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A Key to the Ants of Gothic

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(Taxonomy updated June 22, 2011 by William K. Petry)

The area surrounding the Rocky Mountain Biological Laboratory at Gothic, Colorado, supports a diverse ant fauna. 35 ant species, representing three sub-families, have been collected at or near the RMBL. This key and checklist includes ants found from Almont (elev. 8000') to the higher ridges surrounding the East River valley (elev. 12,500'). Collection efforts from around the RMBL have found all but six of the alpine and subalpine ant species listed in Gregg (1963) The Ants of Colorado and Allred (1982) The Ants of Utah. These six ant species, most of which are quite rare in general, are included in the key in anticipation of their discovery, bringing the total to 41 species. With their inclusion, this key should prove useful in identifying high altitude ants (i.e. above 8000' at the latitude of Central Colorado) throughout the Rocky Mountains. A checklist showing the ants involved is given below. Those high-altitude species which have yet to be found at the RMBL are denoted in the list with an asterisk. The genera *Myrmica* and *Formica* are most prevalent in terms of both diversity (7 and 22 species, respectively) and overall numbers. Their respective subfamilies, Myrmicinae and Formicinae, consequently possess 40 of the 41 species described in this key. The subfamily Dolichoderinae is represented only by the ubiquitous nearctic ant, *Tapinoma sessile*, although colonies of this ant are quite common in the area.

Collecting Ants

Virtually every subalpine and alpine ant spends at least part of its colony lifetime under a rock. Colonies take advantage of solar energy absorbed by these rocks to warm their larvae, shortening development time. Optimal rocks are fairly thin, extending only two to three inches into the soil. After turning rocks, look for tunnels and any other excavations; on sunny afternoons, resident colonies will have often placed their brood on the surface directly below the rock. As with anything else, overturned rocks should be returned to their exact position; many organisms prefer to live under rocks, while others may be killed by an errantly placed rock. In pastures lacking rocks, daring collectors will find that last years cow pats are being used by ants for the same purposes. As might be expected due to the importance of solar radiation, the vast majority of high-altitude ants are found in clearings and meadows.

Ant mounds are often seen in subalpine meadows. These belong exclusively to ants of the genus *Formica*. They range in size from large mounds covered with dry grasses (thatch) or pine needles (*Formica obscuripes*) to small (.25 m in diam.) mounds recognizable only by the short tufts of grass on their crowns.

Finally, a good number of ants can be found in decaying logs both within and on the perimeter of spruce-fir or aspen woodlands. The genus *Camponotus*, for example, is confined to such habitats.

Specimens of these ants are best collected by setting out and monitoring baits (sugar, cat food and tuna work well) or by crawling around the log in search of stray foragers.

Ant collecting equipment is fairly simple. Some type of vial is needed for specimen collection. If the intention is to keep colonies alive, they do quite well (for several days) when packed in their own soil and kept cool (4-15^{o} C). Another important collection device is the pooter, or aspirator. Pooters consist of a small, sealed chamber, from which two lengths of tubing emerge (a typical pooter is shown in Figure 4). The goal is to inhale sharply on one end while holding the other next to the desired ant (s). Various modifications (such as a mesh on 'your' end to keep you from swallowing your subjects) are possible on the basic design. Finally, ants are freqently collected by use of pitfall traps in a variety of habitats. Mle and femal sexual offspring can be collected using Malaise traps, or with nets at reproductive colonies or landmarks used during mating flights (in early August, the RMBL Dining Hall supports a consistently large mating swarm of ants in the genus *Myrmica*).

Identification of Ants

The key was set up using characters recognized by Creighton (1950), Gregg (1963) and Allred (1982), and through discussions with Prof. Andre Francoeur. Figures and a glossary are included to help identification. In identifying ants beyond the subfamily level, it is essential to use a fairly powerful dissecting microscope. A magnification of 40x is the minimum required, and certain characters are easily seen only at a magnification of 60x or greater. Identification is based on worker characteristics, although queens and males can be extremely helpful in determining closely related species. Collections for identification should include a minimum of 5 - 10 ants, since many genera (especially the genus *Formica*) may require some dissection. Any extra workers or sexuals would be gladly received by the RMBL Entomology Collection and/or the author (in vials of 70% ethanol would be great). In several cases trinomial (specific, then subspecific names) names are used, as evidenced by the list below. This is done only when these subspecies recently have been raised to full species (i.e. in Smith, 1979).

Following the identification key, all species are listed by subfamily and genus (in the order shown in the list below). Synonymous names are given below the current name (using Smith, 1979, and Francoeur, unpublished data). Records and elevations are given for all collections made around Gothic. Also, Colorado elevational ranges (from Gregg, 1963) are listed. Finally, habitat, nest sites and other known aspects of their natural histories are given for each species.

Ant Checklist

Subfamily Myrmicinae

Myrmica incompleta
Myrmica discontinua (formerly *M. brevispinosa discontinua*)
Myrmica fracticornis (formerly *M. lobicornis fracticornis*)
Myrmica tahoensis
Myrm,ica detritinodis
Myrmica emeryana
Myrmica monticola
Leptothorax muscorum (possibly a species of *Temnothorax*)
Leptothorax crassipilis (possibly a species of *Temnothorax*)

Subfamily Dolichoderinae

Tapinoma sessile

Subfamily Formicinae

Lasius alienus (formerly *L. alienus americanus*)
Lasius fallax
Lasius nearcticus
* *Lasius niger neoniger*
Lasius pallitarsis (formerly *L. niger sitkaensis*)
Formica lasioides
Formica neogagates
Formica altipetens
Formica canadensis
* *Formica hewitti*
Formica fusca
Formica argentea
Formica podzolica
Formica neorufibarbis
* *Formica oreas*
* *Formica obscuriventris clivia*
Formica obscuripes
Formica coloradensis (formerly *F. integroides coloradensis*)
Formica planipilis (formerly *F. integroides planipilis*)
Formica propinqua (formerly *F. integroides propinqua*)
Formica opaciventris
Formica densiventris (formerly *F. rasilis densiventris* and *F. rasilis*)
* *Formica adamsi alpina* (formerly *F. whymperi alpina*)
Formica obtusopilosa
Formica puberula
Formica aserva (formerly *F. subnuda*)
Camponotus herculeanus
Camponotus modoc (formerly *C. pennsylvanica modoc*)
Camponotus vicinus

Polyergus breviceps

* = Species which are potential inhabitants of the RMBL area

Key to Subfamilies

1.	Pedicel of two segments (Figure 1)	Myrmicinae
	Pedicel of one segment (Figure 2)	2
2.(1)	Anus terminal, circular and fringed with hairs (Figure 3)	Formicinae
	Anus subterminal (ventral), slit-shaped and not fringed with hairs (one species, *Tapinoma sessile*)	Dolichoderinae

Subfamily Myrmicinae - Key to Genera

1.	Antennae have 12 segments; the last 3 antennal segments together much smaller than the rest of the antenna (not including the scape)	*Myrmica*
	Antennae have 11 segments; the last 3 antennal segments form an abrupt club, together are nearly as long as the rest of the antenna (not including the scape); usually smaller in size than *Myrmica*	*Leptothorax*

Genus *Myrmica* - Key to Species

1.	Scape gradually and evenly bent at base, upper area does not form right angle at bend	2
	Scape sharply bent at base, upper area forms right angle	3
2.(1)	Lateral margin of frontal carina thick and deflected toward base of antenna (Figure)	*incompleta*
	Lateral margin of frontal carina rounded and thin, deflected upward	*discontinua*
3.(1)	Bend of scape has large, thick lobed plate that extends backward along basal third of scape	*monticola*
	Bend of scape has small transverse plate, or thin scale, which surrounds bend like a collar and does not extend backward	4
4.(3)	Epinotal spines bent downward, thorax reddish yellow, head and gaster black with reddish tinge; scale of scape small and diagonally transverse on upper surface of scape, continues as prominent transparent flange along inner surface of scape below bend	*emeryana*
	Epinotal spines straight, color combination and scale of scape not as above	5
5.(4)	Antennal lamina small, transverse, and forming an angular tooth on the innerside of the bend; antennal scape of **male** gradually bent at the base and not forming a distinct angle; epinotal spines of male reduced to rounded angles, the epinotal rugae feeble or lacking	*fracticornis*
	Antennal lamina does not form angular tooth on the inner side of the bend	6

6.(5)	Antennal lamina forms a spoonlike, symmetrical flange; antennal scape of **male** abruptly bent at the base with the upper surface angulate at the bend; epinotal spines of male well developed, epinotum with distinct rugae	*tahoensis*
	Antennal lamina transverse, slping down on anterior side; antennal scape of **male** shorter in length than next three segments, gradually bent at the base and not forming a distinct angle	*detritinodis*

Genus *Leptothorax* - Key to Species (Possibly *Temnothorax***)**

1.	Erect body hairs long, numerous, usually pointed	*crassipilis*
	Erect body hairs short, sparse, usually thickened at top	*muscorum*

Subfamily Dolichoderinae

	A very small, dark brown to black ant; very distinctive, sweetly pungent odor when aspirated or crushed	*Tapinoma sessile*

Subfamily Formicinae - Key to Genera

1.	Dorsum of thorax in profile evenly convex	*Camponotus*
	Dorsum of thorax depressed behind level of mesonotum	2
2.(1)	Mandibles sickle shaped, tips sharply pointed	*Polyergus*
	Mandibles triangular (Figure)	3
3.(2)	Ocelli large and conspicuous; frontal carinae prominenent, their lateral margins deflected upward	*Formica*
	Ocelli small, indistinct or absent, frontal carinae poorly marked, their lateral margins flat	*Lasius*

Genus *Lasius* - Key to Species

1.	Eyes large, their length 0.2 times or more width of head; eyes have around 200 facets	2
	Eyes small, their length 0.17 times or less than width of head; eyes have 100 or less facets	4
2.(1)	Antennal scapes and tibia with numerous erect or suberect hairs, body hairs very abundant	3
	Antennal scapes and tibia with less than 10 erect or suberect hairs	*alienus*

3.(2)	Ocelli very indistinct; petiolar scale flat and thin, its crest usually slightly emarginate; body hairs moderate	*neoniger*
	Ocelli always distinct; petiolar scale thicker, crest almost always arched and convex; never emarginate; body hairs dense	*pallitarsis*
4.(1)	Outer surface of tibia has numerous erect or suberect hairs	*fallax*
	Outer surface of tibia has only two suberect hairs	*nearcticus*

Genus *Formica* - Key to Species

1.	Ventral margin of clypeus (near where mandibles meet has median notch; short hairs on gaster dense; body bicolored with head and thorax reddish brown or reddish yellow, gaster brown or black; in side profile dorsomedian area of the epinotum between mesoepinotal suture and petiole angled, not broadly curved	2
	Lacks combination of <u>all</u> above characters	4
2.(1)	Dorsum of thorax lacks erect hairs, or has few fine short inconspicuous ones only on pronotum	*aserva*
	Dorsum of pronotum and mesonotum has conspicuous erect hairs	3
3.(2)	Gaster has long, stout, silvery, erect hairs blunt at tip; erect hairs on other parts of body about as abundant as those on gaster	*obtusopilosa*
	Erect hairs on gaster yellow, not blunt at tip; erect hairs on other parts of the body much more sparse than on gaster	*puberula*
4.(1)	From posterior profile, upper surface of side of epinotum evenly curved to base (end near head); body surface shining and uniformly brown or black	5
	From posterior profile, upper surface of side of epinotum angled before its base (end near head); body surface dull and either uniformly or bi-colored	6
5.(4)	Scape has short, delicate, whitish erect hairs	*lasioides*
	Scape lacks erect hairs except for small cluster at extreme tip	*neogagates*
6.(4)	Dorsal border of head of larger workers strongly concave; pronotum in profile angled between base and and upper surface	*opaciventris*
	Dorsal border of head of larger workers straight or only slightly concave; pronotum in profile evenly convex	7
7.(6)	Erect hairs on pronotum distinctly broader at tip than at base	8
	Erect hairs on pronotum absent, or, if present, taper from base to pointed tip or of equal width throughout	10
8.(7)	Crest of petiole lacks erect hairs; gaster pubescense thin	*adamsi alpina*
	Crest of petiole has erect hairs; gaster pubescence (dorsal side) dense	*densiventris*
~~9.(8)~~	~~Erect hairs on dorsum of head and thorax sparse, or inconspicuous or absent (lumped with below)~~	~~*densiventris*~~
	~~Erect hairs on dorsum of head and thorax abundant, inconspicuous~~	~~*densiventris*~~

10.(7) Body bicolored, head and thorax reddish or yellowish red, both lighter than dark gaster; front of head shining; frontal carinae strongly divergent (*rufa* group) 11
Body unicolored or bicolored, if bicolored then only thorax lighter than gaster; front of head opaque; frontal carinae parallel or moderately divergent dorsally (fusca group) 16

11.(10) Antennal scapes covered with delicate erect or suberect hairs *oreas*
Scapes lack hairs, except at the extreme tip 12

12.(11) In ventral profile, median face of clypeus on each side of keel almost flattened to form an abrupt curve or angle between keel and fossa *obscuriventris clivia*
In ventral profile, upper face of clypeus not flattened, face forms a gradual curve from keel to fossa 13

13.(12) Head of largest worker as broad as long *obscuripes*
Head of largest worker longer than broad 14

14.(13) Erect hairs on middle and hind tibia abundant 15
Erect hairs on tibia confined to a double row on the flexor surface *propinqua*

15.(14) Head and thorax clear red, legs about same color as thorax *coloradensis*
Head and thorax of smaller workers marked with brown, legs brownish black *planipilis*

16.(10) Metasternum has two distinct hairy lobes that arise on each side of the spinasternal cavity 17
Metasternum lacks such lobes 18

17.(16) Cheek and side of prothorax have erect hairs *canadensis*
Cheek and side of prothorax lack erect hairs *altipetens*

18.(16) Cheek between eye and mandible has coarse, elongata puncta widely spaced on upper half *hewitti*
Cheek between eye and mandible lacks coarse, elongata puncta, if concentrated mostly on upper half 19

19.(18) Head and body of uniform color 20
Head and body each bicolored, thorax lighter than head and gaster, perhaps only slightly (may be confused with *rufa* group) *neorufibarbis*

20.(19) Hairs on dorsum of first segment of gaster (exclusive of posterior row) usually less than ten; spinasternal cavity surrounded by hairs *fusca*
Hairs on dorsum of first segment of gaster (exclusive of posterior row) usually more than ten; spinasternal cavity not surrounded by hairs 21

21.(20) Cheek and dorsum of first four gaster segments have dense pubescence producing silvery luster *argentea*
Cheek and dorsum of first four gaster segments have normal to thin

	pubescence, not silvery, but may have silky luster	*podzolica*

Genus *Camponotus* - Key to Species

1.	Clypeus lacks distinct ridge or keel, but sometimes has a slight one; scape not flattened at base; head broader than long/tall	2
	Clypeus has distinct ridge or keel, sometimes reduced; if reduced, scape flattened at base; head as long or longer than broad	*vicinus*
2.(1)	Scape, when tucked all the way to the top corner of the head, reaches only to or barely extends beyond corner of head; HUGE	*herculeanus*
	Scape, when tucked all the way to the top corner of the head, extends beyond corner of head by an amount greater than the maximum diameter of the scape	*modoc*

Genus *Polyergus*

One species in area, *Polyergus breviceps*; sickle-shaped mandibles are unique

Field and Taxonomy Notes

Subfamily Myrmicinae

Myrmica incompleta

(*Myrmica brevinodis sulcinodoides*)
Records: Gothic: RG (63), JDE (89, # 189)
Elevational Range: 4600-10500'
Notes: Found under a cow pat, Gothic Research Meadow. Gregg (63) found male and female alates in nests and having flown during August; flights in late summer

Myrmica discontinua (formerly *M. brevispinosa discontinua*)

Records: Gothic: JDE (89, # 289), B&C (83), T&C(83); Almont: RG(55)
Elevational Range: 6500-10500'
Notes: Under rock, SE side of Research Meadow; *discontinua* 'race' (Allred, 82), separated from *brevispinosa* by dark brown color, vs. orange yellow in latter. Gregg (63) "uncommon"

Myrmica fracticornis (formerly *M. lobicornis fracticornis*)

Records: Gothic: G(63)
Elevational Range: 6900-11200'
Notes: Under stones, wood, near streams

Myrmica tahoensis

Records: Gothic: JE
Elevational Range: *
Notes: Very common in area, often mis-identified as *M. lobicornis lobifrons*. Some intermediate individuals with traits of *M. detritinodis*

Myrmica detritinodis

Records: Gothic: JE
Elevational Range: *
Notes: Fairly common in Kettle Ponds area, otherwise rare.

Myrmica emeryana

(*Myrmica schencki emeryana*)
Records: Gothic: DI(73), Almont: G(63)
Elevational Range: 5800-9713'
Notes: Species fairly widespread in the northern U.S. and southern Canada. Under rock in Gothic townsite (9500').

Myrmica monticola

Records: Almont: G(63)
Elevational Range: 5800-9713'
Notes: Probably Unlikely to be found much higher than Cement Creek

Leptothorax muscorum (possibly a species of *Temnothorax*)

(*L. canadensis*)
Records: Gothic: G(63), JDE(88), Almont: G(63)
Elevational Range: 5700-10505'
Notes: *Muscorum* may encompass several valid species, according to recent work by S. Cover; most commonly found form of genus in Colorado.

Leptothorax crassipilis (possibly a species of *Temnothorax*)

Records: Almont: G(63)
Elevational Range: 5700-9100'
Notes: y

Subfamily Dolichoderinae

Tapinoma sessile

Records: Gothic: G(63), IN(73), JDE(88,89, #)
Elevational Range: 3500-10505'
Notes: UBIQUITOUS; small dark ants in small colonies, under rocks, cowpies, etc. in subalpine meadows. Transient ants, seem to move colonies several times over the course of the year; seem to be polygynous, queens not much larger than workers and relatively 'active'.

Subfamily Formicinae

Lasius alienus (formerly *L. alienus americanus*)

Records: Almont: G(63)
Elevational Range: 3500-10400'
Notes: y

Lasius fallax

Records: none
Elevational Range: Gregg gives none (see below), Allred found as high as 9750' in Utah.
Notes: Gregg was skeptical of Wilson's placing *fallax* as a new species. From Wilson's account this ant should be fairly common (for the genus) around the RMBL.

Lasius nearcticus

(*L. flavus nearcticus*)
Records: y
Elevational Range: 6250-9000'
Notes: Might get as high as RMBL, genus found mainly in rocky, sage areas

Lasius niger neoniger

Records: none
Elevational Range: 3500-12400'
Notes: where is it

Lasius pallitarsis (formerly *L. niger sitkaensis*)

(*L. niger sitkaensis*)
Records: Gothic: IN(76)

Elevational Range: 4600-12200'
Notes: ?

Formica lasioides

(in subgenus *Proformica*)
Records: Gothic: G(63), IN(73), Almont: G(63)
Elevational Range: 4800-10505'
Notes: Inouye found under rock in Gothic townsite (Lead King cabin)

Formica neogagates

Records: Almont: G(63)
Elevational Range: 3500-9700'
Notes: RMBL is definitely on the fringe of this ant's range

Formica altipetens

Records: Almont: G(63)
Elevational Range: 6000-11000'
Notes: ?

Formica canadensis

Records: IN(?)
Elevational Range: 3500-11000'
Notes: Inouye found under rock in Virginia Basin, called it the 'fast' black ant

Formica hewitti

Records: none
Elevational Range: 5354-10000'
Notes: predominately in coniferous habitats

Formica fusca

Records: Gothic: G(63), IN(?), JDE(89, #)

Elevational Range: 5154-12500'
Notes: Most common *Formica*, wide range, Inouye found under rocks in both Va. Basin and Gothic townsite

Formica argentea

Records: Gothic: JDE(89)
Elevational Range: 4500-11000'
Notes: Under rocks, 200 m S.E. of Research Meadow in clearing along Deer Creek trail

Formica podzolica

Records: B&C(83)
Elevational Range: Not given by Gregg (see below)
Notes: New species in revision by Francouer (1972), a fairly common ant in meadows near aspen groves

Formica neorufibarbis

Records: IN(73)
Elevational Range: 6900-14260
Notes: Inouye found twice, under logs in Va. Basin (11,000' and 11,350'). The subspecies *gelida* is undoubtedly the most cold-adapted ant in North America, and was found by Gregg (63) only *above* 8000'.

Francouer (72) returned the subspecies *gelida* to *neorufibarbis*, the key to separate the two is given below for trivia buffs, and in preparation for any further revisions

Thorax clear red to reddish yellow, distinctly lighter in color than head and gaster	*neorufibarbis*
Thorax deep reddish brown to blackish brown, only slightly lighter in color than head and gaster	*neorufibarbis gelida*

Formica oreas

Records: none
Elevational Range: 5200-10505'
Notes: uncommon

Formica obscuriventris clivia

Records: none
Elevational Range: 5354-10000'
Notes:

Formica obscuripes

Records: Gothic: IN(79), JDE(87,88,89, #) Crested Butte: Gregg (63)
Elevational Range: 3500-9500'
Notes: Large thatch mounds in open, moist, generally south-facing meadows. Several are in meadow just downhill from the East River bridge in Gothic. These are the largest of the ants with red and thorax and black abdommen.

Formica coloradensis (formerly *F. integroides coloradensis*)

Records: Gothic: G(63)
Elevational Range: 5354-11600
Notes: ?

Formica planipilis (formerly *F. integroides planipilis*)

Records: Gothic: IN (?)
Elevational Range: 6400-12000'
Notes: /

Formica propinqua (formerly *F. integroides propinqua*)

Records: Gothic: IN(?)
Elevational Range: 6100-10000'
Notes: Inouye found under rock in Gothic townsite

Formica opaciventris

Records: Gothic: IN(?)
Elevational Range: 5160-10500'
Notes: Found with *Formica fusca;* this ant is a temporary slavemaker

Formica densiventris (formerly *F. rasilis densiventris* and *F. rasilis*) **Same as below

Records: none
Elevational Range: 5630-10500'
Notes: conifers; uncommon; parasitic on ?

Formica densiventris (formerly *F. rasilis densiventris* and *F. rasilis*) **Same as above

Records: Gothic: Gregg (63), IN(?)
Elevational Range: 5400-11542'
Notes: Inouye found under log in Va. Basin (11,350') Host?

Formica adamsi alpina (formerly *F. whymperi alpina*)

Records: none
Elevational Range: 4800-11300'
Notes: parasite on colonies of *F. neoclara* and *neorufibarbis gelida*

Formica obtusopilosa

Records: Almont: G(63)
Elevational Range: 4800-9500'
Notes: facultative slavemaker, many hosts

Formica puberula

Records: Gothic: G(63)
Elevational Range: 5100-10000'
Notes: ?

Formica aserva (formerly *F. subnuda*)

Records: Gothic: G(63)
Elevational Range: 5000-13000'
Notes: enslaves members of the *fusca* group

Camponotus herculeanus

Records: Gothic: G(63), JDE(89, #)

Elevational Range: 5150-12500'
Notes: Archetypical boreal ant. As with most 'carpenter' ants, often found in decaying logs

Camponotus modoc (formerly *C. pennsylvanica modoc*)

Records: Almont: G(63)
Elevational Range: 4800-11300'
Notes: logs

Camponotus vicinus

Records: Almont: G(63)
Elevational Range: 3500-9600'
Notes: In different subgenus from other two *Camponotus*

Polyergus breviceps

Records: Gothic: T&C(83)
Elevational Range: 5080-8900'
Notes: Found several times in Gothic area, in meadows to the south of the Research Meadow (JE, 1990). All members of the genus *Polyergus* are obligatory slavemakers, *P. breviceps* is the most abundant in Colorado. Slaves include *F. fusca*..