

W L Brown
C 1

The Ants of North Dakota

By GEORGE C. WHEELER
and ESTHER W. WHEELER
University of North Dakota

Reprinted from
North Dakota Historical Quarterly
Vol. XI, No. 4, October, 1944

THE ANTS OF NORTH DAKOTA

By GEORGE C. WHEELER and ESTHER W. WHEELER¹
University of North Dakota

PART I. GENERAL CONSIDERATIONS

HISTORICAL NOTE

When we came to North Dakota in 1926 there were only three published records of ants collected in the state: McCook, 1883 (*Pogonomyrmex occidentalis*); McCook, 1884 (*Formica rufa obscuripes*); and Wheeler, 1910 (*Camponotus herculeanus pennsylvanicus*). Since 1926 several records have been published, all but one by our former student and present colleague, Dr. Neal A. Weber. We have omitted Emery's "Dakota" records since there is no way of ascertaining whether they refer to North Dakota or South Dakota; we are inclined to suspect that they may refer to the Black Hills in South Dakota.²

This study is based upon ants from approximately 1,400 colonies. Most of them were collected by six of our former students: Joe Davis, James E. Goldsberry, C. V. Johnson, Clinton Schonberger, Richard P. Uhlmann, and Neal A. Weber. We wish at this point to acknowledge our indebtedness to them. Further acknowledgment will be made by giving the collector's initials in parenthesis after each record. Our own records are marked by the initials G. & E.W. A few other collectors are cited by their full names.

GEOGRAPHICAL DISTRIBUTION

An excellent account of the life zones of North Dakota based on the Merriam system has been given by Bailey.³ We should like to quote a few pertinent passages. "In a comparatively level prairie country there are no striking contrasts in the distribution areas, and the life zones blend almost insensibly into each other. The greater part of North Dakota lies in the Transition Zone, which, in crossing the continent as a broad band between the warm Upper Austral (Sonoran) and the cold Boreal Zones, spreads to its greatest width over the northern prairies of the Dakotas, Montana, and

Saskatchewan. It so nearly covers North Dakota that many of its species are found scattered over the limited areas of both the Canadian zone of the Turtle Mountains on the north and the narrow tongues of Upper Austral thrusting into parts of the Missouri River Valley from the south and west." (p. 8)

"The Upper Austral Zone, the Upper Sonoran, or semiarid subdivision of which penetrates only into the warmest corners of the State, is in no part sufficiently extensive to be marked by entirely characteristic mammals, birds, or plants. In its narrow strips along the Missouri Valley below Bismarck, down the Missouri and Yellowstone Valleys to Williston, along the Little Missouri Valley above the Killdeer Mountains, and on many dry, warm slopes between these areas, it is strongly characterized. So near the edge of a zone, however, the slight inclination of a slope to the north reduces the heat received from the sun's rays sufficiently to change the flora and fauna in part or wholly to that of the colder, higher zone, while a steep slope facing the direct rays of the sun will attract many species of the warmer, lower zone above their normal limits. Hence, in a rough and broken country on the border of the two zones, conditions are so complicated and often confusing that the areas can be mapped in only a very general way." (p. 8)

"The Transition Zone covers the whole of North Dakota with the exception of the Turtle Mountains and various cold slopes and gulches in other elevated areas, where Canadian Zone conditions prevail, and the warmer Upper Austral valleys, of the Missouri and Little Missouri Rivers. Its range of climate shows no marked variation over the State, except for a slight decrease in temperature northward and a gradual decrease in rainfall westward. . . . The westward decrease is so gradual that no sharp line can be drawn between the humid eastern and semiarid western subdivisions of the zone. Doctor Merriam . . . places the dividing line a little east of the one-hundredth meridian. The change from humid to semiarid is noticeably marked by the shortening of the prairie grasses and the appearance of western drought-resistant species.

"*The humid Transition Zone* covers practically all of the State west to and including the Dakota (James) and Mouse (Souris) River Valleys. It is generally characterized by a heavy growth of prairie grasses, by strips of timber along the streams, and by thickets of brush in protected locations.

"*The semiarid Transition Zone* covers most of the western half of the State, including the high country on both sides of the Missouri River Valley and much of the Badlands region. It is gener-

ally characterized by short-grass plains and a limited mixture of Rocky Mountain species of mammals, birds, and plants." (p. 11)

"The Canadian Zone, which sweeps across the continent mainly north of the United States and is generally characterized by forests of spruce, fir, hemlock, aspen, and birch, is only lightly represented in a few restricted areas in North Dakota. Its largest area lies within the Turtle Mountains, where Canadian-Zone species dominate the flora and fauna, although by no means unmixed with Transition species." (p. 14)

"The Turtle Mountains at their highest rise less than a thousand feet above the prairie base level, and the actual altitude of the highest hills is only approximately 2,500 feet. Although their elevation is not such as to lower perceptibly the general temperature, it is sufficient to attract an unusually heavy precipitation. This, in the form of rain and snow, produces not only a cooling effect on the surface, but a heavy growth of vegetation, largely arboreal and shrubby, the only extensive openings in which are lakes and marshes. The timber is largely aspen mingled with balsam poplar, white birch, and a few oaks, elms, and boxelders. The forests have been frequently swept away by fires, which fact undoubtedly accounts for the complete absence of conifers. . . . The preponderance of aspens also indicates frequent fires, as these trees, more than any other in this region, quickly reforest burned areas." (p. 15)

We have not been able to generalize with much confidence concerning the zoögeographical relations of the North Dakota ant fauna. We have encountered two difficulties. First, our knowledge of the ant fauna of the state is still inadequate; intensive collecting should be done in many more localities. Second, there is no comprehensive treatise which summarizes our present knowledge of the distribution of North American ants. Wheeler's *Ants* is out-of-date in this respect. The ranges given in Emery's *Genera Insectorum* are too indefinite to be of much value in such a problem.⁴

From the available data, however, we have reached certain tentative conclusions. Of the 71 forms (i.e., species and subspecies) of ants listed in this study:—

- 1 is domesticated and cosmopolitan
- 1 is new and known only from North Dakota
- 7 are of northern distribution

- 6 are of northeastern distribution
- 6 are of eastern distribution
- 2 are of southeastern distribution
- 1 is of southern distribution
- 10 are of southwestern distribution
- 17 are of western distribution
- 20 are widely distributed east of the Rocky Mountains and north of the Gulf States

If we deduct the first two categories and the last, we have a total of 49 forms which have more or less restricted ranges. Combining other categories we find that 19, or 39%, of the 49 are northern, northeastern or eastern, while 27, or 55%, are western or southwestern. This suggests that the ant fauna of the state as a whole has a predominantly western-southwestern complexion.

Let us see how Bailey's zones may be applied to the ants of North Dakota. Of the 70 native species, 37 (or 53%) are of state-wide distribution. But, of those ants recorded only from the *eastern* half of the state, two are widely distributed east of the Rocky Mountains and eight are of western or southwestern distribution. It is therefore safe to assume that more intensive collection in the state would show them to be statewide also. Similarly, of the forms recorded only from the *western* half of the state three are of a wide distribution and three are northern, northeastern or eastern. Adding all these we find that the number of statewide forms will probably reach 53 (or 76%). Since the remaining forms are not concentrated in any restricted area or areas, this would tend to substantiate Bailey's statement that "in a comparatively level prairie country there are no striking contrasts in distribution areas."

What of the smaller zones? First, let us consider the Sonoran. There are no records for its western tongue and few for the south-central; but the southwestern tongue (the Badlands) has been studied rather intensively. A few ants seem to be characteristic of the North Dakota Sonoran. *Pogonomyrmex occidentalis* has been recorded only from the Badlands and the south-central tongue; its range is from North Dakota southward to Oklahoma, westward to the Pacific (except California) and northwestward into British Columbia. *Manica mutica*, a western species, occurs only in the Badlands. *Pheidole vinelandica* which has been found only in the Badlands, has an eastern, southeastern and southern range. A

southern ant, *Dorymyrmex pyramicus niger*, has been taken only in the southern and southwestern tongues and once on the intervening prairie. *Camponotus (Myrmentoma) sayi*, also known only from the Badlands, has been previously reported only from Arizona.

Only two ants seem to be characteristic of the Turtle Mountains, which Bailey regards as Canadian. These are *Stenammina brevicorne diecki* and *Camponotus herculeanus whymeri* — both northern in distribution.

Forty forms have been listed from the Badlands; five of these may be considered characteristic. Twenty-one forms are known from the Turtle Mountains; two of these are characteristic. These data support Bailey's assertion that the Transition Zone so nearly covers North Dakota that many of its species are found scattered over the limited areas of both the other zones.

Stevens accepts the Merriam life zones but also suggests a line of demarcation between eastern and western floras. "The fact that North Dakota is only partially included within the limits used by eastern and western manuals, and that its northern boundary is also that of the United States, makes the composition and distribution of its flora a question of considerable interest. . . . To a botanist unfamiliar with the plants west of the range of the eastern manuals, the first feature of interest is the western plants. To the writer it has always seemed that the most natural limit of the western forms is the Missouri River in the southern part of the state and a line continued across the state in the direction of its course there, which would be about longitude 100° 30' to 101° 30'." ⁵

Recently Dice has used approximately the line suggested by Stevens to separate two biotic provinces — the Saskatchewan and the Illinoian. According to Dice only two provinces are represented in North Dakota: the western half of the state, i.e., west of Steven's line, is in the Saskatchewan, while the eastern half is in the Illinoian. ⁶

How does the North Dakota ant fauna fit into Dice's biotic provinces? Of the 70 native species recorded 37 (or 53%) are statewide, 15 (or 21%) are limited to the eastern half of the state, i.e., east of Steven's line, and 16 (or 23%) are limited to the western half. But, if we consider the entire ranges (i.e., outside North Dakota) we find this situation:

<i>General Range</i>	<i>East of the Line</i>	<i>West of the Line</i>
Widely distributed	2	3
Northern	2	1
Northeastern	1	1
Eastern	2	1
Southeastern	..	1
Southern	..	1
Southwestern	2	4
Western	6	4

May we not assume that the following forms in the table will eventually, after more intensive collecting, be found to be statewide: (1) forms of wide distribution outside the state; (2) northern, northeastern and eastern forms now known only from the western half of the state; (3) western and southwestern forms now known only from the eastern half of the state? Suppose then, that we remove them from the table and regard them as potentially statewide. This leaves the table like this:

<i>General Range</i>	<i>East of the Line</i>	<i>West of the Line</i>
Northern	2	..
Northeastern	1	..
Eastern	2	..
Southeastern	..	1
Southern	..	1
Southwestern	..	4
Western	..	4

Thus, if we allow the assumption, the ant fauna is correlated with Dice's system of biotic provinces.

One of the most surprising features of the North Dakota ant fauna is the absence of certain genera which might confidently be expected to occur in the Red River valley or in the Turtle Mountains. No ant belonging to the subfamily Ponerinae has been found in the state. We have collected *Ponera coarctata pennsylvanica* Buckley as far west as Lake Itasca in Minnesota, which is only 90 miles from the North Dakota boundary. Also no representative of Aphaenogaster or of Myrmecina in the Myrmicinae nor of Brachymyrmex or Prenolepis in the Formicinae have been collected.

We have followed Creighton's excellent proposal that all varieties be raised to subspecific rank.⁷ For example, *Camponotus herculeanus ligniperda* var. *noveboracensis* has now become *Camponotus*

herculeanus noveboracensis. Aside from this change, we have followed the nomenclature used in the *Genera Insectorum* as closely as possible.

References in the text to citations in the bibliography are made by the date in parenthesis after the author's name or by the author's name and the date in parenthesis, e.g. (1883, p. 294) or (McCook, 1883, p. 294). The bibliography includes only citations which refer to the ants of North Dakota. References to other citations are made by footnotes.

A number of localities recorded in this study are difficult or impossible to locate on any ordinary maps. We are therefore listing them herewith and describing the location in more detail for the benefit of students of distribution. In some parts of the state it is desirable or even necessary to cite localities by giving the township in which the collection was made, because it is often many miles from any town, village or post office. In the western part of the state, where townships are not named, they must be designated by township and range numbers, e.g., T. 144 R. 102. Sometimes the section ("sec.") is also cited, but this is likely to be of local interest only. All mileages are approximate.

Billings County: Peaceful Valley Ranch is in T. 140 R. 102 on the Little Missouri River three miles north of Medora. The Petrified Forest is in T. 141 R. 102; it can be located on a map by measuring $4\frac{1}{2}$ miles northward from Medora and then $2\frac{1}{2}$ miles westward. T. 144 R. 102 is in the northwestern corner of the county.

Cass County: The number preceding the name of the township is the section number. Barnes Tp. is three miles south of Fargo. Fabian Tp. is three miles east of Alice. Gunkel Tp. is 14 miles west of the Red River and seven miles south of the northern boundary of the county. Hill Tp. is on the western boundary of the county directly west of Fargo. Normanna Tp. is on the southern boundary of the county line nine miles west of the Red River. Pleasant Tp. is 17 miles south of Fargo. Pontiac Tp. is in the southwestern corner of the county. Stanley Tp. is eight miles south of Fargo.

Divide County: T. 160 R. 96 is near the southeastern corner of the county. T. 160 R. 103 is in the southwestern corner of the county. T. 160 R. 99 is midway between the eastern and western boundaries of the county and seven miles north of the southern boundary. T. 163 R. 95 is in the northeastern corner of the county.

T. 163 R. 97 is five miles north of Crosby. T. 163 R. 102 is 10 miles southeast of the northwestern corner of the county.

Golden Valley County: Sentinel Butte is two miles south of the town of the same name. Its summit is 3430 feet (1045 m) above sea-level. T. 144 R. 103 is in the northeastern corner of the county.

Hettinger County: T. 136 R. 91 is in the northeastern corner of the county.

McKenzie County: North Roosevelt State Park is on the Little Missouri River 55 miles due west of its confluence with the Missouri River.

Richland County: Sand Dunes Park is in the northwestern corner of the county.

Stark County: T. 137 R. 91 is in the southeastern corner of the county.

Slope County: HT Ranch is about ten miles west of Amidon. Logging Camp Ranch is on the Little Missouri River three miles south of the northern boundary of the county and 26 miles east of the western boundary of the state. Black Butte is 17 miles southwest of Amidon; its summit is 3463 feet (1078 m) above sea-level, the highest point in the state.

PART II. AN ANNOTATED LIST OF THE ANTS OF NORTH DAKOTA

SUBFAMILY MYRMICINAE

Genus POGONOMYRMEX Mayr

1. *Pogonomyrmex occidentalis* Cresson

McCook calls this "the occident ant of the American plains."⁸ Others have referred to it as "the mound-building prairie ant." It is truly the *western* harvesting ant, since it is practically limited to the Great Basin and the Great Plains, where its clearings and mounds are conspicuous features of the landscape. Its recorded range extends from British Columbia to the Mexican border and from the Sierra Nevada and Cascade Ranges to northwestern Oklahoma and eastern South Dakota. In North Dakota it has been found only in the southwestern part and its range is apparently limited by the Missouri River valley.

McCook (1883, p. 294) has given us the first published record of this ant in North Dakota: "The ants were seen (A.D. 1882 and 1883) on the Missouri River, south of Bismarck, opposite the mouth of the Cannonball River."

This harvesting ant establishes its colonies on open, dry, sandy and usually flat terrain where the vegetation is chiefly grass or

sagebrush. The subconical mounds are 10–30 cm high and 30–60 cm in diameter and are situated near the center of a cleared area 90–180 cm in diameter. There is usually one entrance-hole, which is on the eastern or southeastern slope. The surface of the mound is usually covered with a layer of gravel, but other materials are often used, such as small pieces of lignite, bits of baked clay (locally known as “scoria”), compact pellets of earth (presumably excavated by the ants), and fragments of dried vegetation. McCook thought that the pebbles were excavated from the underground rooms and galleries and deposited upon the surface.⁹ Headlee and Dean, however, state that the covering layer of coarse particles is selected from the surrounding materials and supplemented with soil brought up from below.¹⁰ Goldsberry (1933) is “firmly convinced that the pieces of gravel are carried to the mound from the area surrounding the nest and not brought up during excavation since the underlying soil in which the ants have excavated their chambers contained no gravel even in cases where the mounds were gravel-covered. Also the workers were observed carrying in pieces of gravel from the surrounding area and placing them on the mound.”

Goldsberry also states that inside the mound there is a “network of tunnels and chambers which extend down into the soil to a depth of at least four feet. The chambers in the mound seem to serve as storehouses for the seed harvested and those on a level with the surface and below contain the brood.” The workers “bring in seeds of nearly all the plants surrounding their nest.” He found seeds of the following genera stored in the mounds: *Polygonum*, *Lithospermum*, *Euphorbia*, *Melilotus*, *Chenopodium* and *Lappula*.

P. occidentalis is a very pugnacious ant with a painful sting. Goldsberry (1933) describes the effect of the sting as a “sharp burning pain which lasts only a few minutes.” McCook evidently suffered considerably more: “A sharp pain followed the wound, which was succeeded at brief intervals by like sensations. The skin gathered into a circular elevation, half an inch wide and quite colorless, immediately surrounding the puncture. The region immediately surrounding was very numb, and the feeling extended as far as the elbow. These pains were accompanied by a peculiar action of the heart which I do not know how to describe, except as a painful fluttering or quivering. In fifteen minutes the whiteness of the parts adjacent to the wound was succeeded by a redness which extended in small blotches along the thumb and around the wrist for a space of two and a-half inches long by two inches wide.

There was a burning sensation in the parts, accompanied by a severe heavy pain; the flesh was very sore to the touch. An hour after the infliction of the sting the pains were intense; they were rhythmic, that is, they were not continuous but came in short paroxysms. What I have noted as 'cooling sensations' characterized the wound at this stage."¹¹ Despite all this the effects of the sting of *P. occidentalis* are not so severe as those of its southern congener, *P. barbatus molefaciens* (Buckley).

In the state larvae and pupae have been found in the nests from August 24 to September 12. Males were collected from nests on August 25 and September 10, and winged females on August 25.

North Dakota records:—

Billings County: Medora (Olson, 1934, p. 508); Mikkelson J.E.G.); T. 144 R. 102 sec. 33 (J.E.G.); Peaceful Valley Ranch (G. & E.W.)

Burleigh County: Bismarck (Frances Sperry)

McKenzie County: North Roosevelt State Park (N.A.W.)

Morton County: Fort Lincoln State Park (N.A.W.)

Sioux County: Confluence of the Cannonball and Missouri Rivers, Solon, Cannonball (N.A.W.); "on the Missouri River . . . opposite the mouth of Cannonball River" (McCook, 1883, p. 294)

Slope County: Logging Camp Ranch (G. & E.W.)

Genus MYRMICA Latreille

2. *Myrmica brevinodis* Emery

This species nests under stones, in decayed wood and in soil among grass roots. It seems to require a moister habitat than do other species of the genus. This probably accounts for its absence from the western third of the state.

Larvae were found in the nests from May 15 to October 11. According to Weber (1934 a, p. 172) males and females appeared on September 5.

North Dakota records:—

Bottineau County: Bottineau (N.A.W.); Turtle Mountains (N.A.W., G. & E.W.)

Cass County: Lake Tp. (C.S.)

Grand Forks County: Grand Forks (G. & E.W., N.A.W.); Kellys (G. & E.W., N.A.W.); Niagara, Northwood (C.V.J.)

McHenry County: Bantry, Drake, Towner (N.A.W.)

McLean County: Butte (N.A.W.); 8 miles NW of Garrison (R.P.U.)

Pierce County: Rugby (N.A.W.)

Rolette County: Turtle Mountains (N.A.W.)

Towner County: Rock Lake (N.A.W.)

Ward County: Minot (N.A.W.)

3. *Myrmica brevinodis brevispinosa* Wheeler

According to Weber (1934 a, p. 189) this ant is found in small colonies nesting under stones in grassy places on the banks of streams and also in sand on the prairie. It occurs throughout the state. Winged forms were taken from July 21 to August 12. Larvae were collected on June 26 and August 12.

North Dakota records:—

Barnes County: Kathryn (N.A.W.)

Billings County: Mikkelson (J.E.G.)

Burleigh County: Bismarck, Wing (N.A.W.)

Cass County: 34 Pontiac Tp. (C.S.)

Grand Forks County: Arvilla (N.A.W.); Grand Forks (L.M.)

McHenry County: Towner (N.A.W.)

McKenzie County: North Roosevelt State Park (N.A.W.)

Morton County: Hebron (Emil Krauth)

Ramsey County: Devils Lake (Weber, 1942, p. 62)

Slope County: Amidon (G. & E.W.)

Stark County: T. 137 R. 91 (R.P.U.)

Walsh County: Grafton (N.A.W.)

4. *Myrmica brevinodis discontinua* Weber

North Dakota record:—

Billings County: Mikkelsen (Weber, 1939 a, p. 150) (Syntype)

5. *Myrmica lobicornis fracticornis* Emery

This form often "nests under stones or wood, occasionally under grass, especially in fairly damp situations. In North Dakota it is found in moister and more shaded localities than is *sabuleti americana*. The brood is kept in a series of chambers scattered through the top four inches of soil, sometimes deeper. This variety is timid, some becoming temporarily immobile when disturbed." (Weber, 1934 a, p. 113.) It is widely distributed throughout the state. Larvae have been found in the nests from April 19 to July 19 and again on October 12. Males were collected in Billings County on August 18.

North Dakota records:—

Billings County: T. 144 R. 102 sec. 9 (J.E.G.)

- Burleigh County: Bismarck (N.A.W.)
 Cass County: Fabian, Fargo, Gardner, Hill Tp., Howes Tp.,
 Leonard Tp., Newman (C.S.)
 Cavalier County: Langdon (N.A.W.)
 Divide County: T. 160 R. 96 (J.D.)
 Grand Forks County: Emerado (L.M.); Grand Forks (L.M.,
 G. & E.W.)
 Hettinger County: T. 136 R. 91 (R.P.U.)
 McHenry County: Anamoose (N.A.W.); Towner (Weber,
 1934 b, p. 59); Upham (Weber, 1941, p. 140)
 McKenzie County: Badlands near Grassy Butte (N.A.W.)
 McLean County: Coleharbor (H. S. Telford & J. A. Munro);
 5 miles NE of Garrison, 13 miles SW of Garrison (R.P.U.)
 Mountrail County: Stanley (Weber, 1942, p. 62)
 Ramsey County: Edmore (N.A.W.)
 Rolette County: Dunseith (N.A.W.)
 Sioux County: Junction of Cannonball and Missouri Rivers
 (N.A.W.)
 Stark County: Dickinson (C. N. Ainslee)
 Steele County: Hope (Weber, 1942, p. 62)
 Williams County: Wildrose

6. *Myrmica sabuleti americana* Weber

Nests are made under logs, stones or clumps of grass, generally in dry habitat exposed to the sun. When situated on short-grass prairie or in lawns the nest entrance is frequently protected by a rather compact vertical collar or a small mound constructed of dry grass blades and other plant material.

Winged males and females were taken from nests from August 13 to 27. Brood has been found in June.

The workers of this subspecies are active and aggressive. The sting is slightly irritating for about an hour and may produce a small wheal which itches for several days.

This ant is widely distributed throughout the state.

North Dakota records:—

- Barnes County: Pillsbury (N.A.W.), Valley City (Weber, 1942,
 p. 62)
 Benson County: Leeds (N.A.W.)
 Billings County: Peaceful Valley Ranch, Petrified Forest (G. &
 E.W.); Mikkelson (J.E.G.)
 Burleigh County: Bismarck (Weber, 1939 a, p. 146); Sterling
 (N.A.W.)

- Dickey County: Ellendale (Weber, 1942, p. 62)
 Dunn County: Killdeer Mountains (G. & E.W.)
 Golden Valley County: Sentinel Butte (G. & E.W.); Beach
 (Weber, 1942, p. 62)
 Grand Forks County: Arvilla (N.A.W., G. & E.W.); Grand
 Forks (L.M., N.A.W., G. & E.W.) (Grand Forks records
 cited by Weber, 1939 a, p. 146)
 Griggs County: Binford (M. A. Hetland)
 McHenry County: Denbigh, Velva (N.A.W.); Towner (Weber,
 1939 a, p. 146)
 McKenzie County: Grassy Butte (Weber, 1939 a, p. 146)
 McLean County: Coleharbor (H. S. Telford & J. A. Munro);
 Mercer (Weber, 1939 a, p. 146)
 Mercer County: Stanton (Weber, 1939 a, p. 146)
 Morton County: Glen Ullin (G. & E.W.); Hebron (N.A.W.)
 Mountrail County: Belden (N.A.W.)
 Pierce County: Rugby (N.A.W.)
 Ramsey County: Devils Lake (N.A.W.)
 Slope County: Black Butte (G. & E.W.)

7. *Myrmica sabuleti nearctica* Weber

This subspecies lives in small colonies in wooded areas. It is widely distributed in the state.

Larvae were collected on June 11 and July 2, pupae on July 9 and 15, and winged females (in nest) on July 15 and 25.

North Dakota records (*records cited by Weber, 1939a, p. 149) :—

- Billings County: *Mikkelson (J.E.G.)
 Cass County: *Chaffee, *Hunter (C.S.)
 Dunn County: *Killdeer Mountains (N.A.W., G. & E.W.)
 Grand Forks County: *Arvilla (G. & E.W., N.A.W.); *Grand
 Forks (L.M., N.A.W.); Larimore (L.M.); Merrifield (C.V.J.)
 McHenry County: Towner (Type locality, Weber, 1939 a,
 p. 149)
 Morton County: *Breien (N.A.W.)
 Sioux County: *Junction of Cannonball and Missouri Rivers
 (N.A.W.)
 Traill County: Mayville (N.A.W.)
 Walsh County: *Grafton (N.A.W.)

8. *Myrmica schencki emeryana* Forel

This ant lives in small, timid colonies under stones, etc., especially at the borders of woods. It sometimes nests under grass in

damp soil. It is widely distributed in the state. Larvae have been collected from June 12 to August 2, pupae from July 9 to August 2 and males (from nest) on August 2.

North Dakota records:—

- Billings County: Mikkelson (J.E.G.)
- Bottineau County: Turtle Mountains near Bottineau (G. & E.W.); Turtle Mountains near Lake Metigoshe (G. & E.W.)
- Burleigh County: Bismarck (N.A.W.)
- Cass County: 36 Pleasant Tp. (C.S.)
- Dunn County: Killdeer Mountains (N.A.W.)
- Grand Forks County: Arvilla (G. & E.W.); Inkster, Manvel C.V.J.); Kellys (G. & E.W.)
- McHenry County: Towner (N.A.W.)
- McKenzie County: Bicycle (G. & E.W.)

Genus MANICA Jurine

9. *Manica mutica* Emery (= *Myrmica (Manica) mutica* Emery)

We have seen only one nest of this genus. The ants had built a low crater about five inches (13 cm) in diameter by one inch (2.5 cm) at its greatest height in sandy soil by the roadside about thirty feet (9 m) from the bank of the Little Missouri River in a cottonwood grove. This species ranges from British Columbia to Colorado; in North Dakota it occurs only in the Badlands near the western border of the state.

North Dakota records:—

- Billings County: Peaceful Valley Ranch (G. & E.W.)
- McKenzie County: North Roosevelt State Park (N.A.W.)

Genus STENAMMA Westwood

10. *Stenamma brevicorne diecki* Emery

One colony of this ant was found under a stone at the edge of an aspen-oak woods on a northeast slope.

North Dakota record:—

- Bottineau County: Turtle Mountains near Bottineau (G. & E.W.)

Genus PHEIDOLE Westwood

11. *Pheidole pilifera coloradensis* Emery

Three colonies were found on a steep north bank of the Heart River among bushes, weeds and grass. The chambers were very deep, probably because the sand in which they were located was

dry. Larvae and pupae were collected on July 31 and August 7; winged females were found in the nest on July 31 and winged males on July 31 and August 7.

North record:—

Stark County: T. 137 R. 91 (R.P.U)

12. *Pheidole vinelandica* Forel

Two nests were found under stones on a slope near the Little Missouri River. Larvae, pupae and winged males and females were taken from one of the nests on June 17.

North Dakota record:—

Slope County: Logging Camp Ranch (G. & E.W.)

Genus CREMATOGASTER Lund

13. *Crematogaster (Acrocoelia) lineolata* Emery

A single nest of the typical form of this species was found under a stone in the Badlands. A winged female was in the colony.

North Dakota record:—

McKenzie County: Badlands near Grassy Butte (N.A.W.)

14. *Crematogaster (Acrocoelia) lineolata cerasi* Fitch

This subspecies was found nesting in a variety of habitats, such as decayed logs, roots and stumps, under bark lying on the ground, in crevices and under stones. Larvae were collected on June 16, August 20 and September 6; pupae on August 5 and September 2. Winged males and females were found in the colony from August 5 to September 3. With one exception, this ant has been taken only in the southwestern corner of the state, below the bend of the Missouri River. The exception came from a small isolated area of sand dunes in the southeastern corner.

North Dakota records:—

Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 6 & 20 (J.E.G.)

McKenzie County: Bicycle (G. & E.W.)

Richland County: Sand Dunes Park (C.S.)

Sioux County: Confluence of Cannonball and Missouri Rivers (N.A.W.)

Slope County: Logging Camp Ranch (G. & E.W.)

Stark County: T. 137 R. 91 (R.P.U.)

Genus MONOMORIUM Mayr

15. *Monomorium minutum minimum* Buckley

This minute black ant is a common household pest in the South,

but it has not been reported as such in North Dakota. It nests in the ground and throws up small craters of soil around the nest openings. Its range extends throughout the state.

North Dakota records:—

Billings County: Fairfield (N.A.W.); Peaceful Valley Ranch (G. & E.W.); Mikkelson (J.E.G.); T. 144 R. 102 sec. 5 (J.E.G.)

Cass County: 8 Hill Tp., 35 Leonard Tp., 34 Pontiac Tp. (C.S.)

Divide County: T. 160 R. 96 (J.D.)

Grand Forks County: Grand Forks (Weber, 1942, p.62); Larimore (L.M.)

Hettinger County: T. 136 R. 91 (R.P.U.)

LaMoure County: NE corner of county (N.A.W.)

McHenry County: Towner (N.A.W.); Upham (Weber, 1941, p. 140)

McKenzie County: Badlands near Grassy Butte (N.A.W.); North Roosevelt State Park (N.A.W.)

McLean County: Garrison (R.P.U.)

16. *Monomorium pharaonis* Linné

This tiny yellowish red ant is cosmopolitan and thoroughly domesticated. It nests indoors and is one of our most annoying household pests.

North Dakota record:—

Grand Forks County: Grand Forks (in an office building, G. & E.W.; a colony nesting in a loaf of bread in an apartment house kitchen, G. & E.W.; in an apartment house, L.M.). (These data referred to by Weber, 1939 b, p. 443.)

Genus SOLENOPSIS Westwood

17. *Solenopsis molesta* Say

This minute yellowish ant nests in a wide variety of habitats in North Dakota: under stones; in the soil, with a crater around the nest opening; under bark; among grass roots in the open prairie; on steep slopes or level ground; in clay, humus or sand, either moist or dry. Also it probably lives as a thief-ant in the nests of larger ants, but it has not been so reported in this state. Its range includes the entire state. Larvae were found on June 26, pupae on August 25.

North Dakota records:—

Barnes County: Valley City (Weber, 1942, p. 62)

Billings County: Mikkelson (J.E.G.)

- Cass County: 35 Leonard Tp. 34 Pontiac Tp. (C.S.)
 Divide County: T. 163 R. 102 (J.D.)
 Golden Valley County: Sentinel Butte (J.E.G.)
 McHenry County: Towner (N.A.W.)
 McLean County: 17 miles SE of Garrison, 13 miles SW of
 Garrison, 16 miles NE of Garrison (R.P.U.)
 Mountrail County: Belden (Weber, 1942, p. 62)

Genus LEPTOTHORAX Mayr

18. *Leptothorax rugatulus* Emery

North Dakota record:—

Mountrail County: Belden (Weber, 1942, p. 62)

19. *Leptothorax rugatulus* **dakotensis** new subspecies

Worker. Length 2 mm; smaller than *rugatulus s. str.* Spines shorter, the length equal to the distance between them and to three-fourths the length of the declivity; apices less acute and scarcely curved inward. Postpetiole broader than long ($1\frac{1}{4}$:1) but less so than in *rugatulus* ($1\frac{1}{2}$:1). Longitudinal rugae on the head coarse (as in *rugatulus*) but somewhat closer together so that interrugal reticulation is not so distinct. Thorax less longitudinally rugose; rugae more irregular and shallower. Sculpture of petiole finer, with few striae; more punctate, like the postpetiole, which has finer sculpture than in *rugatulus*. Dark brown; head and gaster almost black; femora infuscated at the middle; tips of mandibles, petiole, postpetiole, thorax, legs and a small area at the base of the gaster brown.

Description based on fifteen workers out of one nest from Sentinel Butte in Golden Valley County, North Dakota.

This nest was found on the summit of the butte at an altitude of 3430 feet (1045 m) above sea-level. It was under a small stone about 10 cm square and in the soil among grass roots in an area of very scant vegetation. Galleries and brood chambers were exposed when the stone was lifted. Larvae were present (June 22, 1927).

This new subspecies has the thoracic sculpture finer than in *brunnescens*; it is similar to the latter in color, except that the petiole and postpetiole are lighter. Its color is much lighter than that of *cockerelli* and *annectens*.

20. *Leptothorax (Mychothorax) acervorum canadensis* Provancher

This ant nests in rotten wood in open woods. Larvae and pupae were taken on July 3, 1935, in Divide County.

North Dakota records:—

Bottineau County: Turtle Mountains near Bottineau (G. & E.W.)

Divide County: T. 163 R. 95 sec. 10 (J.D.)

Dunn County: Killdeer Mountains (G. & E.W.)

Grand Forks County: Arvilla (G. & E.W.)

McHenry County: 15 miles south of Towner, 4 miles north of Towner, Denbigh (N.A.W.)

21. *Leptothorax (Mychothorax) acervorum yankee* Emery

This western form nests in dead wood on or near the ground. Larvae were found on July 22 at Arvilla and on August 13 in Billings County.

North Dakota records:—

Billings County: Mikkelson (J.E.G.)

Grand Forks County: Arvilla (C.V.J.)

22. *Leptothorax (Mychothorax) hirticornis* Emery

Weber (1935, p. 200) reports that this species is frequently found in the nests of *Formica obscuripes* at Towner (McHenry County).

23. *Leptothorax (Mychothorax) hirticornis formidolosus* Wheeler

North Dakota records:—

McHenry County: Towner (N.A.W.)

Morton County: Glen Ulin (Emil Krauth)

SUBFAMILY DOLICHODERINAE

Genus DOLICHODERUS Lund

24. *Dolichoderus (Hypoclinea) plagiatus inornatus* Wheeler

North Dakota record:—

Dunn County: Killdeer Mountains (G. & E.W.)

25. *Dolichoderus (Hypoclinea) taschenbergi gagates* Wheeler

The formicary in the Killdeer Mountains was in a large mound of plant fragments two feet in diameter and six inches high. A rose bush, a small aspen tree and many grass plants were growing through the mound. The workers were tending membracid nymphs on the smaller branches of an oak tree seventeen feet from the nest. They followed a narrow trail between nest and tree.

Larvae, pupae and winged males and females were found in the formicary. The brood was in chambers six to nine inches below the top of the mound.

North Dakota records:—

Dunn County: Killdeer Mountains (G. & E.W.)

McKenzie County: Badlands near Grassy Butte (N.A.W.)

Genus DORYMYRMEX Mayr

26. *Dorymyrmex pyramicus niger* Pergande

This small southern ant has been taken only in the southwestern part of this state and its range is apparently limited by the Missouri River valley. The nest is usually in dry, sandy soil in exposed situations; typically the entrance is surrounded by a low circular crater. Winged females were found in the nest in Stark County on August 3 and 7; larvae were found on August 7.

North Dakota records:—

Billings County: Mikkelson (J.E.G.)

Burleigh County: Bismarck (N.A.W.)

Sioux County: Confluence of Missouri and Cannonball Rivers (N.A.W.)

Stark County: T. 137 R. 91 (R.P.U.)

Genus TAPINOMA Förster

27. *Tapinoma sessile* Say

This species is common throughout the state. It nests in decaying wood or in the soil under stones and other objects lying on the ground. It has also been found nesting in the mounds of *Formica obscuripes* (Weber, 1935, p. 200) and *Lasius aphidicola*. Brood of all stages was found in nests throughout the summer months. Winged males were found in nests on June 19 and 22, winged females on June 20, 24 and 28.

North Dakota records:—

Barnes County: Kathryn, Valley City (N.A.W.)

Billings County: Mikkelson (J.E.G.); Peaceful Valley Ranch (G. & E.W.); T. 144 R. 102 (J.E.G.)

Bottineau County: Turtle Mountains near Lake Metigoshe (G. & E.W.)

Burleigh County: Bismarck, Sterling, Wing (N.A.W.)

Cass County: 30 Barnes Tp., Harwood Tp. on Cheyenne River, 8 Hill Tp., 8 Lake Tp., Newman, 11 Normanna Tp., 19 Stanley Tp. (C.S.); West Fargo (N.A.W.)

Divide County: T. 160 R. 96 sec. 6 and 36; T. 160 R. 103 sec. 28; T. 163 R. 95 sec. 10; T. 163 R. 102 sec. 24 (J.D.)

Golden Valley County: Sentinel Butte (G. & E.W.)

- Grand Forks County: Arvilla (G. & E.W.); Grand Forks (L.M.); Ojata (C.V.J.)
 Hettinger County: T. 136 R. 91 (R.P.U.)
 McHenry County: Towner (Weber, 1935, p. 200)
 McKenzie County: Bicycle (G. & E.W.)
 Morton County: Glen Ullin (G. & E.W.)
 Mountrail County: Stanley (Weber, 1942, p. 62)
 Sioux County: Confluence of Cannonball and Missouri Rivers (N.A.W.)
 Slope County: Amidon, Black Butte, Logging Camp Ranch (G. & E.W.)
 Stark County: T. 137 R. 91 (R.P.U.)

SUBFAMILY FORMICINAE

Genus CAMPONOTUS Mayr

28. *Camponotus herculeanus mohican* Wheeler

Of the four colonies collected two were found under stones in open terrain in the Badlands (Billings and Golden Valley Counties); the other two were in decayed wood in forests. Larvae, pupae and winged males and females were found in the former on August 31.

North Dakota records:

- Billings County: T. 144 R. 102 sec. 14 (J.E.G.)
 Golden Valley County: T. 144 R. 103 sec. 14 (J.E.G.)
 Grand Forks County: Northwood (L.M.)
 Rolette County: Turtle Mountains 12 miles NE of Dunseith (N.A.W.)

29. *Camponotus herculeanus noveboracensis* (Fitch)

In North Dakota this ant nests in dead wood, either standing or fallen, either moist or dry. Larvae were found in a nest in the Turtle Mountains on July 17. In the Badlands (Golden Valley County) larvae and pupae were taken in late August. Winged females were found in the nests in Cass County on June 9 and 22 and in the Turtle Mountains on July 17; winged males in Cass County on June 12 and 22 and in Grand Forks in September.

"Although *C. noveboracensis* ranges across the continent from the Atlantic to the Pacific, it is not known to occur further south than Maryland or further north than Nova Scotia. In the Atlantic states, it lives by preference in hilly country, usually at higher elevations than *pennsylvanicus* or *ferrugineus*. To judge from the specimens before me *noveboracensis* exhibits very little variation



Fig. 3. Sand hills habitat of *Formica bradleyi* Wheeler. The two white flags mark the sites of nests No. 254 and 255. Near Towner in McHenry County.

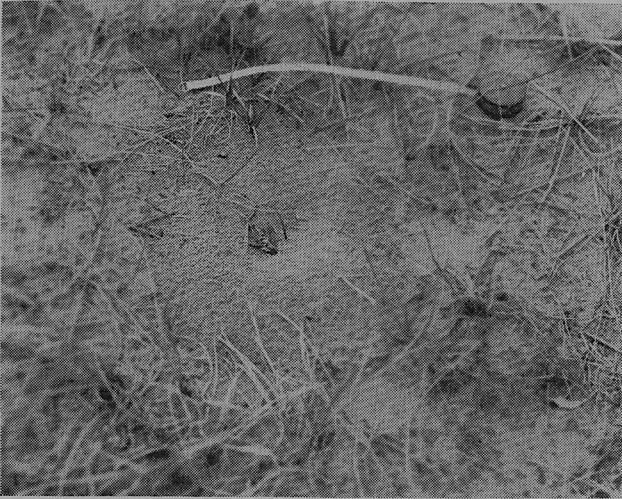


Fig. 4. Nest entrance and crater of *Formica bradleyi* Wheeler. Nest No. 253 near Towner in McHenry County.

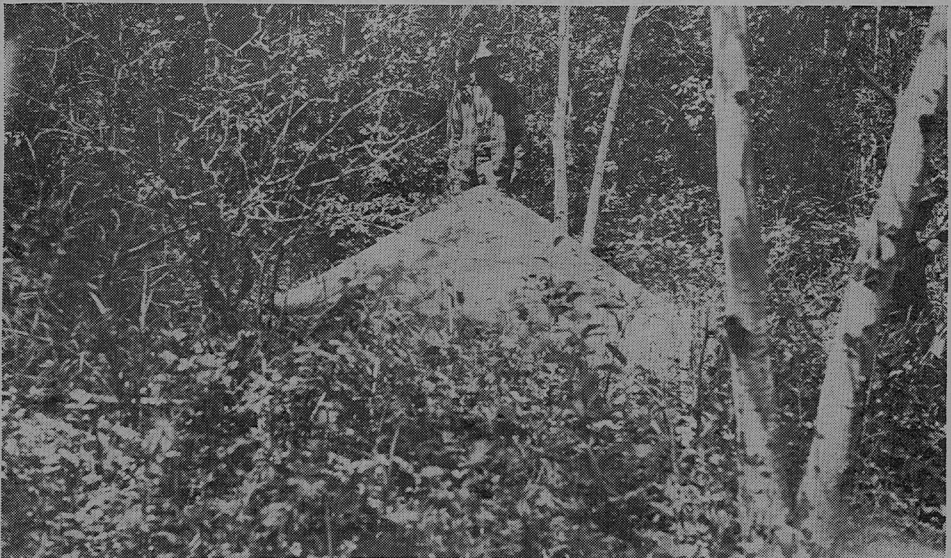


Fig. 5. Mound of *Formica ulkei* Emery. Killdeer Mountains in Dunn County.



Fig. 1. Workers of *Lasius niger neoniger* Emery apparently engaged in burying a caterpillar. A nest-entrance may be seen at the left. Peaceful Valley Ranch in Billings County.



Fig. 2. Prairie studded with ant mounds. Some mounds are inhabited by *Lasius (Chthonolasius) umbratus aphidicola* (Walsh), others by *Formica cinerea neocinerea* Wheeler. Near Emerado in Grand Forks County.

in color. The specimens from Washington, however, have the coarse opaque surface of *whymperi* and may be regarded as transitions to this variety." (Wheeler, 1910, p. 341.)

North Dakota records:—

- Billings County: Peaceful Valley Ranch (G. & E.W.); Mikkelson (J.E.G.)
- Bottineau County: Lake Metigoshe in Turtle Mountains (G. & E.W.)
- Cass County: Gardner: 23 Harwood Tp., 11 Normanna Tp. (C.S.)
- Golden Valley County: T. 144 R. 103 sec. 2 and sec. 15 (J.E.G.); Trotters (J.E.G.)
- Grand Forks County: Arvilla (C.V.J., G. & E.W.); Grand Forks (G. & E.W.)
- McHenry County: Towner (N.A.W.)
- McKenzie County: Badlands near Grassy Butte (N.A.W.)
- Pembina County: Cavalier (N.A.W.)
- Rolette County: Turtle Mountains 10 miles NE of Dunseith (N.A.W.)

30. *Camponotus herculeanus pennsylvanicus* (De Geer)

This subspecies seems to be uncommon in the state. Its nests have been found in or under decaying logs and pieces of bark and in stumps. Larvae and pupae were collected on July 22, 1932 in Grand Forks County.

North Dakota records:—

- Billings County: T. 144 R. 102 sec 5 (J.E.G.)
- Cass County: Harwood Tp., 11 Normanna Tp., 19 Stanley Tp. (C.S.)
- Grand Forks County: Grand Forks (Edna Steedsman, C.V.J., G. C. Wheeler) Grand Forks (Weber, 1942, p. 62); Inkster (C.V.J.)
- Towner County: Ellison (Wheeler, 1910, p. 337). This post office was discontinued in 1912; mail is now sent to Rock Lake.

31. *Camponotus herculeanus whymperi* Forel

Two nests of this subspecies have been collected in the Turtle Mountains. Larvae and pupae were found on July 17, 1927.

North Dakota records:—

- Bottineau County: Turtle Mountains near Bottineau (G. & E.W.)

Rolette County: Turtle Mountains 11 miles NE of Dunseith (N.A.W.)

32. *Camponotus (Myrmentoma) caryae* (Fitch)

A single female was found in a stump in the Badlands (Billings County: T. 144 R. 102 sec. 15. J.E.G.).

33. *Camponotus (Myrmentoma) caryae decipiens* Emery

Winged males were found in nests on June 10, 1937, in Cass County and winged females on July 21, 1936, in Stark County.

North Dakota records:—

Billings County: Peaceful Valley Ranch (G. & E.W); Mikkelson (J.E.G.)

Burleigh County: Bismarck (Frances Sperry)

Cass County: 10 Gunkel Tp., 35 Leonard Tp., 34 Pontiac Tp. (C.S.)

Stark County: T. 137 R. 91 (R.P.U.)

34. *Camponotus (Myrmentoma) sayi* Emery

This southwestern species has been taken only in the Badlands. Its nests were found in dead wood along water courses and in wooded ravines. Larvae were collected in August and early September, pupae in the middle of August. Winged males and females were found in the nest late in August.

North Dakota records:—

Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 5 (J.E.G.)

Golden Valley County: Trotters (J.E.G.)

Genus LASIUS Fabricius

35. *Lasius brevicornis* Emery

This species is not common. It seems to range throughout the state, but has not been reported from the Badlands nor the Turtle Mountains. It usually nests in the soil under small stones but occasionally among grass roots. Larvae were found in the nests from June 11 to September 25, pupae from June 23 to August 19, winged males and females from August 7 to 19.

North Dakota records:—

Benson County: Leeds (N.A.W.)

Cass County: Alice, 8 Lake Tp., 8 Hill Tp. (C.S.)

Divide County: T. 160 R 96 sec. 36; T. 160 R. 103 sec. 28; T. 163 R. 95 sec. 10; T. 163 R. 102 sec. 24 (J.D.)

Griggs County: Binford (M. A. Hetland)

Hettinger County: T. 136 R. 91 (R.P.U.)

McLean County: Garrison (R.P.U.)

Steele County: Hope (Weber, 1942, p. 62)

36. *Lasius brevicornis microps* Wheeler

This ant was found nesting under small stones in open grassy country. Larvae were collected on July 4 and October 4 and pupae on June 23 and July 4; winged males and females were found in the nest on October 4.

North Dakota records:—

Divide County: T. 160 R. 96 sec. 36 (J.D.)

McHenry County: Towner (N.A.W.)

McLean County: 16 miles NE of Garrison (R.P.U.)

37. *Lasius niger americanus* Emery

This is one of the commonest ants throughout the entire state. Vertically it ranges from the highest point in the state (the summit of Black Butte in Slope County, altitude 3468 feet above sea-level) down to about 800 feet in the Red River valley. It is usually found in open grassy terrain but occasionally in or near open woods. Its nests are in logs or stumps, in houses, under stones or other objects lying flat on the ground, or in the soil without cover; in the last case the opening is surrounded by a small crater of soil. Larvae were collected from June 9 to October 4 and pupae from June 9 to August 26. Winged forms were found in the nests from July 9 to August 15. Schonberger (1937) records the aphid *Forda olivacea* Rohwer from *americanus* nests (Cass County: 8 Hill Tp.). Davis (1937) found the coccid *Cryptoripersia arizonensis* (Ehrh.) and the aphid *Forda olivacea* Rohwer on grass roots (*Festuca scabrella* Torr.) in an *americanus* nest in Divide County (T. 161 R. 99 sec. 26).

North Dakota records:—

Barnes County: Kathryn, Valley City (Weber, 1942, p. 62)

Billings County: T. 144 R. 102 sec. 4, 5, 9 & 17 (J.E.G.); Peaceful Valley Ranch (G. & E.W.); Mikkelson (J.E.G.)

Bottineau County: Kramer (N.A.W.); Turtle Mountains near Bottineau (G. & E.W.)

Burleigh County: Bismarck (N.A.W.)

Cass County: Alice, 30 Barnes Tp., Fargo, Gardner, 10 & 23 Harwood Tp., 8 Hill Tp., 21 Howes Tp., 8 Lake Tp., 11 Normanna Tp., 34 Pontiac Tp., 19 Stanley Tp. (C.S.)

Divide County: T. 160 R. 96 sec. 6 & 36; T. 160 R. 103 sec. 28;

- T. 161 R. 99 sec. 26; T. 163 R. 95 sec. 10; T. 163 R. 97 sec. 3;
 T. 163 R. 102 sec 24 (J.D.)
- Grand Forks County: Arvilla (C.V.J., G. & E.W.); Emerado (C.V.J.); Grand Forks (C.V.J., L.M., G. & E.W.); Kellys (G. & E.W.); Manvel, Merrifield, Schurmeier (C.V.J.)
- Golden Valley County: T. 144 R. 103 sec. 2 & 15 (J.E.G.); Sentinel Butte (G. & E.W.)
- Griggs County: Binford (M. A. Hetland)
- Hettinger County: T. 163 R. 91 (R.P.U.)
- McHenry County: Towner (G. & E.W., N.A.W.)
- McKenzie County: Bicycle (G. & E.W.)
- McLean County: Dogden (N.A.W.); 5, 13, 14 & 16 miles NE of Garrison; 8 & 17 miles SE of Garrison; 8 miles NW of Garrison; 13 miles SW of Garrison (R.P.U.)
- Mountrail County: Stanley (Weber, 1942, p. 62)
- Oliver County: Yucca (N.A.W.)
- Pembina County: Walhalla (G. & E.W.)
- Pierce County: Rugby (N.A.W.)
- Slope County: Black Butte, Chalk Butte near Amidon, Logging Camp Ranch (G. & E.W.)
- Stark County: T. 137 R. 91 (R.P.U.)

38. *Lasius niger neoniger* Emery

This is another very common ant which occurs throughout the state. It nests most frequently on the prairie or other open terrain but is often found in woods and occasionally near buildings or along roadsides. Several types of nests have been recognized: in the soil under stones or other flat objects lying on the ground; in or under decaying wood; in the soil with entrances protected by clumps of grass; in the soil with the entrances fully exposed — either with or without craters.

Eggs were collected on June 19, larvae from June 1 to August 25, pupae from June 1 to July 23 and queen-pupae from June 26 to July 5. Winged females were found in the nest from July 23 to September 19 and also on April 27, winged males from July 22 to October 1. Winged individuals of both sexes occurred simultaneously in the same nest from August 15 to September 19. A nuptial flight was witnessed in Grand Forks on September 19, 1928; winged forms emerged simultaneously from five nests; each nest produced both sexes. Schonberger (1937) records marriage flights in Cass County during the first two weeks of September, 1936.

On the Peaceful Valley Ranch near Medora (June 20, 1927) we

observed some *neoniger* workers engaged in some rather unusual behavior for ants: they were apparently in the process of burying a dead caterpillar. See Fig. 1.

Schonberger (1937) found the aphids *Myzus porosus* Sanderson (Cass County: Lake Tp.) and *Trama troglodytes* Heyden (at Fargo) in *neoniger* nests.

North Dakota records:—

Benson County: Leeds (N.A.W.)

Billings County: Peaceful Valley Ranch (G. & E.W.); Mikkelsen (J.E.G.); T. 144 R. 102 sec. 4, 5, & 9 (J.E.G.)

Bottineau County: Turtle Mountains (N.A.W.)

Burleigh County: Bismarck, Wing (N.A.W.)

Cass County: 30 Barnes Tp., Fabian, Fargo, Gardner, 10 Gunkel Tp., 23 Harwood Tp., 21 Howes Tp., Hunter, 35 Leonard Tp., 8 Lake Tp., 36 Pleasant Tp., 34 Pontiac Tp. (C.S.)

Divide County: T. 160 R. 96 sec. 6; T. 161 R. 99 sec. 26 (J.D.)

Dunn County: Killdeer Mountains (G. & E.W.)

Golden Valley County: Trotters (J.E.G.)

Grand Forks County: Arvilla (G. & E.W.); Grand Forks (L.M., G. & E.W.); Kellys (G. & E.W.); Larimore (C.V.J., Edna Steedsman); Northwood, Niagara, Orr, Thompson (C.V.J.)

Griggs County: Binford (M. A. Hetland)

McHenry County: Anamoose, Bantry, Berwick (N.A.W.); Towner (Weber, 1935, p. 196; G. & E.W.); Upham (Weber, 1941, p. 140)

McKenzie County: Bicycle (G. & E.W.)

McLean County: Mercer (G. & E.W.)

Pembina County: Cavalier (N.A.W.)

Rolette County: Turtle Mountains at Belcourt (N.A.W.)

Sheridan County: Denhoff (N.A.W.)

Sioux County: Cannonball River near Breien (N.A.W.)

Slope County: Logging Camp Ranch (G. & E.W.)

Stark County: T. 137 R. 91 (R.P.U.)

Towner County: Rocklake (N.A.W.)

39. *Lasius niger sitkaënsis* Pergande

This is a forest ant which has been collected only in the Red River Valley and in the Turtle Mountains, i.e., in the more heavily wooded parts of the state. It lives in damp woods or thickets where it nests under stones or flat objects lying on the ground or under

loose bark on dead trees. Larvae were collected from June 6 to October 8, pupae from June 26 to August 9. Males were found in nests from August 2 to August 25 and winged females from August 9 to September 23. Winged ants of both sexes were found simultaneously in the same nest on August 25 (Grand Forks). Schonberger (1937) found the aphid *Prociphilus tessellata* (Fitch) in a *sitkaënsis* nest at Harwood.

North Dakota records:—

Bottineau County: Turtle Mountains near Bottineau; Turtle Mountains near Lake Metigoshe (G. & E.W.)

Cass County: 30 Barnes Tp., Fargo, 10 Gunkel Tp., 10 Harwood Tp., Hunter, 8 Lake Tp., 35 Leonard Tp., 11 Normanna Tp., 34 Pontiac Tp., 19 Stanley Tp. (C.S.)

Grand Forks County: Grand Forks (C.V.J., L.M., N.A.W., G. & E.W.)

Pembina County: Pembina (no name)

40. *Lasius (Acanthomyops) claviger* (Roger)

This ant has been taken only in the western part of the state. It nests in open grassland, usually in the soil under stones, but three colonies were found in grass-grown mounds. Pupae were found in the nest on June 23, winged females on August 26 and September 5 and males on September 3.

North Dakota records:—

Billings County: Peaceful Valley Ranch (G. & E.W.); Mikkelson (J.E.G.); T. 144 R. 102 sec. 7, 9 & 17 (J.E.G.)

Divide County: T. 160 R. 96 sec. 36 (J.D.)

Hettinger County: T. 136 R. 91 (R.P.U.)

McLean County: Garrison; 13 miles SW of Garrison; 13 miles NE of Garrison (R.P.U.)

Oliver County: Yucca (N.A.W.)

41. *Lasius (Acanthomyops) claviger subglaber* Emery

This form has been taken in the eastern and in the extreme western part of the state. It nests in the soil under stones in open grassland. Larvae were collected on June 20 and pupae on June 23.

North Dakota records:—

Cass County: 35 Leonard Tp. (C.S.)

Divide County: T. 160 R. 96 sec. 36 (J.D.)

Griggs County: Binford (M. A. Hetland)

McKenzie County: Bicycle (G. & E.W.)

Slope County: Black Butte (G. & E.W.)

42. *Lasius (Acanthomyops) interjectus* Mayr

Apparently this species occurs throughout the state, but it is nowhere common. It nests in the soil under stones or in grass-grown mounds in exposed situations. It has been found tending aphids on grass roots. Larvae were found in the nest on June 20, pupae on June 20, August 19 and September 5 and winged males and females on September 9 and 16.

North Dakota records:—

Benson County: Leeds (N.A.W.)

Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 17 (J.E.G.)

Cass County: 34 Pontiac Tp. (C.S.)

McHenry County: Towner (N.A.W.)

McLean County: Garrison (R.P.U.)

Slope County: Black Butte, Logging Camp Ranch (G. & E.W.)

43. *Lasius (Acanthomyops) latipes* (Walsh)

Dr. N. A. Weber (1935, p. 200) has collected this ant near Towner (McHenry County). "Live workers, males and dealated alpha and beta females . . . were found in digging up an [*Formica*] *obscuripes* nest at a depth of about two feet (61 cm.)." He has also recorded it from Valley City in Barnes County (1942, p. 62).

44. *Lasius (Chthonolasius) umbratus aphidicola* (Walsh)

This ant is widely distributed throughout the state. It nests in large mounds of earth usually on the open prairie but occasionally in thickets or near lakes or rivers. Near Emerado (Grand Forks County) many acres of prairie are thickly studded with large grass-grown mounds inhabited either by this species or by *Formica neocinerea*. See Fig. 2.

Of special interest are collections made in Divide (1935) and McLean (1934) Counties during a severe drouth. These ants were nesting under stones instead of in mounds.

In Divide County (T. 163 R. 95 sec. 10) Davis (1937) found this ant tending aphids (*Forda olivacea* Rohwer, det. P. W. Mason) on grass roots. In another locality (T. 160 R. 96 sec. 6) he found a colony tending *Forda olivacea* and *Pemphigus* sp. (det. P. W. Mason) on the roots of *Agropyron Smithii* Rydberg (det. C. V. Morton).

Larvae were found in the formicary from June 17 to September 5, pupae from June 22 to August 18, winged females from July 10 to August 18 and males on August 1.

North Dakota records:—

- Bottineau County: Turtle Mountains near Lake Metigoshe (N.A.W.)
 Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 17 (J.E.G.)
 Cass County: Grandin (H. S. Telford); 8 Hill Tp., 19 Stanley Tp. (C.S.)
 Divide County: T. 160 R. 96 sec. 6 & 36; T. 160 R. 103 sec. 28; T. 161 R. 99 sec. 26; T. 163 R. 95 sec. 10; T. 163 R. 97 sec. 3; T. 163 R. 102 sec. 24 (J.D.)
 Grand Forks County: Arvilla (G. & E.W.); Emerado, Ojata, Powell, Schurmeier (C.V.J.)
 McHenry County: Towner (Weber, 1935, p. 196)
 McLean County: Coleharbor (H. S. Telford & J. A. Munro); 17 miles SE of Garrison, 5 miles & 14 miles NE of Garrison (R.P.U.)
 Sheridan County: Denhoff (N.A.W.)
 Slope County: Chalk Butte near Amidon (G. & E.W.)

Genus FORMICA Linné

45. *Formica bradleyi* Wheeler

This beautiful Formica is definitely ammophilous. In North Dakota it has been found only among sand dunes, sand hills and other very sandy areas with scant vegetation. Apparently it nests only in sand. Since so little is known about the habits of this species, we give here a few of our own field data:

Nest No. 253 (Towner) — On the side of a hollow among the sandhills; entrance 1 cm in diameter centrally located in a sand crater 18 cm in diameter and 2 cm high; grass growing in crater. See Fig. 4.

Nest No. 254 (Towner) — In a hollow among the sand hills; three craters in a row, 30 cm and 15 cm apart. See Fig. 3.

Nest No. 255 (Towner) — In a hollow among the sand hills. Ten craters in an area about 50 cm in diameter; much grass growing in and among the craters. See Fig. 3.

In Sand Dunes Park (Richland County) Schonberger (1937) found this ant nesting in a mound in a clump of *Carex*. "The mound measured about 20 cm. in diameter and was about 3 cm. high. Half a dozen openings led into the mound. The soil was entirely sand, dry near the surface and quite moist at a depth of 6 cm. Below the surface of the ground, grass roots made a tough and almost

impenetrable maze. . . . These sedges and grasses held the sand in this spot and prevented drifting so that the ants were assured of a more or less permanent home."

Larvae were collected on June 12.

North Dakota records:—

Cass County: 35 Leonard Tp. (C.S.)

McHenry County: Towner (G. & E.W.; Weber, 1942, p. 62)

Ransom County: Anselm (N.A.W.)

Richland County: Sand Dunes Park (C.S.)

46. *Formica cinerea altipetens* Wheeler

This ant has not been collected in the extreme northern, western or southern tier of counties. Elsewhere it does not seem to be common. Wheeler (1913, p. 524) says that in Colorado "it forms populous colonies which inhabit large earthen mound-nests (2-3 feet in diameter and 6-10 inches high), overgrown with grass in the alpine meadows." Of the seven colonies collected in McLean County in 1934 four were inhabiting mounds (20-30 inches in diameter and 6 inches high); but the other three were under stones. The latter may have been adapted to drouth.

Larvae and pupae were collected on August 19.

North Dakota records:—

Cass County: Grandin (H. S. Telford). (This is referred to by Telford and Munro, 1944, p. 36, but the locality is not cited.)

Grand Forks County: Kellys (G. & E.W.)

Griggs County: Binford (M. A. Hetland)

Hettinger County: T. 136 R. 91 (R.P.U.)

McHenry County: Berwick (N.A.W.)

McLean County: 17 miles NE, 8 miles NW, 8 miles SE, 5 miles NE and 13 miles SW of Garrison (R.P.U.)

47. *Formica cinerea neocinerea* Wheeler

This ant has been found only in the eastern half of the state. It usually nests in earthen mounds, but Schonberger (1937) reports it as having exposed nests with small craters or as under stones. Wheeler (1913, p. 525) describes its mounds as being "usually much flatter" than those of *altipetens*. Near Emerado (Grand Forks County) many acres of prairie are thickly studded with large grass-grown mounds inhabited either by this species or by *Lasius aphidicola*. See Fig. 2.

Larvae and pupae were found in the nests from June 11 to August 10, winged queens from July 10 to August 10 and males on August 10.

North Dakota records:—

- Cass County: 8 Hill Tp., 21 Howes Tp., 8 Lake Tp. (C.S.)
 Grand Forks County: Arvilla (collector unknown); Emerado,
 Gilby, Grand Forks, Kellys, Mekinock, Niagara, Ojata,
 Powell, Schurmeier (C.V.J.)
 Griggs County: Binford (M. A. Hetland)
 McHenry County: Towner (N.A.W.)

48. *Formica criniventris* Wheeler

Only one colony has been collected: McLean County, 13 miles NE of Garrison (R.P.U.). The nest was under a stone among grass and weeds on flat prairie. The main chamber was 32 inches (81 cm) below the surface.

49. *Formica dakotensis montigena* Wheeler

A single colony was found at Binford (Griggs County) by M. A. Hetland.

50. *Formica fusca* Linné

The typical *fusca* seems to be rare in this state. It has been taken only near the eastern, western and northern boundaries. This species is extremely variable and most of our material shows some resemblance to the subspecies *subsericea*. Nests were in decayed logs. Larvae were collected on July 10 and pupae were found in the nest from July 10 to August 17.

North Dakota records:—

- Billings County: Mikkelson (J.E.G.)
 Bottineau County: Turtle Mountains near Lake Metigoshe
 (G. & E.W.)
 Grand Forks County: Mekinock (C.V.J.)
 Rolette County: 10 miles NE of Dunseith (N.A.W.)

51. *Formica fusca argentea* Wheeler

This ant occurs throughout the state. It nests under stones. Larvae were found from June 23 to August 26 and pupae from June 20 to September 27.

North Dakota records:—

- Billings County: Mikkelson (J.E.G.)
 Cass County: Fargo (C.S.)
 Divide County: T. 160 R. 96 sec. 36; T. 161 R. 99 sec. 26;
 T. 163 R. 97 sec. 3 (J.D.)
 Golden Valley County: Sentinel Butte (G. & E.W.)
 Grand Forks County: Arvilla (C.V.J.); Grand Forks (L.M.,

- G. & E.W.); Kellys (G. & E.W.); Larimore (Edna Steedsmann)
 Morton County: Breien (N.A.W.)
 Mountrail County: Verendrye National Monument (Weber, 1942, p. 62)
 Oliver County: Yucca (N.A.W.)
 Slope County: Black Butte, Logging Camp Ranch (G. & E.W.)
 Stark County: T. 137 R. 91 (R.P.U.)
 Steele County: Hope (Weber, 1942, p. 62)

52. *Formica fusca neoclara* Emery

This ant is fairly common in the western half of the state but apparently rare in the eastern half. It nests in open places either under stones or with the entrances exposed. Larvae and pupae were found in the nest from May 27 to September 24.

North Dakota records:—

- Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 5 (J.E.G.); Peacefull Valley Ranch (G. & E.W.)
 Burleigh County: Bismarck (Frances Sperry; N.A.W., G. & E.W.)
 Divide County: T. 160 R. 96 sec. 6 (J.D.)
 Griggs County: Binford (M. A. Hetland)
 McLean County: Garrison & 5 miles NE of Garrison (R.P.U.); Coleharbor (Telford & Munro, 1944, p. 36, but the locality is not cited)
 Slope County: Chalk Butte near Amidon (G. & E.W.)
 Stark County: Dickinson (G. & E.W.); T. 137 R. 91 (R.P.U.)

53. *Formica fusca neorufibarbis* Emery

North Dakota record:—

- Bottineau County: Turtle Mountains near Bottineau (G.&E.W.)

54. *Formica fusca subaenescens* Emery

This subspecies is fairly common throughout the state. Its nests have been found in exposed soil, in earthen mounds, under stones, in decayed stumps and in decayed wood lying on the ground. It prefers moist woods, either open or dense, or heavy thickets, although it is occasionally found nesting on the prairie. It is enslaved by *Polyergus bicolor* and *Formica aserva*. Eggs were collected on June 10 and 19, larvae from June 9 to August 9 and pupae from June 15 to September 6. Males were found in the nest on July 22.

North Dakota records:—

- Billings County: Mikkelson (J.E.G.); T. 144 R. 102 sec. 15 & 16 (J.E.G.)
- Bottineau County: Turtle Mountains near Lake Metigoshe (G. & E.W.)
- Cass County: Fargo, Gardner, 10 Harwood Tp., Hunter, 8 Lake Tp., Newman, 11 Normanna Tp., 36 Pleasant Tp., 19 Stanley Tp. (C.S.)
- Divide County: T. 161 R. 99 sec. 26 (J.D.)
- Grand Forks County: Arvilla (C.V.J., G. & E.W.); Grand Forks, Inkster (C.V.J.); Kellys (G. & E.W.)
- McHenry County: Towner (N.A.W., G. & E.W.)
- McLean County: 13 miles SW of Garrison (R.P.U.)
- Pembina County: Walhalla (G. & E.W.)
- Rolette County: Turtle Mountains 11 miles NE of Dunseith (N.A.W.)
- Slope County: Logging Camp Ranch (G. & E.W.)
- Stark County: T. 137 R. 91 (R.P.U.)

55. *Formica fusca subsericea* Say

This is one of the commonest ants throughout the entire state. In abundance of both colonies and individuals it is a close rival of *Lasius americanus* and *L. neoniger*. Its nests are usually in low mounds but may also occur under stones, under logs, pieces of wood or bark lying on the ground, among grass roots, or even in exposed situations with no apparent protection. It is enslaved in this state by *Polyergus bicolor*, *P. fusciventris*, *Formica aserva* and *F. rubicunda*. Eggs were collected on June 10, larvae from June 1 to August 27, pupae from June 1 to October 30 and pupae of sexual forms from June 23 to July 29. Winged males were found in the nest from August 9 to 13; winged males and females were found in the same nest on August 13. In Divide County (T. 160 R. 96 sec. 36) Davis (1937) found this ant tending the aphid *Neothomasia populicola* (Thos.) (P. W. Mason det.) on aspen (*Populus tremuloides* Michaux).

North Dakota records:

- Benson County: Leeds (N.A.W.)
- Billings County: Mikkelson (J.E.G.); Peaceful Valley Ranch (G. & E.W.); T. 144 R. 102 sec. 5 & 17 (J.E.G.)
- Bottineau County: Turtle Mountains near Lake Metigoshe (N.A.W., G. & E.W.)

Burleigh County: Bismarck (G. & E.W.); McKenzie (Frances Sperry)

Cass County: Alice, Chaffee, Fargo, Gardner, 10 Gunkel Tp., 10 Harwood Tp., 8 Lake Tp., 34 Pontiac Tp. (C.S.)

Divide County: T. 160 R. 96 sec. 6 & 36; T. 163 R. 95 sec. 10 (J.D.)

Dunn County: Killdeer Mountains (G. & E.W.)

Grand Forks County: Arvilla (C.V.J., G. & E.W.); Grand Forks (C.V.J., L.M., G. & E.W.); 6 Elkmount Tp., Inkster, Kempton, Manvel, Merrifield, Niagara, Ojata, Thompson (C.V.J.); Larimore (C.V.J., Edna Steedsman)

McHenry County: Towner (N.A.W.)

McKenzie County: Bicycle (G. & E.W.)

Mercer County: Stanton (N.A.W.)

Morton County: Mandan (no name)

Rolette County: Turtle Mountains 10 miles NE of Dunseith (N.A.W.)

Slope County: Black Butte, Logging Camp Ranch (G. & E.W.)

Stark County: T. 137 R. 91 (R.P.U.)

Towner County: Rocklake (N.A.W.)

56. *Formica rufa haemorrhoidalis* Emery

North Dakota records:—

Burleigh County: Bismarck (N.A.W.)

Grand Forks County: Kellys (G. & E.W.)

57. *Formica rufa obscuripes* Forel

F. obscuripes is the most conspicuous ant in our North Dakota fauna. This is partly due to the workers themselves: they are active, aggressive, rather large and conspicuously colored and the colonies are populous. But the nests attract even more attention, for they are surmounted by a thatch mound averaging eight inches (20 cm) in height and three feet (91 cm) in diameter but ranging up to a maximum of 18 inches (46 cm) in height and 11 feet (335 cm) in diameter. These mounds are constructed of twigs, grass blades, dried herbaceous stems or other slender bits of material from adjacent vegetation. *F. obscuripes* is one of the few ants that have (or deserve to have!) common names. McCook (1884) referred to it as the "thatching ant."

Dr. Neal A. Weber has given us a comprehensive survey (1935) of the biology of the thatching ant in North Dakota. He found that the food consists of insects and aphid secretions. The aphids attended are:

- (1) *Aphis symphoricarpi* Thomas on wolfberry (*Symphoricarpos occidentalis* Hooker) — McHenry County (Weber, 1935, p. 198)
- (2) *Bipersona* sp. on sagebrush (*Artemisia* sp.)—Billings County (Goldsberry, 1933; referred to by Weber, 1935, p. 198)
- (3) *Neothomasia populicola* (Thomas) on aspen (*Populus tremuloides* Michaux) — Divide County: T. 160 R. 96 sec. 6 (Davis, 1937); McHenry County (Weber, 1935, p. 198)
- (4) *Periphyllus negundinis* (Thomas) on box elder (*Acer Negundo* L.) — Divide County: T. 163 R. 95 sec. 10 (Davis, 1937)

Larvae have been found in the nests from May 27 to August 31 and pupae from May 27 to October 9. According to Weber (p. 190) sexual pupae have not been found later than June 20. Winged forms have rarely been found in the nests.

McCook described the marriage flight of this ant but his information was second-hand and it is very doubtful that *F. obscuripes* was the form discussed. Weber says (p. 189), "Local popular accounts of the swarms of winged ants always refer to much smaller ants. I have never found an observer of swarming winged ants as large as *obscuripes*." Furthermore, he is of the opinion that this ant does not have a true marriage flight. "The winged sexual forms merely emerge from the nest singly or a few at a time and take flight." This emergence occurred throughout June in McHenry County.

F. obscuripes is a common ant throughout North Dakota. In altitude it ranges from about 800 feet in the northeastern corner to the summit of Black Butte, which is the highest point in the state (3468 feet). It prefers to nest in open situations, rarely in woods, but never very far from trees or shrubs.

Creighton (1940, p. 7) gives the range of this subspecies as "North Dakota to the Pacific Northwest with a southern extension in the Rocky Mountain region."

North Dakota records (* indicates records mentioned by Weber, 1935, p. 169) :—

Barnes County: Pillsbury, Valley City (N.A.W.)

Benson County: *Leeds (N.A.W.)

Billings County: *Medora (N.A.W., G. & E.W.); *Mikkelson (J.E.G.); Peaceful Valley Ranch (G. & E.W.)

Bottineau County: Kramer (Weber, 1941, p. 140); *Lake Metigoshe (N.A.W.)

Burleigh County: *Bismarck, *Sterling (N.A.W.)

- Cass County: Alice, Fargo (C.S.); Harwood (N.A.W.)
- Divide County: T. 160 R. 96 sec. 6 & 36; T. 160 R. 103 sec. 28;
T. 161 R. 99 sec. 26; T. 163 R. 95 sec. 10; T. 163 R. 102
sec. 24 (J.D.)
- Foster County: McHenry (M. A. Hetland)
- Golden Valley County: Beach (N.A.W.); summit of *Sentinel
Butte (G. & E.W.); *Trotters (J.E.G.); T. 144 R. 103 sec.
13 & 15 (J.E.G.)
- Grand Forks County: *Arvilla (N.A.W., G. & E.W.); Grand
Forks (C.V.J., L.M., *N.A.W., *G. & E.W.); *Inkster, *Lari-
more, Merrifield, *Niagara, Orr (C.V.J.); Northwood (C.
V.J., L.M., N.A.W.)
- Griggs County: *Binford (M. A. Hetland)
- Hettinger County: T. 136 R. 91 (R.P.U.)
- McHenry County: *Anamoose, *Bantry, *Denbigh, *Drake,
*Granville, *Guthrie, *Norwich, *Smoky Lake, *Towner,
*Upham, *Velva (N.A.W.)
- McKenzie County: *Bicycle (G. & E.W.)
- McLean County: 15 miles NE, 17 miles SE, 8 miles NW, 13
miles SW and 7 miles S of Garrison (R.P.U.); *Butte,
*Washburn (N.A.W.); Mercer (G. & E.W.)
- Mountrail County: *Parshall, *Plaza, Stanley, Verandrye Na-
tional Monument (N.A.W.)
- Morton County: *Breien, Fort Lincoln State Park, *Glen Ullin,
*Hebron, *Mandan (N.A.W.)
- Nelson County: Michigan, Pekin (N.A.W.)
- Oliver County: *Yucca (N.A.W.)
- Pembina County: Cavalier (N.A.W.); *Walhalla (G. & E.W.)
- Pierce County: *Balta, *Barton, *Round Lake, *Rugby (N.A.W.)
- Ramsey County: Devils Lake, Edmore (N.A.W.)
- Ransom County: Anselm, Sheldon, Venlo (N.A.W.)
- Renville County: *Sherwood (N.A.W.)
- Richland County: Christine, Wild Rice River S of Wyndmere
(N.A.W.)
- Rolette County: *Dunseith (N.A.W.)
- Slope County: *Black Butte, *Chalk Butte (near Amidon),
H. T. Ranch, Logging Camp Ranch (G. & E.W.)
- Sheridan County: *Denhoff (N.A.W.)
- Stark County: Dickinson, Gladstone (N.A.W.); T. 137 R. 91
(R.P.U.)
- Steele County: Goose River (N.A.W.)

Stutsman County: *Jamestown (McCook, 1884, p. 57; this record also cited by Wheeler, 1913, p. 431)
 Towner County: Rocklake (N.A.W.)
 Traill County: Hatton, Mayville (N.A.W.)
 Ward County: *Minot (N.A.W.)

58. *Formica sanguinea aserva* Forel

This form occurs throughout the state but is far from common. It nests in or under decayed wood which is in contact with the ground. Eggs were found in the nest on June 12, larvae and pupae from June 12 to August 3, males on July 1 and winged females on July 15.

North Dakota records:—

Billings County: Peaceful Valley Ranch (G. & E.W.)
 Bottineau County: Turtle Mountains near Bottineau (G. & E.W.); Turtle Mountains near Lake Metigoshe (N.A.W., G. & E.W.)
 Cass County: Fargo (Edna Steedsman); Harwood Tp., 8 Lake Tp., 36 Pleasant Tp. (C.S.)
 Grand Forks County: Emerado, Larimore (C.V.J.); Grand Forks (C.V.J., L.M.); Kellys (C.V.J., G. & E.W.); Northwood (L.M.)
 McHenry County: Towner (N.A.W., G. & E.W.)
 Slope County: Logging Camp Ranch (G. & E.W.)
 Stark County: T. 136 R. 91 (R.P.U.)

59. *Formica sanguinea rubicunda* Emery

The range of this subspecies includes the entire state, but it has not been collected many times. It nests on the open prairie under stones or in low earthen mounds. It enslaves *Formica fusca subsericea* and *F. (Proformica) neogagates*. Larvae and pupae were found in the nest from June 19 to July 29 and males on July 22.

North Dakota records:—

Billings County: Petrified Forest (G. & E.W.)
 Grand Forks County: Grand Forks (L.M., G. & E.W.); Niagara, Powell (C.V.J.)
 Griggs County: Binford (M. A. Hetland)
 Hettinger County: T. 136 R. 91 (R.P.U.)
 McLean County: Dogden (N.A.W.)
 Pierce County: Rugby (N.A.W.)
 Slope County: Black Butte, Logging Camp Ranch (G. & E.W.)

60. *Formica sanguinea subnuda* Emery

Only eight colonies of this ant have been collected, but the localities recorded suggest that it occurs throughout the state. It nests in decaying wood which is in contact with the ground. The nests are usually located in open woods.

North Dakota records:—

Bottineau County: Turtle Mountains (N.A.W.)

Grand Forks County: Grand Forks (C.V.J., G. & E.W.); Inkster, Kellys, Mekinock (C.V.J.)

Stark County: T. 137 R. 91 (R.P.U.)

61. *Formica subpolita* Mayr

This species has been collected from four nests under stones on the open prairie in the western half of the state.

North Dakota records:—

Hettinger County: T. 136 R. 91 (R.P.U.)

McLean County: 14 miles NE & 17 miles SE of Garrison (R.P.U.)

62. *Formica truncicola integra* Nylander

This ant has been collected only once — in a decayed log at Mikkelson in Billings County (J.E.G.).

63. *Formica ulkei* Emery

This species constructs conspicuous earthen mounds, which are typically located in open woods. The ants excavate a nest deep in the ground and use the excavated soil for the mound. The surface of the mound is often covered with a thin layer of plant debris. The diameter of the mounds ranges up to 48 inches and the height up to 14 inches. Typically the mound is a low cone, but the apex may be either pointed or rounded off and very large mounds tend to be elliptical in outline. There are many entrance-holes in the mound; most of them are around the base, but a few may be part way up the slope.

This ant is widely distributed throughout the state but is nowhere common. Larvae and pupae were found in the nest from June 25 to August 6 and winged males on July 10 and 15.

North Dakota records:—

Benson County: Sully's Hill Park (N.A.W.)

Billings County: Mikkelson (J.E.G.)

Bottineau County: Turtle Mountains near Lake Metigoshe (G. & E.W.)

Burleigh County: Bismarck (N.A.W.)
 Dunn County: Killdeer Mountains (N.A.W., G. & E.W.)
 Grand Forks County: Schurmeier (C.V.J.)
 McHenry County: Towner (G. & E.W.)
 McKenzie County: Bicycle (G. & E.W.)
 Stark County: T. 137 R. 91 (R.P.U.).

64. *Formica (Proformica) limata* Wheeler

A populous colony was taken in Divide County (T. 163 R. 95 sec. 10 — J.D.). The nest had six entrances and was in dry wind-blown soil in open grassland.

65. *Formica (Proformica) neogagates* Emery

This small timid species occurs throughout the state, usually nesting under stones in open, dry country. In the Badlands some formicaries had scattered and exposed entrances; a few had small mounds. Larvae were found in the nests from June 11 to July 22, pupae from June 19 to September 3 and males from June 27 to July 20.

North Dakota records:—

Billings County: T. 144 R. 102 sec. 5 & 9 (J.E.G.)
 Bottineau County: Turtle Mountains near Lake Metigoshe (G. & E.W.)
 Cass County: Grandin (H. S. Telford); 8 Hill Tp., 35 Leonard Tp. (C.S.)
 Divide County: T. 160 R. 96 sec. 6; T. 160 R. 103 sec. 28; T. 163 R. 95 sec. 10; T. 163 R. 102 sec. 24 (J.D.)
 Grand Forks County: Larimore (C.V.J.)
 Hettinger County: T. 136 R. 91 (R.P.U.)
 Morton County: Breien (N.A.W.)
 McHenry County: Towner (N.A.W.); Upham (Weber, 1941, p. 140)
 Slope County: Chalk Butte near Amidon (G. & E.W.)

66. *Formica (Proformica) neogagates lasioides* Emery

Only two nests have been found: one was under a flat stone; the other was exposed and had several openings.

North Dakota record:—

Grand Forks County: Grand Forks (L.M., G. & E.W.)

67. *Formica (Proformica) neogagates vetula* Wheeler

This ant ranges throughout the state but is not common. It usually nests under stones in open terrain; sometimes, however, there is merely a group of exposed entrances, which may or may not be

surrounded by small craters. Larvae were collected on July 25 and August 10. Pupae were found in the nests from June 19 to July 25 and males from July 23 to August 10.

North Dakota records:—

Billings County: Mikkelson (J.E.G.)

Cass County: Fargo, 8 Lake Tp. (C.S.)

Divide County: T. 160 R. 96 sec. 6 & 36; T. 163 R. 102 sec. 24 (J.D.)

Hettinger County: T. 136 R. 91 (R.P.U.)

McHenry County: Towner; 10 miles NE of Towner (N.A.W.)

McLean County: 13 miles NE of Garrison (R.P.U.)

Mountrail County: Stanley (Weber, 1942, p. 62)

Stark County: T. 137 R. 91 (R.P.U.)

68. *Formica (Neoformica) pallidefulva fuscata* Emery

Two workers were found in the stomach of a toad (*Bufo cognatus* Say) collected at Grandin (Cass County) August 10, 1943, by Dr. H. S. Telford.

Genus POLYERGUS Latreille

69. *Polyergus rufescens bicolor* Wasmann

This obligatory slave-maker has been collected only in the Red River valley. Its slaves are *Formica fusca subaenescens* and *F.f. subsericea*.

North Dakota records:—

Cass County: Fargo, 10 Harwood Tp. (C.S.)

Grand Forks County: Arvilla (G. & E.W.); Grand Forks, Honeyford (C.V.J.); Manvel (C.V.J., G. & E.W.)

70. *Polyergus rufescens breviceps* Emery

This subspecies also has been taken only in the Red River valley. Only two colonies have been collected, one at Kempton and one at Powell (Grand Forks County — C.V.J.). Slaves were not collected.

71. *Polyergus rufescens fusciventris* Wheeler

This ant has likewise been collected only in Grand Forks County: Arvilla (no name); Emerado (C.V.J.); Grand Forks (L.M.). Its slave is *Formica fusca subsericea*.

PART III. SUMMARY

1. Seventy-one species and subspecies of ants from North Dakota are listed with annotations and localities for each.

2. One new subspecies is described, *Leptothorax rugatulus dakotensis*, worker, from Sentinel Butte.
3. Records for ten species of aphids are given.
4. Tentative zoögeographical conclusions are:—
 - a. That the ant fauna of North Dakota has a predominantly western-southwestern complexion.
 - b. That the ant fauna shows some correlation with the life zones of Merriam (later employed by Bailey): most of the ant forms are statewide in distribution; five may be regarded as Sonoran and two as Canadian.
 - c. That the ant fauna may also be correlated with Dice's biotic provinces: an eastern Illinoian province and a western Saskatchewan province, with the 101st meridian as the approximate line of demarcation.

BIBLIOGRAPHY OF THE ANTS OF NORTH DAKOTA

- Creighton, W. S. 1940. A revision of the variants of the ant *Formica rufa*. *Am. Mus. Nat. Hist. Novitates* No. 1055: 10 p., 1 fig.
- Davis, J. M. 1937. The ants of Divide County, North Dakota. (Unpublished thesis in the University of North Dakota Library)
- Goldsberry, J. E. 1933. The ants of the North Dakota Badlands. (Unpublished thesis in University of North Dakota Library)
- McCook, H. C. 1883. The occident ant in Dakota. *Proc. Acad. Nat. Sci. Philadelphia*: 294-296.
- McCook, H. C. 1884. The rufous or thatching ant of Dakota and Colorado. *Proc. Acad. Nat. Sci. Philadelphia*: 57-65, 5 fig.
- Olson, O. W. 1934. Notes on the North American harvesting ants of the genus *Pogonomyrmex* Mayr. *Bull. Mus. Comp. Zool. Harvard College* 77: 493-514, 15 pl.
- Schonberger, C. S. 1937. The ants of Cass County, North Dakota. (Unpublished thesis in the University of North Dakota Library)
- Telford, H. S. & J. A. Munro. 1944. Toads feed upon sweet clover weevils. *North Dakota Agr. Exp. Sta. Bimo. Bull.* 6: 35-37.
- Weber, N. A. 1934a. A revision of the ants of the genus *Myrmica* Latreille. (Unpublished thesis in Harvard University Library.)
- Weber, N. A. 1934b. A new American myrmosid. (Hymenoptera, Myrmosidae) *Psyche* 41: 57-59.
- Weber, N. A. 1935. The biology of the thatching ant, *Formica rufa obscuripes* Forel, in North Dakota. *Ecological Monographs* 5: 165-206, 6 fig.
- Weber, N. A. 1939a. Descriptions of new North American species and subspecies of *Myrmica* Latreille. *Lloydia* 2: 144-152.
- Weber, N. A. 1939b. Tourist ants. *Ecology* 20: 442-446.
- Weber, N. A. 1941. Notes on the effect of drouth upon the nesting habits of ants. *Canadian Entomologist* 73: 140-141.
- Weber, N. A. 1942. On ant nesting habits in North Dakota in 1941 compared with drouth years. *Canadian Entomologist* 74: 61-62.
- Wheeler, W. M. 1910. The North American ants of the genus *Camponotus* Mayr. *Ann. N. Y. Acad. Sciences* 20: 295-354.
- Wheeler, W. M. 1913. A revision of the ants of the genus *Formica* (Linné) Mayr. *Bull. Mus. Comp. Zool. Harvard College* 53: 379-565, 5 fig.

FOOTNOTES

1. Dr. Esther W. Wheeler died in 1940.
2. Emery, C. 1894. Beiträge zur Kenntnis der nordamerikanischen Ameisenfauna. *Zool. Jahrb. Abt. Syst.* 7: 632-682.
3. Baily, Vernon. 1926. A biological survey of North Dakota. I. Physiography and life zones. *U. S. Dept. Agric. Bur. Biol. Surv. N. Am. Fauna* No. 49: 1-18, 5 pl., map.
4. Emery, C. 1910-1922. *Genera Insectorum. Fasc. Nos.* 102, 118, 137, 174 and 183.
5. Stevens, O. A. 1920. The geographical distribution of North Dakota plants. *Am. Jour. Bot.* 7: 231-242.
6. Dice, Lee R. The biotic provinces of North America. 1943. *Ann Arbor; University of Michigan Press.* VIII + 78 p., map.
7. Creighton, Wm. S. On formicid nomenclature. 1938. *Jour. New York Ent. Soc.* 46: 1-9.
8. McCook, H. C. 1882. The honey ants of the Garden of the Gods and the occident ant of the American plains. Philadelphia: J. B. Lippincott & Co. 188 p., 13 pl.
9. *loc. cit.* p. 132.
10. Headlee, T. J. & Geo. A. Dean. 1908. The mound-building prairie ant (*Pogonomyrmex occidentalis* Cresson). *Kansas State Agric. Coll. Bull.* 154: 165-180, 13 fig.
11. McCook, *loc. cit.* p. 159.