, 1♀ in CNCI; same data, but Hwy 6, 4.4 km SE Hwy 5, 28.6.1980 (Smith) pan trap, 1♂ in CNCI; Waterton Lks. N.P., Maskimonge Lk., 1400 m, 19-28.6.1980 (Campbell) ex carrion trap, 10♂ and 2♀ in CNCI & MHNG; Waterton Lks. N.P., Rowe Cr., 1650 m, 19.6.1980 (Campbell) under ground-squirrel carcass, 1♀ in CNCI; same data, but 1600 m, 24.6.1980, ex carrion, 1♂ in CNCI. BRITISH COLUMBIA, 16 km S Cranbrook, 27.6-4.8.1980 (Anderson) 3♂ and 7♀ in CNCI & MHNG; Argenta, 8.8.1982 (Askevold) ex *Boletus*, 2♂ in SEMK; Kootenay L., 1.8.1959, 1♂ and 2♀ in CNCI; West Creston, at "Corn Creek Woods", 5.8.1982 (Askevold) ex *Agaricus*, 3♂ and 3♀ in SEMK; Yoho N.P., Amiskwi R., 1800 m, 7.8.1971 (Campbell) 1♂ and 1♀ in CNCI; same data, but Otterhead R., 1700 m, 3.8.1971, 1♂ in CNCI. MANITOBA, SE Brandon (Criddle) 21.8.1911, ex fungus, 1♀ in CNCI; Riding Mts N.P., 2.5 km W May Lake, 13.9.1979 (Smetana) 1♂ in CNCI; Riding Mts N.P., Katherine Lake, 13.6.1979 (Lyon) ex *Russula*, 5♂ and 1♀ in CNCI & MHNG; Riding Mts N.P., Moon Lake, 21.8.1979 (Miller) ex mushrooms, berlese, 1♂ and 1♀ in CNCI; Stonewall, 18.8.1918 (Wallis) ex rotten fungus, 9♂ and 9♀ in CNCI. NEW BRUNSWICK, Kouchibougnac N.P., 12.9.1977 (Miller) 2♂ and 4♀ in CNCI; same data, but 17.9.1977 (Campbell) 4♂ and 3♀ in CNCI; same data, but 21.9.1977 (Campbell & Smetana) 5♂ and 5♀ in CNCI & MHNG; same data, but 29.8.1977 (Calderwood) 1♀ in CNCI; St. Andrews, 11.8.1978 (Marshall) ex carrion, 1♂ in CNCI; same data, but 14.8.1978, ex dead seagull, 1♂ in CNCI. NEWFOUNDLAND, Western Brook Pond, 15-21.8.1969 (Brendell) ex carion trap in secondary forest, 2♂ and 1♀ in BMNH. NOVA SCOTIA, Cape Breton H.N.P., Clayburn Brook Trail, 15m, 24.9.1984 (Campbell & Davies) ex mushrooms, 4♂ and 2♀ in CNCI; Cape Breton H.N.P., Lone Shieling, 1.7.1983 (Vockeroth) malaise trap, 1♀ in CNCI; same data, but 5.8.1983 (Bright) interception, 3♂ and 1♀ in CNCI; same data, but 11-18.7.1983 (Masner) ex forest int. trap, 1♂ in CNCI; same data, but 16.8.1983 (Martin) 1♂ in CNCI; same data, but 18-21.7.1983 (Bright) interception and pan trap, 4♂ and 6♀ in CNCI & MHNG; Cape Breton H.N.P., Mac Intoch Lk. trail, 75 m, 25.9.1984 (Campbell & Davies) ex mushrooms, 2♀ in CNCI; Cape Breton H.N.P., Mac Kenzie Mts, 29.7.1983 (Bright) ex pan traps, 1♀ in CNCI; same data, but (Vockeroth) 1♀ in CNCI; Cape Breton H.N.P., Pleasant Bay, 25m, 14.9.1984 (Campbell & Davies) ex mushrooms, 1♀ in CNCI; same data, but 21.9.1984, 1♂ and 3♀ in CNCI. ONTARIO, Alfred, 10.5.1981 (Peck & Anderson) ex spruce bog, moose dung, 1♂ in CNCI; Alfred, 27.9-13.10.1980 (Peck) ex *Sphagnum* bog carrion trap, 1♀ in CNCI; Aylmer West, 14-21.8.1973, malaise trap, 1♀ in CNCI; Constance Bay, 10.1970 (Peck) 1♀ in CNCI; Golden Lk., 14.8.1969 (Campbell) 3♂ in CNCI; 56 mi N Hurkett, 27.6.1973 (Parry & Campbell) 1♂ in CNCI; Powel Lk., 10.5 km NE L. Superior, Thunder Bay, 5.6.1980 (Kaulbars) carrion trap, 13♂ and 5♀ in CNCI & MHNG; same data, but 21.6.1980, intercept, 2♂ and 1♀ in CNCI; same data, but 5.7.1980, 3♂ and 1♀ in CNCI; same data, but 13.7.1980, 13♂ and 6♀ in CNCI; same data, but 19.7.1980, 10♂ and 2♀ in CNCI; same data, but 2.8.1980, 14♂ and 4♀ in CNCI. PRINCE EDWARD ISLAND, Bonshaw, 25.7.1967 (Martin) 1♀ in CNCI. QUEBEC, Bradore Bay, 8.8.1930 (Brown) 2♀ in BMNH; Drummondville, St. Cyrille, 19.8.1977 (LeSage) ex mushrooms, 1♂ and 1♀ in CNCI; Gatineau Pk., 11.8.1976 (Hammond) 2♂ in BMNH; Gatineau Pk., near Meach L., 1.9.1982 (Davies) 1♂ in CNCI; Gatineau Pk., Ramsay Lake Area, 1.4.1968 (Campbell) 3♀ in CNCI; same data, but 23.5.1971, 4♂ and 2♀ in CNCI & MHNG; same data, but 2.9.1980, 1♂ in CNCI; Grand Lk., 3 mi N Perkins, 3.9.1979 (Davies) ex *Clavaria* mushrooms, 1♀ in CNCI; Hudson Heights, 1-4.9.1956 (Linberg) 1♂ in CNCI; Kazabazua, 13.7.1961 (Campbell) 1♂ and 2♀ in CNCI; same data, but 15.7.1967, 5♂ in CNCI; same data, but 15.7.1967, berlese sample of deciduous duff, 9♂ and 3♀ in CNCI; same data, but 12.8.1967, 1♂ and 1♀ in CNCI; Kazabazua, 15.8.1968 (Lawrence) 2♀ in CNCI; Kazabazua, 18.8.1927 (Brown) 3♂ in CNCI; Kazabazua, 24.8.1966 (Goulet) 1♀ in CNCI; Kazabazua, 29.8.1928 (Adams) 1♀ in CNCI; Lac Beauport, 21.7.1959 (Aubé) 1♀ in CNCI, Lachute, 16.8.1962 (Kiteley) 1♀ in CNCI; Laniel, 24-30.8.1932 (Brown) 4♂ and 2♀ in CNCI; Mare-du-Sault, Parc des

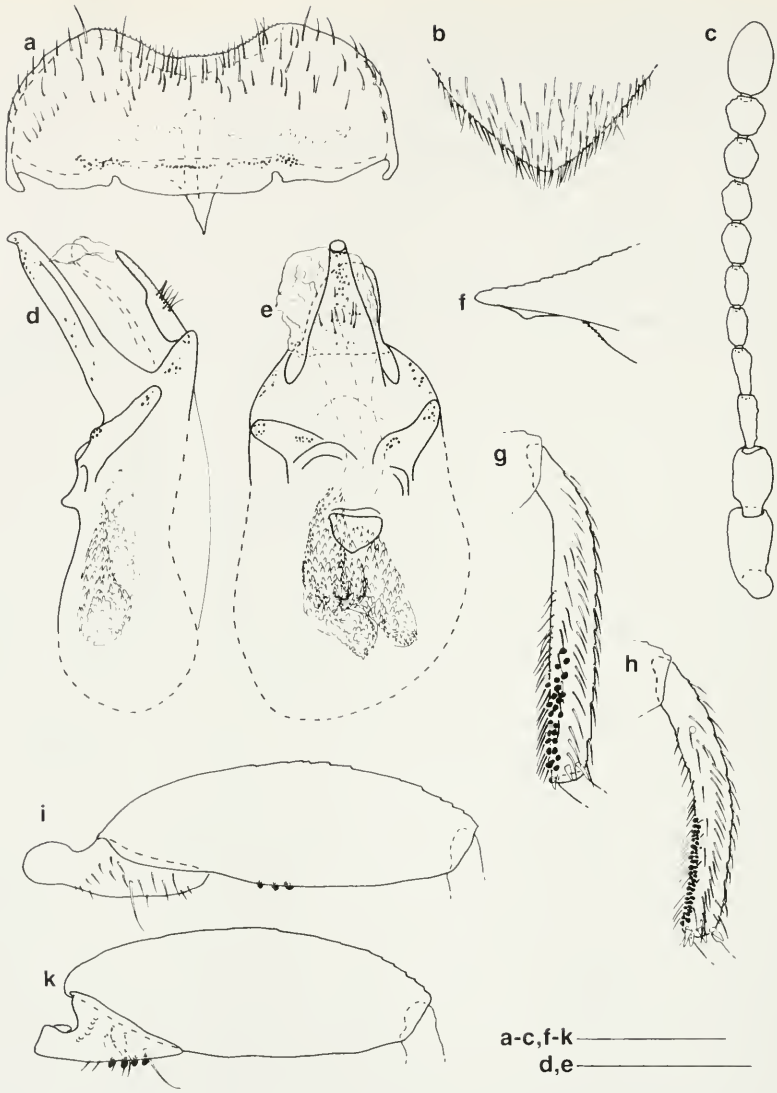


Fig. 14. *Megarthrus excisus*; a: male, abdominal sternite 8; b, f: male, apex of abdominal tergite 8, dorsal and lateral; c: antenna; d, e: aedeagus, lateral and ventral; g: male, metatibia; h: male, mesotibia; i: male, metatrochanter and metafemur; k: male, mesotrochanter and mesofemur. Scale bars = 0.2 mm.

Laurentides, 800 m, 15-17.8.1970 (Campbell) 2♂ in CNCI; Montreal, 20.7.1970 (Kiteley) 1♀ in CNCI; same data, but 22.7.1983, ex carrion of dead bird, 1♂ in CNCI; same data, but 18.8.1974, 1♂ in CNCI; same data, but 28.8.1966, 1♀ in CNCI; Mt Albert, Parc de Gaspesie, 300 m, 9.7.1972 (Campbell) 1♂ in CNCI; Roddik Lk., 7.9.1980 (Masner) ex pan trap, 1♂ in CNCI; same data, but near Bouchette, 1-15.8.1982, 1♂ in CNCI; St. Catherine, Portneuf, 19.7.1959 (Aubé) 1♀ in CNCI; Ste-Foy, 15.8.1966 (Chantal) 2♂ in CNCI; same data, but 28.8.1965, 1♂ in CNCI; same data, but 31.8.1962 (Aubé) 1♂ and 2♀ in CNCI; Val Morin, 15.8.1903, 1♂ and 2♀ in CNCI. YUKON TERRITORY, 14 mi of Dawson, 1000 m, 3.8.1949 (Bruggemann) 1♀ in CNCI; Dawson City, 11.7.1968 (Smetana) 2♂ and 2♀ in CNCI & MHNG; same data, but 16.7.1968 (Campbell & Smetana) 2♂ and 4♀ in CNCI; Hansen Lk., 9 mi SE Keno, 19.7.1968 (Campbell & Smetana) 2♂ and 3♀ in CNCI. USA: ALASKA, Kupreanof Is., Castle River, 28.8.1951 (Malkin) 1♀ in FMNH; Prudhoe Bay Rd., Fish Cr. <150°50'W; 66°32'N> 250 m, 9.7 (Campbell & Smetana) 1♂ in CNCI. COLORADO, Boulder Co., 2 mi W Boulder, 1800 m, 8.8.1973 (Campbell) 1♂ and 1♀ in CNCI; Latimer

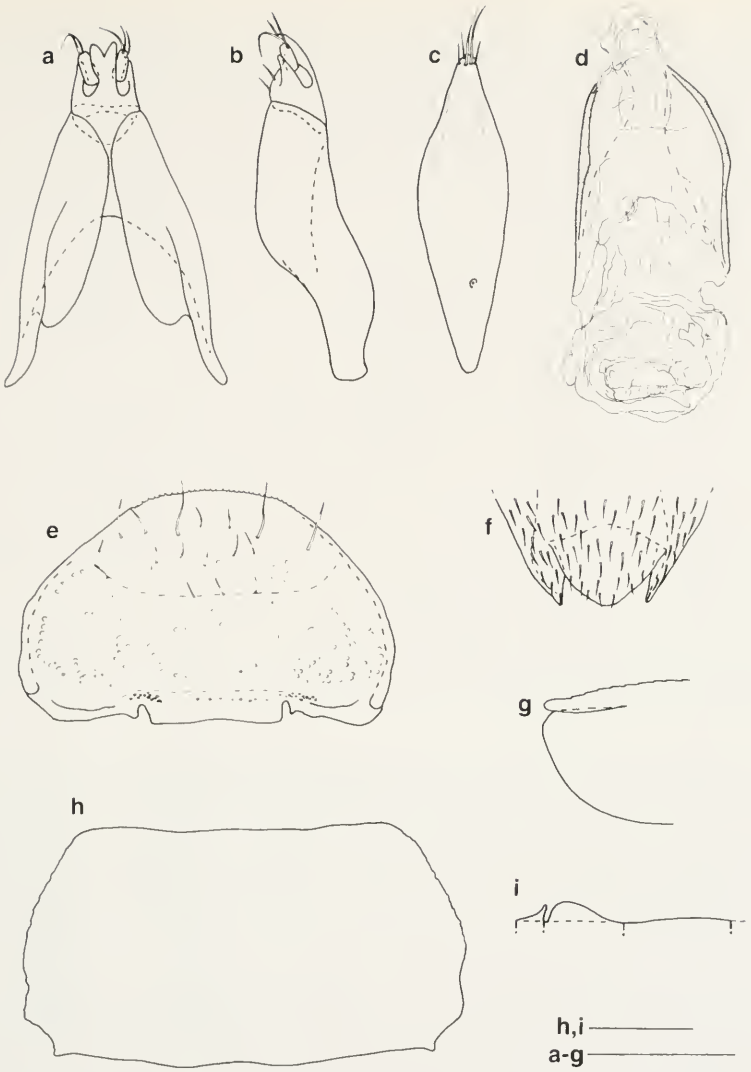


Fig. 15. *Megarthrus excisus*; a, b, d: female, genital segment, sternites (a) dorsal, (b) lateral and tergites (d) ventral; c: male, abdominal sternite 9; e: female, abdominal sternite 8; f, g: female, apex of abdominal tergite 8, dorsal and lateral; h: pronotum; i: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

Co., Estes Park, 15.11.1990 (Ashe) ex rotting gilled mushrooms, 10♂ and 13♀ in SEMK; San Juan Co., Lime Creek, 6 mi S Molas Pass, 2250 m, 29.7.1973 (Campbell) 1♂ and 1♀ in CNCI. ILLINOIS, Du Page Co., Argone Nat. Lab., 3.7.1967 (Suter) bait pine, 1♂ in FMNH. MASSACHUSETTS, Barnstable Co., Princetown, Cape Cod Nat. Seash., Beach Forest, 17.4.1970 (Peck) berlese, ex rotten pine log & litter, 2♂ and 1♀ in CNCI; Barnstable Co., Dennis, 19-22.8.1992 (Newton) 1♂ and 3♀ in FMNH; Hampshire Co., Northampton, 16.8.1977 (Kiteley) 1♂ in CNCI. MICHIGAN, Crawford Co., Grayling (Seevers) 14.9.1952, ex decaying fungi, 6♂ and 7♀ in FMNH; same data, but St. Ignace, 1♂ in FMNH; Keweenaw Co., Dasy Farm, 10.8.1965 (Bixler) 1♀ in FMNH. MINNESOTA, Cass Co., Cass Lake, 6.8.1978 (Summers) ex fungi, 1♂ in FMNH; Cook Co., Tofte, 25.8.1955 (Kiteley) ex rotten fungus, 1♂ in CNCI; Hubbard Co., Park Rapids, 17.8.1971 (Kiteley) 1♂ and 1♀ in CNCI. NEW HAMPSHIRE, Coos Co., 8 mi E Gorham, 250 m, 14.8.1976 (Campbell) 4♂ and 1♀ in CNCI & MHNG; Coos Co., Jefferson Notch, 910 m, 14-31.7.1982 (Newton & Thayer) *Picea-Abies-Betula*, windowtrap, 3♂ and 4♀ in FMNH; same data, but 0.3 mi S Jefferson Notch, 895m, 6♂ in FMNH; same data, but 3.1 mi S Jefferson Notch, 620 m, 6♂ in FMNH; same data, but 5 mi N Jefferson

Notch, 450 m, acer-mixed hdwd-*Tsuga-Picea*, 1♂ and 3♀ in FMNH; Grafton Co., Zealand R., 6 mi SE Twin Mts, 700 m, 5.9.1975 (Newton & Thayer) on gilled mushrooms, 1♂ in FMNH. NEW JERSEY, Burlington Co., Rancocas St. Park, 28.8.1976 (Thayer & Newton) ex rotting mushrooms, 1♂ in FMNH. NEW MEXICO, Taos Co., Agua Piedra Cpdg. near Tres Ritos, 2800 m, 3-5.7.1972 (Newton) ex gilled mushrooms, 1♂ in FMNH. NEW YORK, Clinton Co., Up. Saranac, 13.7.1928 (Green) 1♂ in CNCI; Greene Co., Catskill Mts near Hunter, 10.9.1946 (Seevers) ex mushrooms, 1♂ in FMNH; Tompkins Co., Ithaka, Ringwood, 8.1928 (Cameron) 3♂ and 4♀ in BMNH. NORTH CAROLINA, Bumcombe Co., Great Craggy Mts Blue Ridge Pkw., Mi 359, Balsam Gap, 15.8.1981 (Peck) ex litter, 1♀ in CNCI; Jackson Co., Blue Ridge Pkw., near Grassy Ridge Mine, 1520 m, 27.5.1986 (Smetana) 1♂ in CNCI; Macon Co., Waya Bald, 1600 m, 2.9.1949, ex fungi, 1♂ and 1♀ in FMNH; Macon Co., Glen Falls Area, 3 mi SW Highlands, 1060 m, 2.9.1967 (Campbell) berlese sample of pine duff, 2♂ and 4♀ in CNCI & MHNG; same data, but Van Hook Glade, 4 mi W Highlands, 1160 m, 30-31.8.1967, 2♂ and 2♀ in CNCI; Macon Co., 2 mi N Highlands, 30.5.1982 (Suter) sawdust pile under pine/cherry duff, 1♂ in FMNH; Macon Co., 4 mi N Highlands, 19.3.1976 (Watrous) berlese deep pine & oak duff, 2♂ in FMNH; Swain Co., Gr. Smoky Mts N.P., 2 mi NW Smokemont, 17.8.1972 (Smetana) 2♂ and 1♀ in CNCI. OREGON, Grant Co., Dixie Pass, 1700 m, 1.6.1957 (Malkin) 1♂ in FMNH; Union Co., Blue Mts, Hyw. 204, 12 km NW Elgin, 950 m, 27.5.1989 (Smetana) 2♂ in CNCI. PENNSYLVANIA, Centre Co., 6 mi SE Philipsburg, 600 m, 17.6.1968 (Peck) stump litter, 1♂ and 1♀ in FMNH; Somerset Co., Mts 3 mi E Allegeny, 29.3.1975 (Suter) berlese stump buttress, oak-laurel area, 1♂ in FMNH. SOUTH DAKOTA, Custer Co., Flynn Creek, 8m N Pringle, 1900 m, 8-9.7.1961 (Howden) 1♀ in CNCI. VERMONT, Orleans Co., Westmore, 26.8.1964 (Kiteley) 1♂ in CNCI. WEST VIRGINIA, Mercer Co., Camp Crest St. For., Mash Fork Falls, 8.4.1970 (Bird) 3♂ in CNCI; same data, but 10.4.1970, 2♂ in CNCI. WISCONSIN, Jackson Co., Black R. St. For. Cpgd., 3.11.1974 (Bergston) *Sphagnum* moss, 1♀ in FMNH; Washburn Co., 30.8.1952 (Jones) ex fleshy fungus, 2♂ and 3♀ in MHNG.

Distribution. *Megarthrus excisus* is a widely distributed, transcontinental species, occurring from Newfoundland west to Alaska; south to Oregon and along the Rocky Mts to Colorado and New Mexico in the west, and in the east along the Appalachian Mts to North Carolina (Map 2).

Biology. Found in moose dung, bird and ground-squirrel carrions, under and in rotting logs, in recently abandoned beaver nest, in leaf litter, moss and in decaying fungi at elevations ranging from sea level to 2800 m. Collected in forests and sphagnum bogs, by sifting, or using pan, dung, carrion, window, malaise, and flight interception traps.

Description. Similar to *M. angulicollis* from which it differs as follows: Length 1.0-1.4 mm; width 0.7-0.9 mm. Body predominantly dark brown, head, abdomen and sutural margins of elytra darkened, appendages paler; antennomeres 1-4 paler than antennomeres 5-11. Abdominal pubescence somewhat denser near apical margin of tergite 7. Frons at level, or slightly raised above level of vertex. Frontal impression shallow, or indistinct. Antenna as in Fig. 14c. Pronotal disc (Fig. 15h) with shallow depression limited to the area along posterior portion of lateral edge. Scutellum as in Fig. 1c. Elytron not narrowed basally; lateral edge straight in dorsal view. Abdominal tergite 3 almost flat. Sternites 2 and 3 with median processes as in Fig. 15i.

Ratios: AL 1.7-1.9; EL 1.6-1.8; ET 1.8-2.0; GT 2.1-2.4; HW 1.6-1.8; PT 1.8-2.1; SP 2.4-3.2; TPF 4.5-6.0.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur (Fig. 14i) longer than mesofemur (Fig. 14k), with a single row of 2-5 peg-like setae. Metatibia (Fig. 14g) longer than mesotibia (Fig. 14h). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protrochanter, protibia and metatrochanter (Fig. 14i); arranged in a single row on mesotrochanter (Fig. 14k); grouped to form a field on mesotibia and metatibia. Apex of abdominal tergite 8 as in Fig. 14b, f. Sternite 8 as in Fig. 14a. Sternite 9 (Fig. 15c) bearing a very small subbasal protuberance. Aedeagus as in Fig.14d, e.

♀. Abdominal tergite 8 (Fig. 15f, g) with medioapical projection. Sternite 8 as in Fig. 15e. Genital segment as in Fig. 15a, b, d.

Comments. *Megarthrus excisus* may be easily distinguished from all other Nearctic *Megarthrus* by the male metafemur bearing 2-5 peg-like setae and, in female, by the shape of the valvifers.

Megarthrus newtoni sp.n.
(Figs 16a-h, 17a-m, Map 5)

Type material. Holotype, ♂: USA, ARIZONA, Apache Co., Big L., 22 mi SW Eagar, 2700 m, 15.7.1976 (Hammond) BMNH. Paratypes (93): same data as holotype, 1♂ and 2♀ in BMNH. USA: ARIZONA, Cochise Co., Chiricahua Mts, 2800 m, 4.4.1969, 1♀ in FMNH; Cochise Co., Huachuca Mts, Miller Cn., 2150-2300 m, 1.8.1969 (Smetana) 3♂ and 2♀ in CNCI & MHNG; same data, but 6.8.1979, Ramsey Cn., 1♂ in CNCI; Graham Co.,

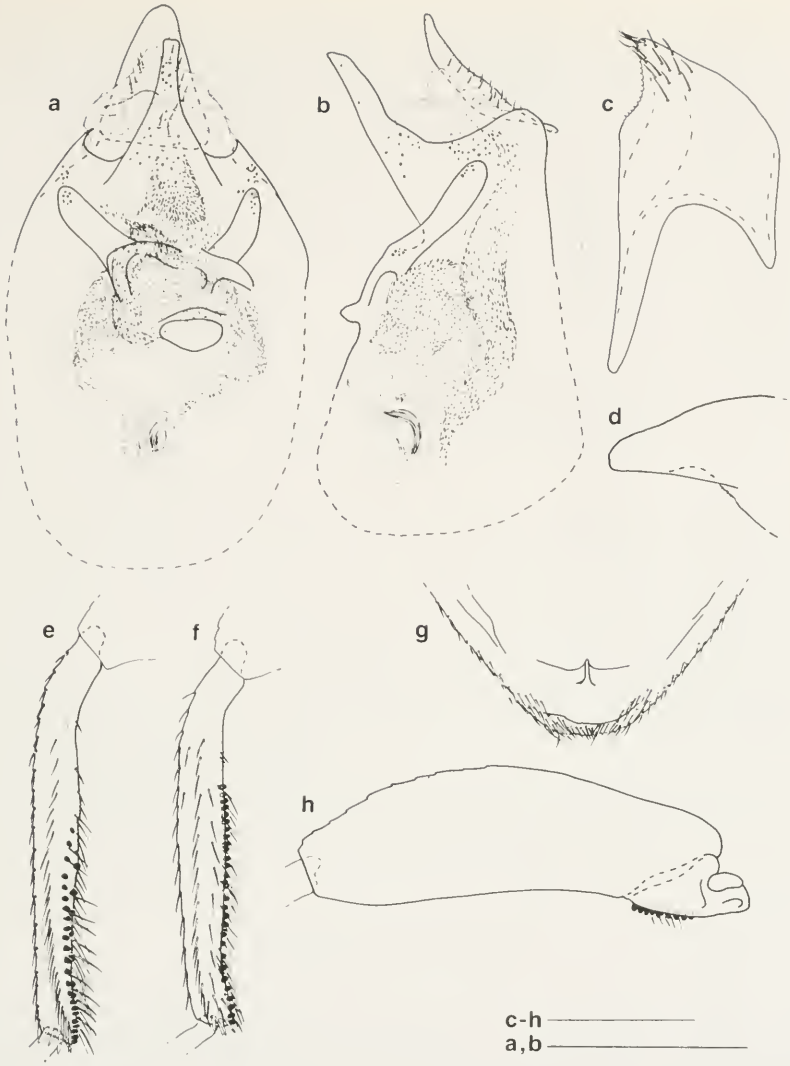


Fig. 16. *Megarthrus newtoni*, male; a, b: aedeagus, ventral and lateral; c: abdominal hemitergite 9; d, g: apex of abdominal tergite 8, lateral and ventral; e: metatibia; f: mesotibia; h: mesotrochanter and mesofemur. Scale bars = 0.2 mm.

Graham Mts, 2800 m, 24.6.1972 (Stephan) 1♂ in FMNH; same data, but Wet Cyn., 21.9.1974, 1♂ in FMNH; Graham Co., Pinaleno Mts, 4 mi NW Colombine, 2890 m, 28.7.1969 (Smetana) 1♂ in CNCI; same data, but Turkey Flat, 2160 m, 27.7.1969, 5♂ and 3♀ in CNCI & MHNG; same data, but Twilight Canyon, 2150 m, 22.7.1977 (Chandler) sift. rotten wood, 2♂ and 2♀ in FMNH; Pima Co., Sta. Catalina Mts, Hitchcock Hwy, 2700 m, 27.8-2.9.1970 (Newton) on fungi, 1♀ in FMNH; Pima Co., Sta. Catalina Mts, Mt Lemmon, 13.6.1970 (Stephan) 1♀ in FMNH. NEW MEXICO, Otero Co., Cloudcroft, 2600 m, 20.7.1973 (Campbell) 1♂ and 2♀ in CNCI; same data, but 23.7.1973, 6♂ and 6♀ in CNCI & MHNG; same data, but 24.7.1973, 2♂ and 1♀ in CNCI; same data, but 25.7.1973, 1♀ in CNCI; same data, but 26.7.1973, 4♂ and 3♀ in CNCI; same data, but 21.7.1973, 1♂ in CNCI; same data, but ex polypore on log, 2♂ and 1♀ in CNCI; Otero Co., Lincoln N.F., 2 mi SE Cloudcroft, 13.7.1969 (Smetana) 4♂ and 8♀ in CNCI & MHNG; same data, but 2670 m, 15.7.1969, 5♂ and 4♀ in CNCI; same data, but 1 mi SE Cloudcroft, 13-18.7.1969 (Smetana) 6♀ in CNCI; same data, but 14.7.1969, 3♂ and 3♀ in CNCI; Otero Co., Saddle Campground, 3 mi E 2 mi N Cloudcroft, 2700 m, 10.7.1972 (Newton) ex squirrel midden, 1♀ in FMNH; same data, but ex leaf litter, 1♂

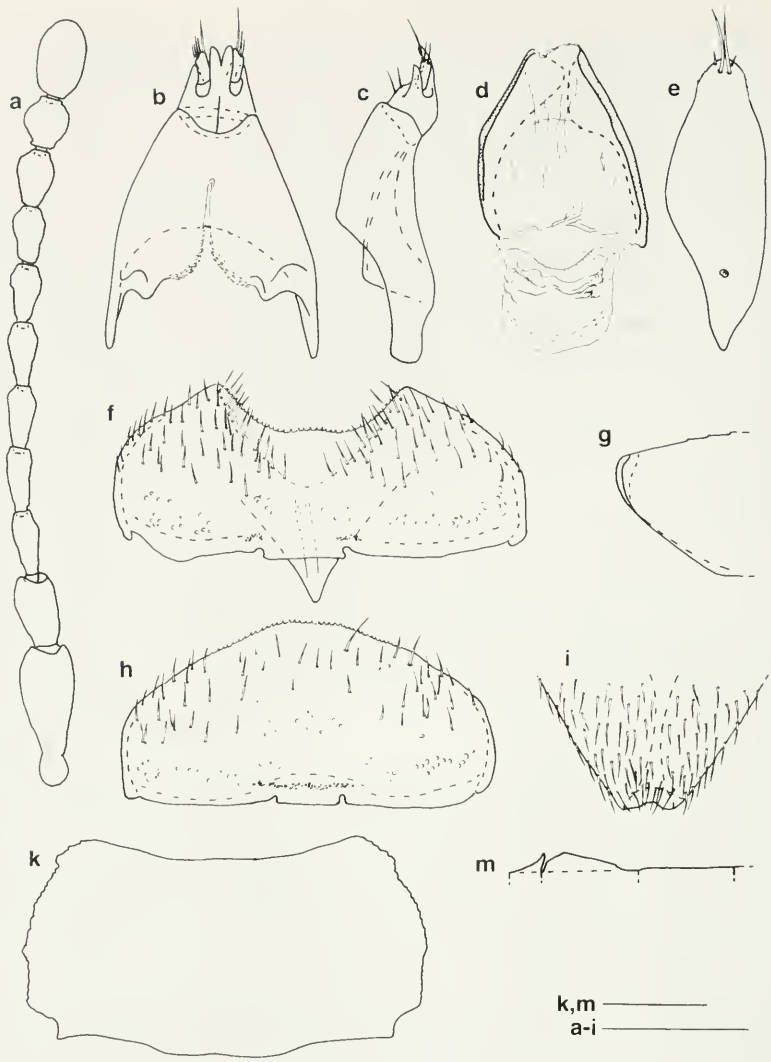


Fig. 17. *Megarthrus newtoni*; a: antenna; b-d: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (d) ventral; e: male, abdominal sternite 9; f, h: abdominal sternite 8, (f) male and (h) female; g, i: female, apex of abdominal tergite 8, lateral and dorsal; k: pronotum; m: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

and 1♀ in FMNH.

Distribution. *Megarthrus newtoni* occurs in mountains of Arizona and New Mexico (Map 5).

Biology. Found in leaf litter, on fungi, including polypore fungi on logs, in rotten wood and in squirrel midden at elevations from 2150 m to 3000 m.

Description. Length 1.3-1.5 mm; width 0.9-1.0 mm. Body predominantly dark brown, head and sutural margins of elytra darkened, appendages paler; antennomeres 1-4 paler than antennomeres 5-11. Dorsal pubescence fairly uniform, denser near apical margin of abdominal tergite 7. Anteriomedian portion of frons with setae orientated backward. Elytral setae straight, recumbent. Metasternal setae shorter than prosternal setae, becoming sparser posteriomedianly. Abdominal pubescence parallel. Punctation fine on anterior portion of hypomeron; posteriomedian portion of metasternum impunctate. Frons raised above level of

vertex, forming a ridge above clypeus; frontal ridge blunt, or sharp, fine. Anterior frontal edge evenly convex. Frontal impression shallow. Eye strongly convex, with highest point slightly below, or reaching, level of vertex; supra-ocular margin sinuate in dorsal view. Temple similar to that in Fig. 1f. Occipital ridge indistinct. Submentum weakly convex. Antenna (Fig. 17a) without patches of sensilla; scape not flattened; antennomeres 3-4 slightly asymmetrical; short and dense pubescence present on antennomere 5-11. Pronotum (Fig. 17k) weakly convex in frontal view, with mesal portion almost straight in lateral view. Pronotal disc with shallow depression along lateral edge; median groove shallow, parallel-sided. Hypomeral ridge absent. Median prosternal ridge absent; anterior prosternal margin not bordered by longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge sinuate, then bifid. Scutellum similar to that in Fig. 1c. Elytron not narrowed, or weakly narrowed basally; base gradually inclined, then overhanging. Humeral callus low. Elytral disc with low swellings, shallowly depressed along apical portion of lateral edge; lateral edge finely carinate, weakly convex, or somewhat sinuate in dorsal view; sutural area straight basally, slightly arcuate apically in lateral view; apical margin straight, or weakly convex, near suture; inner apical angle obtuse. Metasternum with femoral line arcuate in middle; median ridge present posteriorly, fine and low. Abdominal tergite 3 almost flat. Sternites 2 and 3 with median processes as in Fig. 17m, process of sternite 3 straight. Sternite 4 flat.
Ratios: AL 1.9-2.1; EL 1.6-1.8; ET 1.6-1.8; EW 1.1-1.3; EY 2.5-3.2; GT 1.8-2.2; GW 1.7-2.0; HW 1.6-1.8; ML 1.5-1.7; MP 1.5-1.8; PT 1.8-2.1; SP 4.5-5.0; TPF abs.
♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur shorter than mesofemur (Fig. 16h). Metatibia (Fig. 16e) longer than mesotibia (Fig. 16f). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protrochanter, protibia, metatrochanter and metafemur; arranged a in single row on mesotibia; in two rows on mesotrochanter (Fig. 16h) and metatibia. Pubescence on abdominal sternites 4-7 becoming denser near apical margins. Apex of abdominal tergite 8 as in Fig. 16d, g. Sternite 8 as in Fig. 17f. Hemitergite 9 as in Fig. 16c. Sternite 9 with a very small subbasal protuberance (Fig. 17e). Aedeagus as in Fig. 16a, b.
♀. Abdominal tergite 8 (Fig. 17g, i) without medioapical projection. Pubescence on abdominal sternites 4-7 uniform, but with a pair of long subapical setae on each sternite. Sternite 8 as in Fig. 17h. Genital segment as in Fig. 17b-d, coxites bearing a median ridge.
Comments. *Megarthrus newtoni* is the only North American member of the genus possessing coxites bearing a median ridge. This character is shared with the Neotropical *M. adelphus* Bierig, *M. inaequalis* Bierig, *M. mammiger* Bierig and *M. solitarius* Sharp, which differ by the pronotal shape.
Etymology. The species is named in honor of one of the collectors, Dr. Alfred F. Newton Jr., Chicago, Illinois.

Megarthrus occidentalis sp.n.
(Figs 18a-i, 19a-k, Map 1)

Type material. Holotype, ♂: CANADA, BRITISH COLUMBIA, [Vancouver] Stanley Park, sea level, 7.7.1988 (Löbl & Burckhardt) ex dead leaves on damp soil in hygrophilous temperate forest, MHNG. Paratypes (3): USA: OREGON, Charleston Co., 17.8.1947 (Newell) ex leaf litter, 1♂ and 1♀ in CNCI & MHNG; Clatsop Co., N Fork Klaskanne Riv. Bridge, Hwy Ore. 202, ca. 5 mi SE Olney, 150 m, 27.11.1971 (Benedict) EB-170, red alder, 1♂ in CNCI.
Distribution. *Megarthrus occidentalis* is apparently confined to Pacific coastal lowlands from southern British Columbia to southern Oregon (Map 1).
Biology. Found in forest leaf litter at low elevations.

Description. Similar to *M. angulicollis* from which it differs as follows: Length 1.4-1.5 mm; width 0.9-1.0 mm. Frons at level of vertex. Antenna as in Fig. 19a. Pronotal disc (Fig. 19k) with depression shallow limited to the area along posterior portion of lateral edge. Sternites 2 and 3 with median processes as in Fig. 19h.
Ratios: PT 1.9-2.1; SP 2.3-2.6; TPF 5.2-5.8.
♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur (Fig. 18f) about as long as mesofemur (Fig. 18h). Metatibia (Fig. 18c) longer than mesotibia (Fig. 18d). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Metatrochanter (Fig. 18f) without, or with upto 3 peg-like setae. Metafemur without, or with a single peg-like seta. Peg-like setae absent from protrochanter and protibia; arranged in a single row, or in two rows, on metatibia; grouped to form a field on mesotrochanter (Fig. 18h) and mesotibia. Apex of abdominal

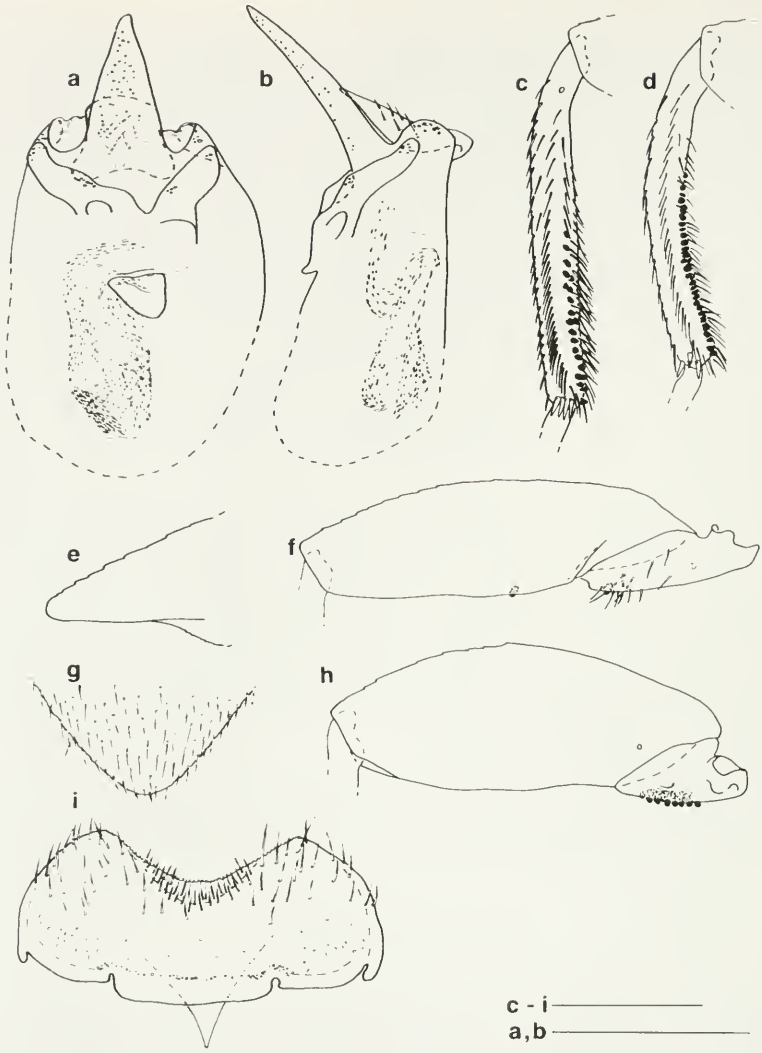


Fig. 18. *Megarthrus occidentalis*, male; a, b: aedeagus, ventral and lateral; c: metatibia; d: mesotibia; e, g: apex of abdominal tergite 8, lateral and dorsal; f: metatrochanter and metafemur; h: mesotrochanter and mesofemur; i: abdominal sternite 8. Scale bars = 0.2 mm.

tergite 8 as in Fig. 18e, g. Sternite 8 as in Fig. 18i. Sternite 9 (Fig. 19d) with a very small subbasal protuberance. Aedeagus as in Fig. 18a, b.

♀. Abdominal tergite 8 (Fig. 19g, i) with medioapical projection. Sternite 8 as in Fig. 19f. Genital segment as in Fig. 19b, c, e.

Comments. *Megarthrus occidentalis* may be easily distinguished from the other Nearctic species by the male mesotrochanter bearing peg-like setae grouped to form a field.

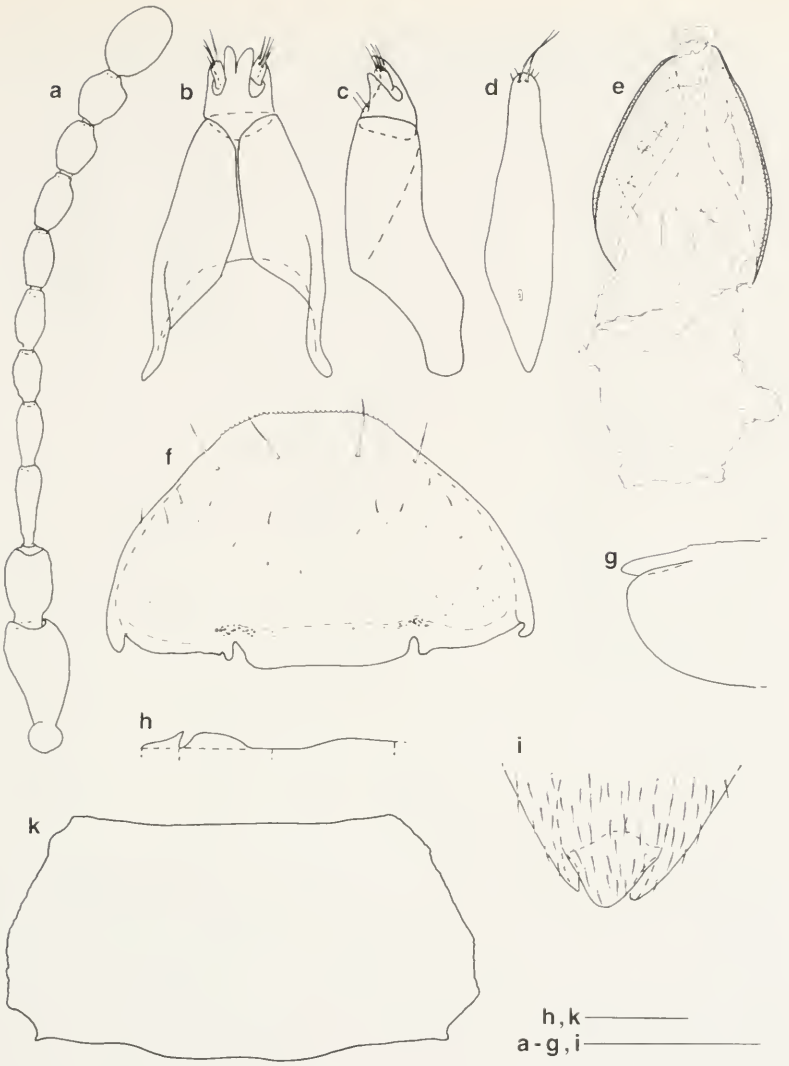


Fig. 19. *Megarthrus occidentalis*; a: antenna; b, c, e: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (e) ventral; d: male, abdominal sternite 9; f: female, abdominal sternite 8; g, i: female, apex of abdominal tergite 8, lateral and dorsal; h: median processes of abdominal sternites 2-4 (left to right), schematic; k: pronotum. Scale bars = 0.2 mm.

Megarthrus pecki sp.n.
(Figs 20a-n, 21a-g, Map 3)

Type material. Holotype, ♂: CANADA, BRITISH COLUMBIA, Metlakatla, 1915 (Keen) #355, BMNH. Paratypes (69): same data as holotype, 1♂ and 1♀ in BMNH & MHNG; CANADA: ALBERTA, Jasper, 1928 (Cameron) 1♀ in BMNH; Waterton Lakes N. P., Bertha Falls Trail, 1400 m, 21.6.1980 (Smith) 1♂ and 1♀ in CNCI. BRITISH COLUMBIA, Queen Charlotte Is., Moresby Is., Mt Moresby, 600 m, 25.7.1983 (Campbell) ex bear dung, 3♂ in CNCI & MHNG. ONTARIO, Rainy R. Dist., 22.6.1924 (Brimley) 1♀ in CNCI. QUEBEC, Berthier, Berthierville (Chantal) ex vegetational debris, 1♂ in FMNH; Gatineau Park, Meach Lake area, 1.9.1982 (Davies) ex fleshy fungi on tree, berlese, 2♂ and 1♀ in CNCI & MHNG; same data, but 22.10.1978 (Campbell) under pile of old mushrooms, 2♂ in CNCI & MHNG; Gatineau Park, Pinks Lake, 27.5.1980 (Peck & Davies) intercept, 2♀

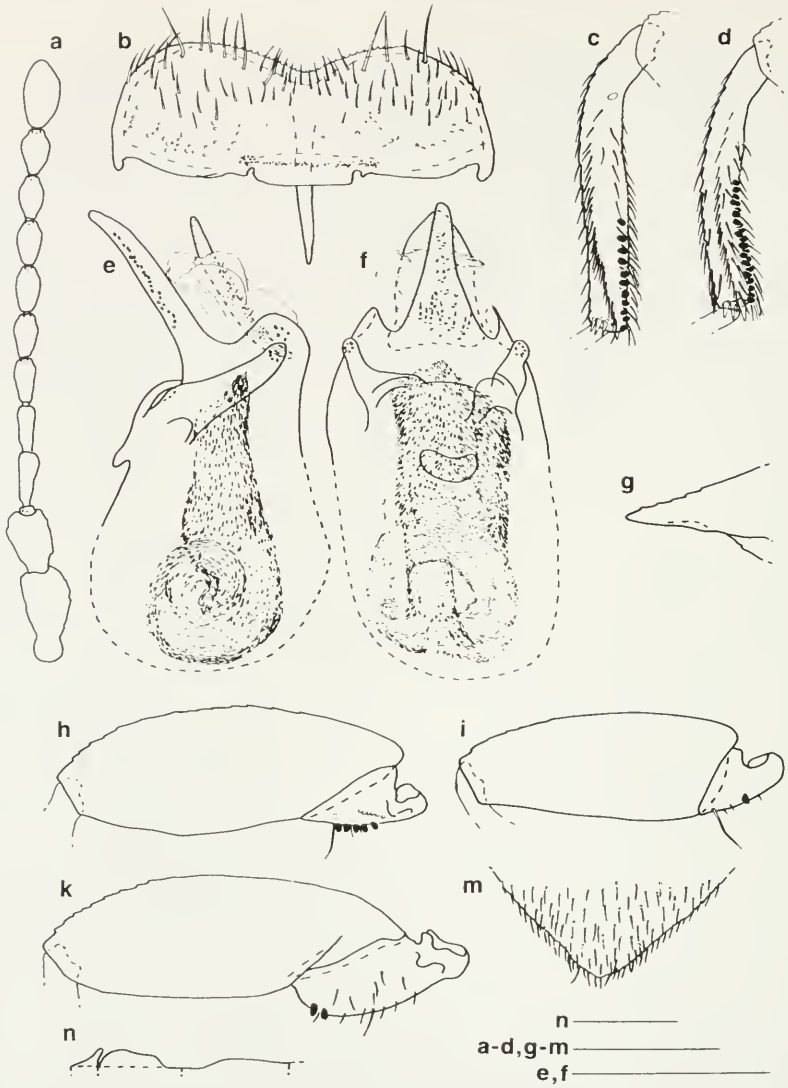


Fig. 20. *Megarthrus pecki*; a: antenna; b: male, abdominal sternite 8; c: male, metatibia; d: male, mesotibia; e, f: aedeagus, lateral and ventral; g, m: male, apex of abdominal tergite 8, lateral and dorsal; h: male, mesotrochanter and mesofemur; i: male, protrochanter and profemur; k: male, metatrochanter and metafemur; n: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

in CNCI & MHNG; Gatineau Park, Ramsay Lake area, 23.5.1971 (Campbell) 1♂ in CNCI; Ste Catherine Port., 15.6.1958 (Aubé) 3♂ and 1♀ in BMNH & CNCI; same data, but 11.6.1960, 1♂ and 1♀ in CNCI. USA: ILLINOIS, Carroll Co., Savanna, Mt Palisade Park, 13-17.5.1979 (Peck) malaise, 1♂ and 2♀ in CNCI & MHNG. IOWA, Jackson Co., Maquoketa Cave St. Pk., 29.7.1968 (Peck) #145, ex forest litter under dung, berlese, 4♂ and 4♀ in FMNH & MHNG. MICHIGAN, Berrien Co., Warren Woods, near Lakeside, 11.6.1961 (Dybas) under dead Hydraceae on ground, 1♀ in FMNH. MINNESOTA, Sherburne Co., Elk River, 1.7.1968 (Kiteley) 1♀ in CNCI. NEW HAMPSHIRE, Coos Co., 5 mi N Jefferson Notch, 450 m, 14-31.7.1982 (Newton & Thayer) ex *Acer* mixed hardwood *Tsuga-Picea*, window trap 645, 2♀ in FMNH; same data, but Jefferson Notch, 910 m, ex window trap 644, 1♀ in FMNH; Coos Co., 4 mi E Gorham, 15.8.1976 (Hammond) 1♂ in BMNH. NEW YORK, Green Co., Catskill Mts, near Hunter, 10.9.1946 (Seevers) on mushrooms, 1♀ in FMNH. NORTH CAROLINA, Craven Co., Cove Creek, 17.6.1963 (Stephan) 1♂ in

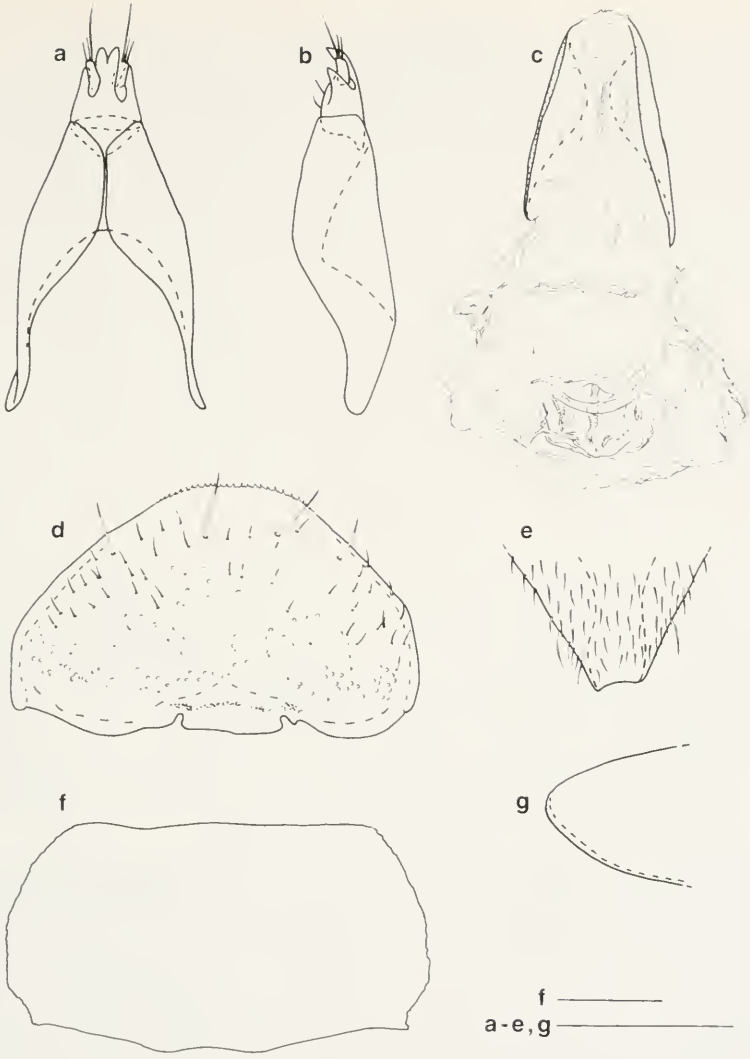


Fig. 21. *Megarthrus pecki*; a-c: female, genital segment, sternites (a) dorsal, (b) lateral and tergites (c) ventral; d: female, abdominal sternite 8; e, g: female, apex of abdominal tergite 8, dorsal and lateral; f: pronotum. Scale bars = 0.2 mm.

FMNH; Haywood Co., Richland Balsam Mtn, 1950 m, 27.5.1986 (Smetana) 1♂ in CNCI; Henderson Co., Flatrock, 28.3.1970 (Cornell) ex *Polyporus* sp., 1♀ in SEMK; Jackson Co., 6 km S Cashier, 975m, 20.6.1986 (Smetana) 2♀ in CNCI; Jackson Co., Blue Rdg. Pkw., near Grassy Ridge Mine, 1520 m, 27.5.1986 (Smetana) 1♂ and 3♀ in CNCI & MHNG; Macon Co., Highlands, Wilson's Gap, 950 m, 25.5.1957 (Vockeroth) 1♂ in CNCI; Macon Co., 4 mi NW Highlands, 19.3.1976 (Watrous) ex deep pine & oak duff, berlese, 1♀ in FMNH; Macon Co., Waya Bald, 1650 m, 2.9.1949, 1♂ in FMNH; Watauga Co., Boone, 1.5.1973 (Ashe) ex carrion trap, 2♂ and 2♀ in SEMK; same data, but 10.5.1973, under bark, 1♂ in SEMK; same data, but 18.5.1975, under black locust bark, 3♂ and 1♀ in SEMK; same data, but 19.5.1973, sifted from leaf pile, 1♀ in SEMK. PENNSYLVANIA, Fulton Co., Cowan Gap St. Pk., 26-28.5.1981 (Peck) oak for. UV, 1♀ in CNCI. TENNESSEE, Sevier Co., 8 mi S Gatlinburg, 9500 m, 17-22.5.1972 (Newton) #454a, squid/octopus trap, 1♀ in FMNH. WASHINGTON, Pierce Co., Fairfax, 16.6.1957 (Dybas) FMHD #57-64, flood debris under old bones, 1♀ in FMNH. WEST VIRGINIA, Greenbrier Co., 19.1 km NE Richwood, 12.5-6.6.1986 (Smetana) 1♂ in CNCI; Pocahontas Co., 2 km W Cranberry Glades, 1050 m, 14.5.1986 (Sme-

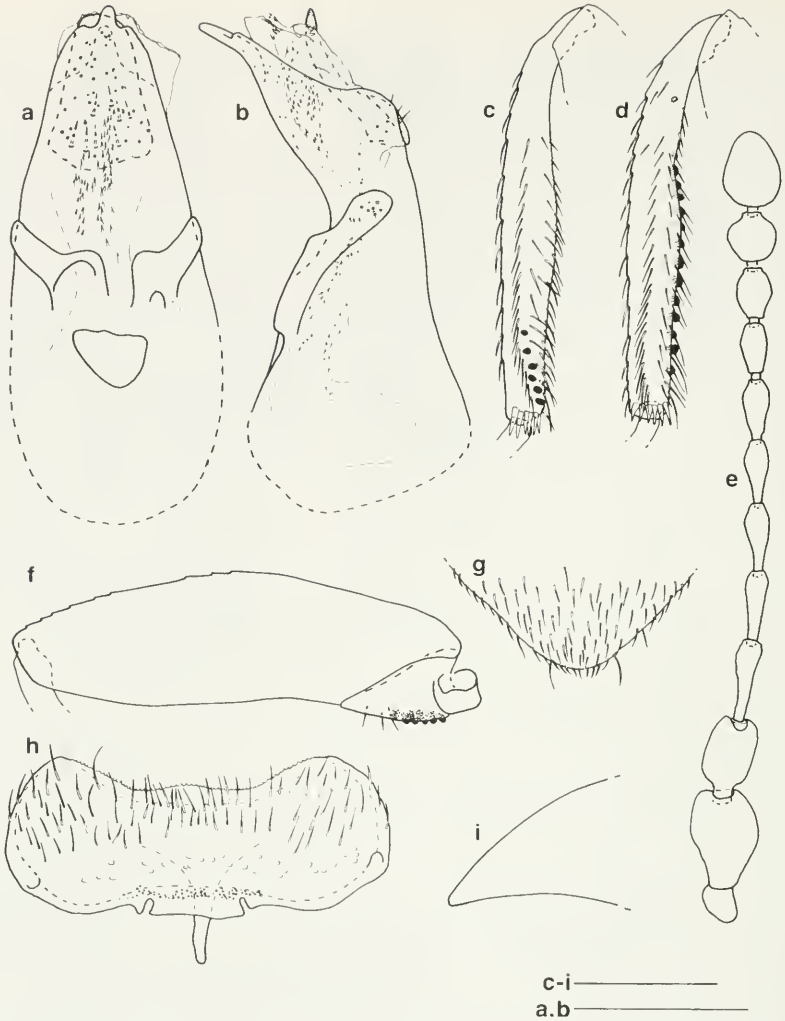


Fig. 22. *Megarthrus pictus*; a, b: aedeagus, ventral and lateral; c: male, metatibia; d: male, mesotibia; e: antenna; f: male, mesotrochanter and mesofemur; g, i: male, apex of abdominal tergite 8, dorsal and lateral; h: male, abdominal sternite 8. Scale bars = 0.2 mm.

tana) 1♂ in CNCI.

Distribution. *Megarthrus pecki* is a transcontinental species occurring from southern Quebec south along the Appalachian Mts to North Carolina, west to northern British Columbia, including the Queen Charlotte Islands, and Washington (Map 3).

Biology. Found in dung, carrion, old bones, fungi, forest leaf litter, flood debris and other decaying plant matter at elevations ranging from 700 to 1860 m. Collected by sifting, or using carrion, interception, malaise, window, and other baited traps.

Description. Length 1.1-1.3 mm; width 0.7-0.8 mm. Body predominantly dark brown, or blackish, elytra and appendages somewhat paler, sutural margins of elytra usually darkened. Dorsal pubescence fairly uniform, sparser on elytra. Anteriomedian portion of frons with setae orientated backward. Elytral setae straight, recumbent. Metasternal setae shorter than prosternal setae, uniform, or sparser posteriomedianly. Abdominal pubescence parallel, uniform on sternites 4-7, but with a pair of long subapical setae on each

sternite. Punctation fine on anterior portion of hypomeron; posteriomedian portion of metasternum impunctate. Frons raised above level of vertex forming a blunt ridge above clypeus. Anterior frontal edge evenly convex, or strongly convex in middle. Frontal impression shallow, or indistinct. Eye moderately convex, with highest point slightly below, or reaching, level of vertex; supra-ocular margin sinuate in dorsal view. Temple similar to that in Fig. 1g. Occipital ridge indistinct. Submentum weakly convex. Antenna (Fig. 20a) without patches of sensilla; scape not flattened; antennomeres 3-4 slightly asymmetrical; short and dense pubescence present on antennomeres 5-11. Pronotum (Fig. 21f) weakly convex in frontal view, with mesal portion fairly straight in lateral view. Pronotal disc not depressed, or shallowly depressed along posterior portion of lateral edge; median groove shallow, parallel-sided. Hypomeral ridge absent. Median prosternal ridge absent; anterior prosternal margin bordered by an irregular row of fine longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge straight, then bifid. Scutellum similar to that in Fig. 1b. Elytron not narrowed basally; base gradually inclined, then overhanging. Humeral callus low. Elytral disc lacking swellings, shallowly depressed along middle portion of lateral edge; lateral edge finely carinate, weakly convex in dorsal view; sutural area almost straight in lateral view; apical margin straight, or sinuate, near suture; inner apical angle obtuse, or right angled. Metasternum with femoral line arcuate in middle; median ridge absent, or present posteriorly, fine and low. Abdominal tergite 3 slightly transversally vaulted. Sternites 2 and 3 with median processes as in Fig. 20n, process of sternite 3 straight. Sternite 4 with basal portion straight, then strongly transversely vaulted.

Ratios: AL 1.8-2.0; EL 1.5-1.7; ET 1.6-1.8; EW 1.1-1.3; EY 2.2-2.5; GT 2.0-2.5; GW 1.7-1.9; HW 1.5-1.6; ML 1.4-1.8; MP 1.7-2.0; PT 1.8-2.0; SP 3.5-4.5; TPF abs.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 with tenent setae. Metafemur (Fig. 20k) longer than mesofemur (Fig. 20h). Metatibia (Fig. 20c) longer than mesotibia (Fig. 20d). Metatarsomere 1 somewhat shorter than combined length of metatarsomeres 2-4. Peg-like setae absent from protibia and metafemur; absent, or arranged in a single row on metatibia; arranged in a single row mesotrochanter (Fig. 20h); grouped to form a field on mesotibia. Protrochanter (Fig. 20i) without, or with a single peg-like seta. Metatrochanter (Fig. 20k) without, or with upto 3 peg-like setae. Apex of abdominal tergite 8 as in Fig. 20g, m. Sternite 8 as in Fig. 20b. Sternite 9 lacking subbasal protuberance. Aedeagus as in Fig. 20e, f.

♀. Abdominal tergite 8 (Fig. 21e, g) without medioapical projection. Sternite 8 as in Fig. 21d. Genital segment as in Fig. 21a-c.

Comments. *Megarthrus pecki* may be distinguished from the other Nearctic members of the genus by the presence of a narrow basal projection on the abdominal sternite 8, in combination with the rounded lateral margins of the pronotum. The number of the peg-like setae is unusually variable on the protrochanter, metatrochanter and metatibia, but appears constant on the mesotrochanter and mesotibia. The only other species, examined so far, that possess a single peg-like seta on male protrochanter, are *M. fennicus* Lahtinen and *M. straudi* Scheerpeltz from Europe.

Etymology. The species is named in honor of one of the collectors, Prof. Stewart Peck, Ottawa.

Megarthrus pictus Motschulsky
(Figs 1d & k, 22a-i, 23a-i, Map 2)

Megarthrus pictus Motschulsky, 1845: 39.

Type material. Lectotype, ♂: "Sitka", MZM, by present designation.

Additional material (372). CANADA: BRITISH COLUMBIA, Bella Coola, Hwy 20, sea level, 14.7.1988 (Löbl & Burckhardt) 2♂ in MHNG; Downing P.P., 15 km SW Clinton, 1100-1200 m, 21.7.1988 (Löbl & Burckhardt) 1♂ in MHNG; Cmpg. Glacier View, 17 km E Hagensborg, Hwy 20, 13-16.7.1988 (Löbl & Burckhardt) 3♂ and 5♀ in MHNG; Essondale, 27.4.1961, 1♀ in MHNG; same data, but 8.7.1959, 1♀ in MHNG; same data, but 5.5.1961, 1♀ in MHNG; same data, but 3.1968 (Lazorko) 1♂ in FMNH; Hagensborg, Hwy 20, 15.7.1988, 13♂ and 4♀ in MHNG; Hope, Hwy 1, Silver Hope Creek, 3 km S Hope, 150 m, 9.7.1988 (Löbl & Burckhardt) #3, 7♂ and 5♀ in MHNG; 10 km Hope, 250 m, 10.7.1988 (Löbl & Burckhardt) #5, 2♂ and 3♀ in MHNG; Bowser, 5.6.1955 (Brown) 6♂ and 2♀ in CNCI; same data, but 7.6.1955, 1♂ in BMNH; Brunswick, 20.5.1968 (Campbell & Smetana) 3♂ and 6♀ in CNCI; Covichan, N Shore Rd., 1.7 km N of town, 27.6.1979 (Smith) ex leaf litter and soil, 1♂; same data, but 20.8.1983, 1♀ in CNCI; same data, but run beside N Shore Rd., 7.6.1979, ex moss and litter, 1♂ in CNCI; same data, but S. Shore Rd., 2.3 km N of town, 16.6.1979, ex damp litter, 1♂ in CNCI; Malahat, Goldstream Prov. Pk., nr. Mt Finlayson Trail,

11.7.1979 (Smith) ex moss and old log, 2♂ in CNCI; 10 mi.S Garibaldi, 29.5.1968 (Campbell & Smetana) 1♂ in CNCI; Mt Garibaldi, 9 mi. N Squamish, 450 m, 30.5.1968 (Campbell & Smetana) 10♂ and 17♀ in CNCI; 10 km N Squamish, Hwy 99, 180 m, 22.7.1988 (Löbl & Burckhardt) 2♀ in MHNG; same data, but 22 km N Squamish, 330 m, 22.7.1988, 14♂ and 17♀ in MHNG; Queen Charlotte Is., 1 km S Moresby, 20.8.1983 (Campbell) ex moss at edge of old road, 2♀ in CNCI; same data, but 1.5 km W Skedan Louise Is., 6.8.1983, ex moss, 2♀ in CNCI; Queen Charlotte Is., Moresby, 1.7.1984 (Anderson) ex sitka hemlok alder, 14♂ and 11♀ in CNCI; Shames R., 21 km W Terrace, 2 km N Hwy 16, 24.8.1983 (Campbell) ex alder and decid. shrub litter, 5♂ and 7♀ in CNCI; Stamp Fall Prov. P., 8 km NW Alberni, 26.5.1968 (Campbell & Smetana) 1♂ and 5♀ in CNCI; Vancouver, 10.11.1940, compost heap, 1♂ in FMNH; Vancouver, Stanley Parc, 3.1968 (Lazorko) 1♀ in FMNH; Vancouver, Uni.B.C. Endowement Lands, 7.7.1968 (Löbl & Burckhardt) 6♂ and 5♀ in MHNG; same data, but 7.7.1988 (LeSage) ex leaf litter in costal rain forest, 1♀ in CNCI. USA, CALIFORNIA, Humboldt Co., Arcata Comm. Forest, 6.5.1962 (Pinto) berlese, 1♂ in FMNH; Humboldt Co., Dry Lagoon State Park, 22.3.1967 (Benedict) 1♀ in FMNH; Martin Co., 2 mi W Inverness, 22.3.1983 (Smetana) 5♂ in CNCI; Martin Co., 3.1 mi NW Inverness, 70 m, 8-22.5.1976 (Newton & Thayer) berlese, litter and old flood debris in *Alnus* forest, 1♂ in FMNH; same data, but flood debris, small stream, 1♂ in FMNH; Mendocino Co., Little River, 14.5.1955 (Helfer) 3♂ and 1♀ in CNCI; same data, but 14.6.1955, 1♂ and 1♀ in FMNH; Santa Cruz Co., Sta. Cruz Mts, 1♀ in FMNH; Sonoma Co., Sonoma, 1♂ in CNCI; Trinity Co., 4 mi W Forest Glen, 9.7.1979 (Campbell) 1♂ and 1♀ in CNCI. OREGON, Hwy 34 at Benton Co. line (Malcolm) 3♂ and 1♀ in FMNH; Clackamas Co., 1 mi S Barton, 22.4.1972 (Benedict) ex blak cottonwood debris duff, 9♂ and 8♀ in CNCI; same data, but 3 mi from Carver, on S Baker Rd., Gerber Rd., ex west red cedar duff, 1♂ in CNCI; same data, but Little Fan Cr. Cmpg., Collawasn R. Rd., mouth of Hot Springs Fork, 500 m, 9.10.1971, ex alder duff mostly hemlock needles, 1♂ in CNCI; same data, but Mt Hood, NE Rd.357, ca. 30 mi SE Estecada, 660 m, 26.5.1972, broken fern debris, 1♂ in CNCI; Clackamas Co., Wildwood, Rec.Site near Wildwood, 300 m, 13.7.1975 (Newton & Thayer) ex leaf litter mixed hardwood conifer forest, 1♂ in FMNH; Clatsop Co., N Fork Klaskame Riv. Bridge, Hwy 202, ca. 5 mi SE Olney, 260 m, 27.11.1971 (Benedict) ex red alder, 1♂ and 1♀ in CNCI; same data, but 170 m, 4♂ and 1♀ in CNCI; same data, but Saddle Mt Rd., ca. 5 mi N, 7 mi W Elsie, 230 m, 13.7.1973, ex duff sitka spruce red alder, 1♂ in CNCI; Columbia Co., ca. 3 mi SW Clatskanie Hill Rd., Murray Hill, 100 m, 8.1.1979 (Benedict) ex red alder litter & duff, 1♀ in CNCI; same data, but Columbia R., 5 mi N, 2 mi E Bunlington, oak l. of Sauvies I., ca. 10 m, 7.10.1972, ex Ore. oak snowberry duff, 1♀ in CNCI; Coos Co., 6 mi E, 2 mi S Allegani Weyerhaeuser Comp., Millicoma Tree Farm Comp., 1500 m, 20.11.1971 (Benedict) ex alder lit. & duff, 3♂ and 1♀ in CNCI; same data, but 10 mi E, 2 mi S Allegani Weyerhaeuser Comp., Rd. 5046, 21.11.1971, ex rotten wood, 1♂ in CNCI; Coos Co., Coos Head, 14.9.1947 (Newell) 1♂ in FMNH; Curry Co., 4 mi S, 4 mi E Pt. Orford, Middle Elk Rd., 260 m, 17.5.1973 (Benedict) ex tan 0ak duff, 1♂ in CNCI; Curry Co., Humbug Mtn St. Pk., 6-7.6.1975 (Newton & Thayer) flood debris forest stream, 1♂ in FMNH; Douglas Co., 1 mi S, 2 mi W Ash, 2.12.1971 (Benedict) ex decid myrtle litter and duff, 1♀ in CNCI; same data, but ex hay, 1♂ in CNCI; same data, but 3 mi NE Scottsburg, 130 m, ex red alder duff & some rotten wood, 3♂ and 1♀ in CNCI; same data, but 11.12.1971, ex alder duff, some moss, 1♂ in CNCI; same data, but ca. 13 mi NW Umpqua R., 130 m, 7.2.1972, ex Calif. oak duff & moss, 1♂ in CNCI; same data, but Canyon Cr., Hwy 227, Canyonville, 330 m, 6.11.1971, riparian zone tree, sandy soil 1♀ in CNCI; same data, but 12 mi E, 9 mi N Tiller, S Umpqua Falls For.Camp., 530 m, 2.11.1972, ex ash & maple duff, 1♀ in CNCI; Jackson Co., Soda Mt Rd., 7 mi S, 13 mi E Ashland, 1630 m, 15.10.1972 (Benedict) ex duff litter-villow, 1♀ in CNCI; Lane Co. Big Fall Cr., Dolly Varden For. Cpgd., 40 m, 4.3.1972 (Benedict) ex tree hollow rotted wood, 1♂ in CNCI; same data, but ex red alder cotonwood, vine maple duff on thin moss, 1♂ in CNCI; Lane Co., 7 mi E Mapleton, 15.9.1960 (Malcolm) 1♀ in FMNH; Lane Co., Glenada, 7.6.1957 (Dybas) conc. straw pile in woods & sub litter, 1♀ in FMNH; same data, but Triangle Lake, ex maple litter conc, 2♀ in FMNH; Lincoln Co., 0.8 mi E Yachats, 18.6.1972 (Russell) 2♂ and 2♀ in FMNH; Lincoln Co., 1.4 mi Nashville, Yaquina Riv., 200 m, 20.11.1971 (Benedict) ex alder duff and moss, 1♂ in CNCI; Lincoln Co., Forgaty Creek State Park, 19.11.1966 (Coddo & Johnson) 1♂ in FMNH; Linn Co., 1.4 mi N Nashville, Yaquina Riv., 200 m, 20.12.1971 (Benedict) ex alder duff, some moss, 1♀ in CNCI; Linn Co., 6 mi S Crawfordsville, 400 m, 15.9.1973 (Benedict) ex duff-big-leaf maple, 3♂ and 2♀ in CNCI; Linn Co., 25 mi E Waldport, Hwy 34, 400 m, 5.5.1973 (Benedict) ex big leaf maple duff, 2♂ and 1♀ in CNCI; Linn Co., Swamp Mt Rd., ca. 3 mi S Hwy 20, Jct. of 200 Line Canyon Cr., 2 mi. S, 2 mi E Cascadia, 600 m, 29.4.1972 (Benedict) ex foliating bark and moss, 1♀ in CNCI; Marion Co., 5 mi N Sublimity, Silverton to Sublimity Rd., 230 m, 17.9.1973 (Benedict) ex Ore. oak snowberry duff, 1♂ in CNCI; same data, but 630 m, ex oregon ash duff, 1♀ in CNCI; Polk Co., 2.2 mi W Falls City, 260 m, 2.6.1973 (Benedict) ex Ore. oak snowberry duff, 1♀ in CNCI; Tillamook Co., Cape Falcon Cove, ca. 0.5 mi N Manzanita, 330 m, 13.7.1973 (Benedict) ex duff salmonberry alder, 2♂ and 2♀ in CNCI; same data, but ex duff salmonberry alder, 2♂ in CNCI; Tillamook Co., Elk Cr. St. For. Cmpg., 4.5 mi W Lee's camp, 300 m, 4.11.1972 (Benedict) ex red alder duff, 2♀ in CNCI; same data, but Rest Area, Willson R. Hwy, ca. 1 mi W Lee's camp, ex rot tree hollow, 8♂ and 4♀ in CNCI; same data, but ex west red cedar, red alder, 5♂ and 5♀ in CNCI; same data, but 4 mi SE Blaine, Suislaw Nat. For., along Nestucca R., 160 m, 15.3.1972, ex red alder duff, 1♀ in CNCI; Washington Co., 1 mi W Glenwood, 30.8.1966 (Benedict) 1♀ in FMNH; same data, but 25 mi E Sherwood, Hwy 99, ca.50 m, 1.1.1972, ex big leaf maple duff, 1♀ in CNCI; Yamhill Co., Mc Bride Cemet. Rd., ca. 2 mi S Carlton, 1.1.1972 (Benedict) ex Ore oak duff and moss, 1♂ and 3♀ in CNCI; Yamhill Co., McMinnville,

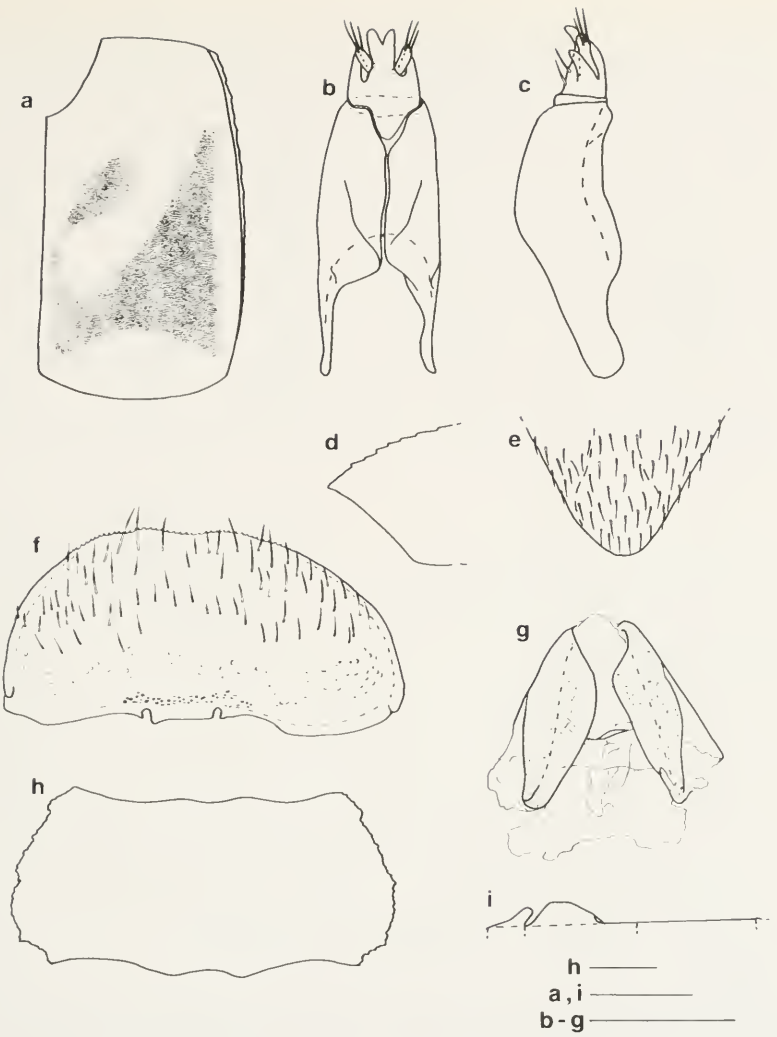


Fig. 23. *Megarthrus pictus*; a: elytron, schematic; b, c, g: female, genital segment, sternites (b) dorsal, (c) lateral and tergites (g) ventral; d, e: female, apex of abdominal tergite 8, lateral and dorsal; f: female, abdominal sternite 8; h: pronotum; i: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

11.2.1957 (Dybas) berlese, floor litter maple, fir, 1♂ and 1♀ in FMNH. WASHINGTON, Clallam Co., 6 mi E Joyce, 12.5.1968 (Campbell & Smetana) 11♂ and 2♀ in CNCI; Clallam Co., 5 mi W Forks, 14.5.1968 (Campbell & Smetana) 1♂ in CNCI; Clallam Co., La Push, 14.5.1968 (Campbell & Smetana) 2♀ in CNCI; Olympic N.P., Hoh Ranger Sta., 200 m, 13.1.1968 (Campbell & Smetana) 1♂ in CNCI; same data, but 19.8.1979 (Campbell) 1♂ and 1♀ in CNCI; same data, but Soleduck Cmpg., 1000 m, 13.8.1979, 7♂ in CNCI; Jefferson Co., Port Discovery, 19.6.1957 (Dybas) forest floor, 3♂ in FMNH; King Co., Seattle, Chase Lake, 15.6.1957 (Dybas) floor debris in mixed pine fire alder forest, 1♂ in FMNH; same data, but 2 mi E Black Diamond, 14.6.1957, ex maple fire & alder litter 2♀ in FMNH; King Co., Seattle, Discovery Parc, 15.11.1980 (Nelson) ex *Alnus-Arbustus* litter, 1♂ in CNCI; same data, but North Bluff, 20.12.1980, ex *Alnus rubra-Rubus spectabilis* litter, 1♂ in CNCI; same data, but 8 km N Carnation, ex *Acer-Alnus-Equisetum* duff, 1♂ in CNCI; Pierce Co., Mt Rainier N.P., N Puyallup River, 2300 m, 10.8. 1973 (Smetana) 1♀ in CNCI; Snohomish Co., Chase Lake, 9.1954 (Maklin) 1♂ in FMNH; Snohomish Co., Edmonds, 15.6.1957 (Dybas) conc. floor litter, 1♂ and 2♀ in FMNH.

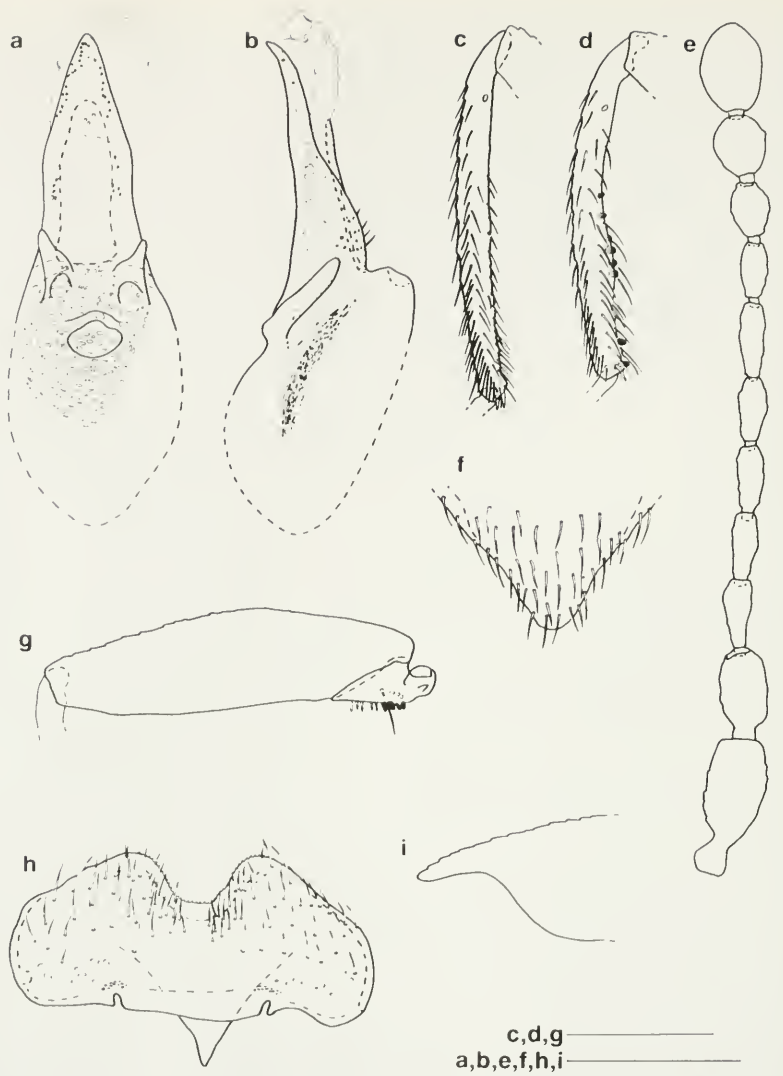


Fig. 24. *Megarthrus smetanai*; a, b: aedeagus, lateral and ventral; c: male, metatibia; d: male, mesotibia; e: antenna; f, h: male, apex of abdominal tergite 8, dorsal and lateral; g: male, mesotrochanter and mesofemur; i: male, abdominal sternite 8. Scale bars = 0.2 mm.

Distribution. *Megarthrus pictus* occurs along the Pacific coast, from Sitka, Alaska, south to about San Francisco area, California (Map 2).
Biology. Found by sifting flood debris, compost, hay, moss, rotten wood, forest leaf litter and various duff at elevations ranging from sea level to 2300 m, but usually below 1000 m.

Description. Length 1.4-1.7 mm; width 0.8-1.1 mm. Body and appendages predominantly yellow-brown, vertex, pronotum and scutellum darkened; elytra with colour pattern as in Fig. 23a. Dorsal pubescence fairly uniform, sparser on elytra. Anteriomedian portion of frons with setae orientated backward. Elytral setae curved, recumbent. Metasternal setae shorter than prosternal setae, fairly uniform. Abdominal pubescence converging on tergites 4-6, uniform on sternites 4-7, but with a pair of long subapical setae on each sternite.

Punctation fine on anterior portion of hypomeron and on posteriomedian portion of metasternum. Frons raised above level of vertex, forming a ridge above clypeus; frontal ridge sharp, fine in middle, conspicuous laterally. Anterior frontal edge weakly convex in middle, oblique laterally. Frontal impression shallow. Eye strongly convex, with highest point reaching, or raised above, level of vertex; supra-ocular margin sinuate in dorsal view. Temple and occipital ridge similar to that in Fig. 1k, occipital ridge indistinct in middle, sinuate laterally. Submentum weakly convex. Antenna (Fig. 22e) without patches of sensilla; scape flattened; antennomeres 3-4 symmetrical; short and dense pubescence present on antennomeres 7-11. Pronotum (Fig. 23h) strongly convex in frontal view, with mesal portion fairly straight in lateral view. Pronotal disc with shallow depressions along entire lateral edge and beside median groove; median groove shallow, widened apically. Hypomeral ridge absent. Median prosternal ridge present anteriorly, straight; anterior prosternal margin not bordered by longitudinal ridges. Protrochanter lacking transverse ridge. Lateral portion of prepectal ridge angulate, then bifid. Scutellum as in Fig. 1d. Elytron not narrowed basally; base abruptly inclined, then overhanging. Humeral callus low. Elytral disc with low swellings, shallowly depressed along lateral edge; lateral edge conspicuously carinate, weakly convex in dorsal view; sutural area straight basally, strongly arcuate apically in lateral view; apical margin convex near suture; inner apical angle obtuse. Metasternum with femoral line arcuate in middle; median ridge absent. Abdominal tergite 3 almost flat. Sternites 2 and 3 with median processes as in Fig. 23i, process of sternite 3 bifid. Sternite 4 flat.

Ratios: AL 1.9-2.1; EL 2.0-2.2; ET 2.1-2.2; EW 1.1-1.3; EY 2.5-2.7; GT 2.0-2.2; GW 1.8-2.0; HW 1.6-1.8; ML 1.5-1.8; MP 1.9-2.0; PT 2.0-2.4; SP 4.0-6.0; TPF abs.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 lacking tenent setae. Metafemur somewhat longer than mesofemur (Fig. 22f). Metatibia (Fig. 22c) somewhat longer than mesotibia (Fig. 22d). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae absent from protibia, protrochanter, metatrochanter and metafemur; arranged in a single row on mesotibia and metatibia; arranged in two rows on mesotrochanter (Fig. 22f). Apex of abdominal tergite 8 as in Fig. 22g, i. Sternite 8 as in Fig. 22h. Sternite 9 lacking subbasal protuberance. Aedeagus as in Fig. 22a, b.

♀. Abdominal tergite 8 (Fig. 23d, e) without medioapical projection. Sternite 8 as in Fig. 23f. Genital segment as in Fig. 23b, c, g.

Comments. *Megarthrus pictus* is characterised by the elytral color pattern. It is the only Nearctic species possessing angulate temples, as in several Japanese and Oriental species.

Megarthrus smetanai sp.n.
(Figs 24a-i, 25a-k, Map 4)

Type material. Holotype, ♀: CANADA, BRITISH COLUMBIA, 4 mi W Midway, 6.6.1968 (Campbell & Smetana) CNCI. Paratypes (45): same data as holotype, 1♂ and 3♀ in CNCI & MHNG; same data, but ex river debris, 2♂ and 8♀ in CNCI & MHNG. CANADA: BRITISH COLUMBIA, 16 mi W Osoyoos, 5.6.1968 (Campbell & Smetana) 1♂ and 1♀ in CNCI; same data, but 2 mi S Salmo, 9.6.1968, ex river debris, 1♂ in CNCI; same data, but 8 mi W Creston, 10.6.1968, 1♂ in CNCI; same data, but ex river debris, 3♀ in CNCI & MHNG; same data, but 20 mi E Hope, Manning Pk., 21.6.1968, 2♂ in CNCI & MHNG; same data, but 7 mi E Terrace, 26-28.6.1968, 7♂ and 4♀ in CNCI & MHNG. NORTHWEST TERRITORIES, Martin Riv., 10 mi NW Ft. Simpson, 20.6.1972 (Smetana) 1♀ in CNCI. QUEBEC, Gatineau Pk., Lake Philippe, 1.9.1968 (Campbell) 1♂ in CNCI. USA: ALASKA, Wales Hwy, Mi 24, Hess Creek., 200 m, <149°10'W; 65°40'N> 1.7.1978 (Campbell & Smetana) 1♀ in CNCI; same data, but 10.7.1978, 4♂ and 4♀ in CNCI & MHNG.

Distribution. *Megarthrus smetanai* occurs in northwestern North America, ranging from Alaska and Northwest Territories south to southern British Columbia. At present, one isolate record is known also from Quebec (Map. 4).

Biology. Found in river flood debris at low elevations.

Description. Similar to *M. arcuatus* from which it differs as follows: Antenna as in Fig. 24e. Pronotum as in Fig. 25i. Sternites 2 and 3 with median processes as in Fig. 25k, process of sternite 3 widened apically.

Ratios: EL 1.8-2.0; ET 2.0-2.3; PT 2.0-2.2; TPF abs.

♂. Frontoclypeal area, metasternum, protarsomere 5 and abdominal sternites 4-6 unmodified. Protarsomere 1 lacking tenent setae. Mesofemur (Fig. 24g) longer than metafemur. Mesotibia (Fig. 24d) shorter than metatibia (Fig. 24c). Metatarsomere 1 about as long as combined length of metatarsomeres 2-4. Peg-like setae

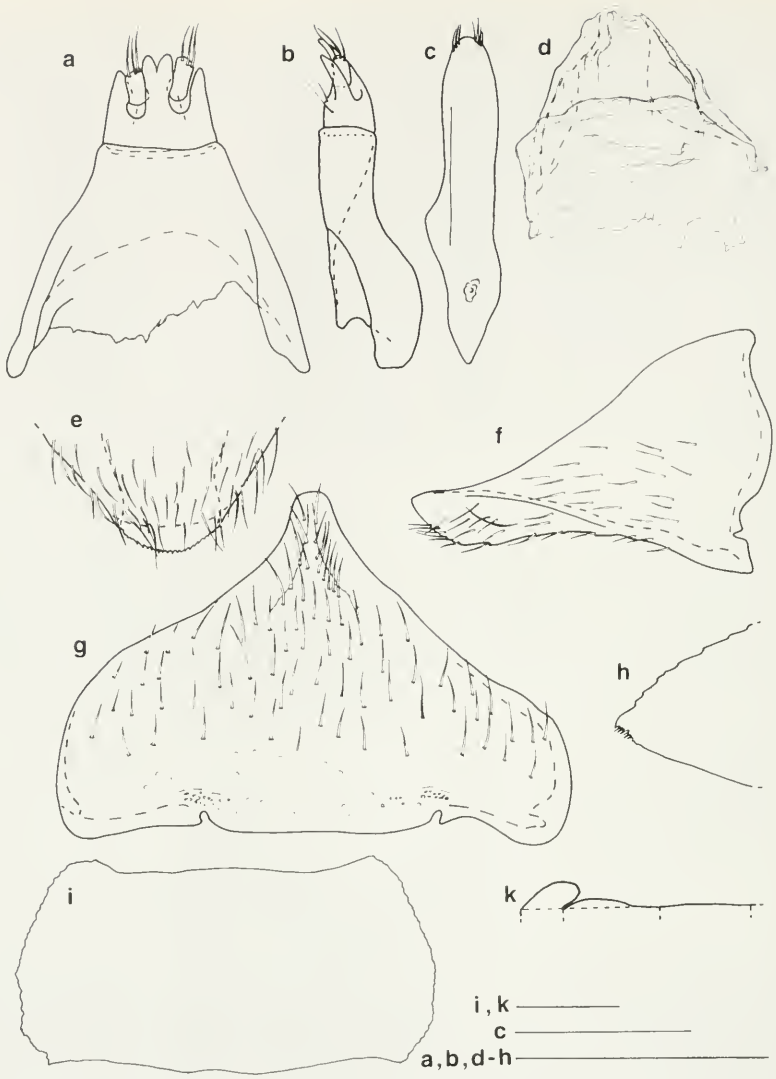


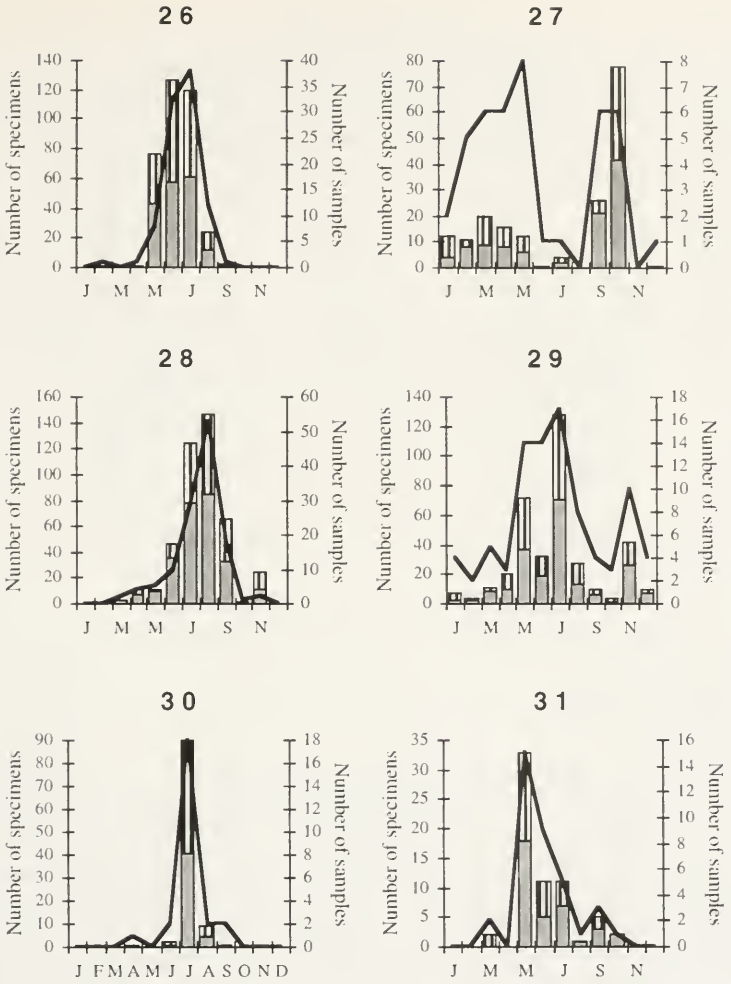
Fig. 25. *Megarthrus smetanai*; a, b, d: female, genital segment, sternites (a) dorsal, (b) lateral and tergites (d) ventral; c: male, abdominal sternite 9; e, h: female, apex of abdominal tergite 8, dorsal and lateral; f, g: female, abdominal sternite 8, lateral and ventral; i: pronotum; k: median processes of abdominal sternites 2-4 (left to right), schematic. Scale bars = 0.2 mm.

absent from protrochanter, protibia, metatrochanter, metafemur and metatibia; arranged in a single row on mesotibia; grouped to form a field on mesotrochanter (Fig. 24g). Apex of abdominal tergite 8 as in Fig. 24f, h. Sternite 8 as in Fig. 24i. Sternite 9 (Fig. 25cc) with a large subbasal protuberance. Aedeagus (Fig. 24a, b) with apical portion of ventral wall of median lobe flat.

♀. Abdominal tergite 8 (Fig. 25e, h) without medioapical projection. Sternite 8 as in Fig. 25f, g. Genital segment as in Fig. 25a, b, d.

Comments. See discussion under *M. arcuatus*.

Etymology. The species is named in honor of one of the collectors, Dr Ales Smetana, Ottawa.



Figs 26-31. Occurrence of *Megarthrus* according to label data of examined specimens of (26) *M. angulicollis*, (27) *M. americanus*, (28) *M. excisus*, (29) *M. pictus*, (30) *M. newtoni* and (31) *M. pecki*. Histograms: number of specimens; broken-lines: number of samples; dotted: males; hatched: females.

Natural history and ecology

The specimens examined were taken in a wide range of habitats, such as carrion, dung, fungi, under bark, in rotting logs, flood debris, leaf litter and in other decaying plant matter throughout the year, at elevations ranging from the sea level to over 3000 m. Nine species come only from sifted and berlese samples, but they represent 49.4 % of the specimens. Thus the more active/common members of the genus (*M. angulicollis*, *M. excisus* and *M. pecki*) are also collected by other means, especially with traps (carrion, dung, window, malaise, pan and flight interception). *Megarthrus arcuatus*, *M. borealis*, *M. occidentalis*, *M. pictus* and *M. smetanai* seem to occur exclusively in decaying ground litter (Table 1).

Based on the label data on examined specimens, the maximum of occurrence of ten species spans over a relatively short period from May to August (Figs 26, 28, 30, 31). Only two species were collected throughout the winter: *M. americanus* (Fig. 27), with an unusually low summer occurrence, and *M. pictus* (Fig. 29), which is the only species found throughout the year. Hammond (in press) observed similar pattern in five British species of *Megarthrus*, which seem to have distinct phenologies.

Map 1. Distribution of *Megarthrus angulicollis* (triangles) and *M. occidentalis* (squares). White mark = State record only. Scale bar = 500 km.

Distributional pattern

None of the twelve species of *Megarthrus* recognised in America north of Mexico (Table 2) is represented in the collections from Mexico, Central America or from the Old World, examined so far. *Megarthrus angulicollis*, *M. excisus* and *M. pecki* are transcontinental. *Megarthrus arcuatus* and *M. smetanai* have disjunct distributions. Only *M. angulicollis* and *M. borealis* are recorded north of Arctic circle, at 67°12' N. Three species, *M. americanus*, *M. excisus* and *M. pecki*, occur in the Appalachian Mountains; *M. americanus* is likely endemic to the range. *Megarthrus ashei* and *M. newtoni* are restricted to the mountains of Arizona and New

Table 1. Summary of the ecology of the *Megarthrus* of America north of Mexico.

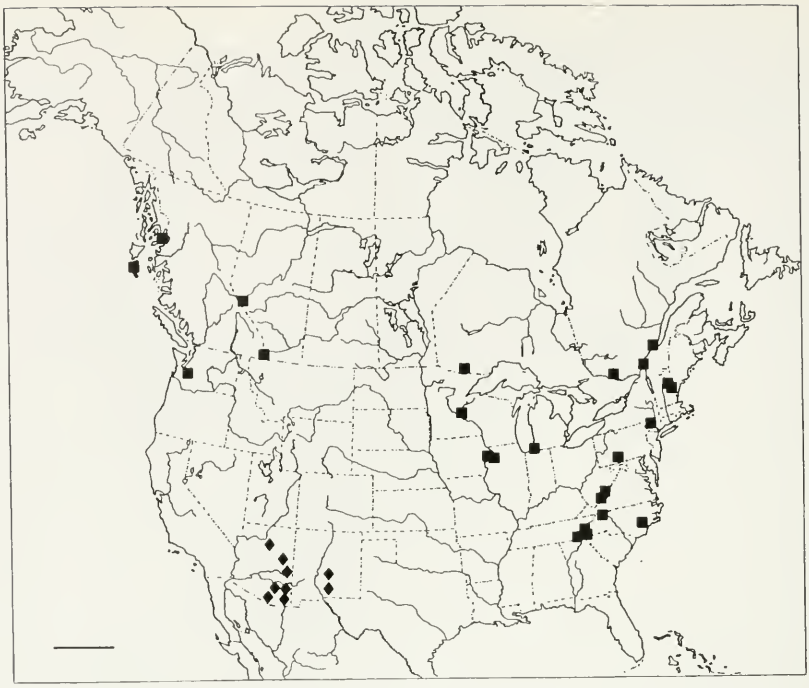
	HABITAT				CLIMATE				ALTITUDINAL RANGE [m a.s.l. x 100]						
Species	dung	carrion	fungi	decaying vegetational matter	subarctic	cold temperate	warm temperate	montane	0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	25 to 30	31 to 35
M. americanus		X	X	X			X								
M. angulicollis	X	X	X	X	X	X		X	X	X	X	X	X	X	X
M. arcuatus				X		X	X	X	X	X	X				
M. ashei	X		X	X				X				X	X	X	
M. atratus	X					X		X	X	X	X	X	X		
M. borealis				X	X				X						
M. excisus	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
M. newtoni			X	X				X					X	X	
M. occidentalis				X		X			X						
M. pecki	X		X	X		X	X	X		X	X	X			
M. pictus				X		X	X		X	X	X	X	X		
M. smetanai				X	X	X			X						
12	5	3	6	11	4	8	5	7	8	6	6	6	6	4	1

Map 2. Distribution of *Megarthrus excisus* (triangles) and *M. pictus* (squares). Scale bar = 500 km.

Mexico. *Megarthrus occidentalis* seems to be a species restricted to the coastal lowlands; *M. pictus* has similar distribution pattern but gets higher up in the Coastal Ranges. *Megarthrus borealis* is known only from Alaska.

Table 2. Summary of the distribution of the *Megarthrus* of America north of Mexico.

Localities / Species	ALASKA	Coast Mountains	Coastal Ranges	Cascade Range	Rocky Mountains		Appalachian Mountains	CANADA east of Rocky Mts
					North	South		
M. americanus							X	
M. angulicollis	X	X		X	X	X		X
M. arcuatus			X	X	X			X
M. ashei						X		
M. atratus	X	X			X			
M. borealis	X							
M. excisus	X				X	X	X	X
M. newtoni						X		
M. occidentalis		X	X					
M. pecki				X	X		X	X
M. pictus	X	X	X	X				
M. smetanai	X	X		X	X			X
					6	4		
12	6	5	3	5	8		3	5



Map 3. Distribution of *Megarthrus ashei* (diamonds) and *M. pecki* (squares). Scale bar = 500 km.

Map 4. Distribution of *Megarthrus americanus* (circles), *M. atratus* (squares; also in the Aleutian Islands) and *M. smetanai* (diamonds). Scale bar = 500 km.

Map 5. Distribution of *Megarthrus arcuatus* (squares), *M. borealis* (diamonds) and *M. newtoni* (triangles). Scale bar = 500 km.

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