

LEPTOTHORAX WILSONI N. SP., A NEW PARASITIC ANT
FROM EASTERN NORTH AMERICA
(HYMENOPTERA: FORMICIDAE)*

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Wherever populations of ants are dense, social parasitic species can occur. Parasitic ants are dependent on workers of another species for all or a portion of their life-cycle. They often exhibit fascinating behaviors such as slave-raids, e.g. in *Polyergus rufescens* and *Harpagoxenus sublaevis*, the throttling or decapitation of host queens by *Epimyrma* or *Bothriomyrmex* respectively, or riding like an ectoparasite on the back of the host queen in *Teleutomyrmex schneideri* (Wilson, 1971; Buschinger, 1987).

Social parasites are unusually common in the myrmicine tribe Leptothoracini. For example, *Leptothorax acervorum*, an ant common in alpine and boreal forests throughout northern and central Europe, is host to four different parasitic species: the slave-maker *Harpagoxenus sublaevis* and the workerless *Doronomyrmex goesswaldi*, *D. kutteri*, and *D. pacis* (Buschinger, 1971). In North America, however, the vast populations of several species closely related to *L. acervorum* (currently synonymized under *L. "muscorum"* by Brown, 1955), are parasitized only by *Harpagoxenus canadensis* in the northeast (Creighton, 1950) and the inquiline *L. faberi*, known only from its type locality in Alberta (Buschinger, 1981). The status of a third species, *Doronomyrmex pocahontas*, formerly thought to be a workerless parasite (Buschinger, 1979), is unclear (Heinze and Buschinger, unpubl. data).

In this paper I report findings of a new, apparently workerless parasitic *Leptothorax* from Mount Monadnock, Cheshire Co., New Hampshire. The new parasite has small, brachypterous queens characterized by an alitrunk notably reduced in size. The host species is a large, black *Leptothorax "muscorum"*—group form that

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has provisionally been termed *Leptothorax* sp. B in previous publications (Heinze and Buschinger 1987, 1988). The *L. "muscorum"*—complex will be revised by A. Francoeur, Université du Québec, Chicoutimi.

An additional queen collected in a colony of *Leptothorax* sp. B on Mt. du Lac des Cygnes, P. N. des Grands Jardins, Quebec, is very similar to the females from Mount Monadnock but possesses a bulky, fully developed thorax. In this paper the Quebec queen is considered to be conspecific with the Mount Monadnock specimens and the Monadnock and Quebec queens are regarded as intermorphic and gynomorphic forms of one species. This is an example of queen polymorphism, a phenomenon that occurs in some other leptothoracine ants, too: in the genus *Formicoxenus* (Francoeur et al., 1985), in *Harpagoxenus sublaevis* (Buschinger and Winter, 1975), and in two independent species from eastern North America, *Leptothorax sphagnicolus* (Francoeur, 1986) and the undescribed *Leptothorax* sp. A (Heinze and Buschinger, 1987). The measurements follow the definitions given in Francoeur et al., 1985.

***Leptothorax wilsoni*, n. sp.**

Fig. 1a, b

Holotype female: an intermorphic queen from Mt. Monadnock.

Total length appr. 3.1 mm, head length 0.63 (excluding mandibles), head width 0.56 (behind eyes), scape length 0.45, maximum eye diameter 0.16, alitrunk length (Weber's) 0.79, pronotal alitrunk width 0.41, length of petiole in lateral view 0.26, height of petiole at node in lateral view 0.30, maximum width of petiole 0.16, length of postpetiole 0.17, height of postpetiole 0.25, maximum width of postpetiole 0.30, length of forewing 1.12, length of hind femur 0.50, length of hind tibia 0.40.

The habitus of the holotype (figs. 1a, 1b, 2a, 3) is similar in general to other queens of the subgenus *Leptothorax* s.str. M. R. Smith (= *Mychothorax* Ruzsky) with the exception of the mandibles and the alitrunk. The subapical mandibular teeth are extremely reduced in size and visible only as an undulation of the masticatory border (fig. 1b). The alitrunk is strongly reduced in volume compared to that of the normal (gynomorphic) queen of this species (fig. 2b) and other gynomorphic *Leptothorax* s. str. queens (e.g., fig. 2c). No sclerites are fused, however, in contrast to the extensive fusion

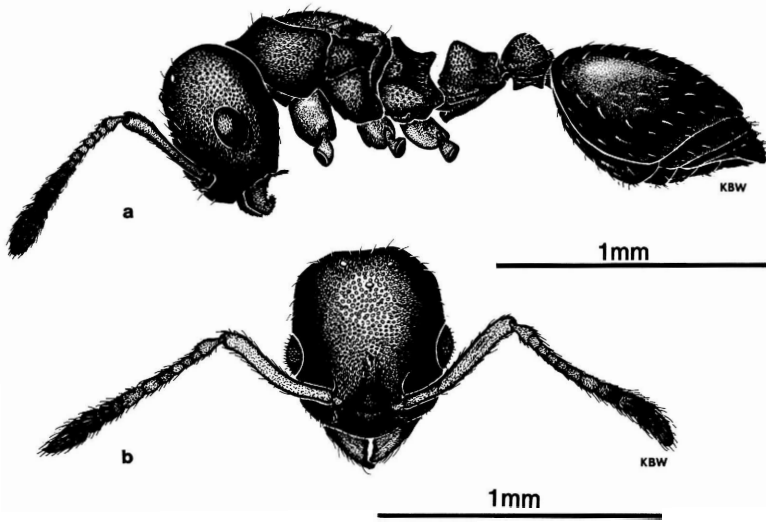


Fig. 1: Inter-morphic female of *Leptothorax wilsoni* in lateral view (1a) and head in frontal view (1b).

seen in inter-morphic females of *Harpagoxenus sublaevis* or *Leptothorax* sp.A. Head as in fig. 1b. Antennae 11-segmented with a 3-jointed apical club; maxillary palps 5-segmented, labial palps 3-segmented. Propodeal spines short, Propodeal spine index (Buschinger, 1966) appr. 1.4. Petiole in dorsal view subcylindrical. In profile petiole lacking an anterior peduncle; node prominent, triangular, with straight sides and a narrowly rounded apex. Subpetiolar process large and terminating anteriorly in a broadly angular tooth (fig. 1b). Lateral edges of petiole at base of node terminate anteriorly in two small but distinct teeth. Petiolar node apex viewed from rear flat. Maximum diameter of postpetiole in dorsal view (measured across broadly convex anterior margin) 1.7 times broader than maximum diameter of petiole, 1.5 times broader than the posterior margin, and distinctly trapezoidal in shape (fig. 3). In profile postpetiole with evenly rounded dorsal surface and well-developed anteroventral tooth. Head foveate-reticulate (sensu Harris, 1979), excepting a broad, median strip on the ventral surface that is smooth and shining. Alitrunk, petiole and postpetiole densely foveate-reticulate, gaster smooth and shining. Body sparsely covered

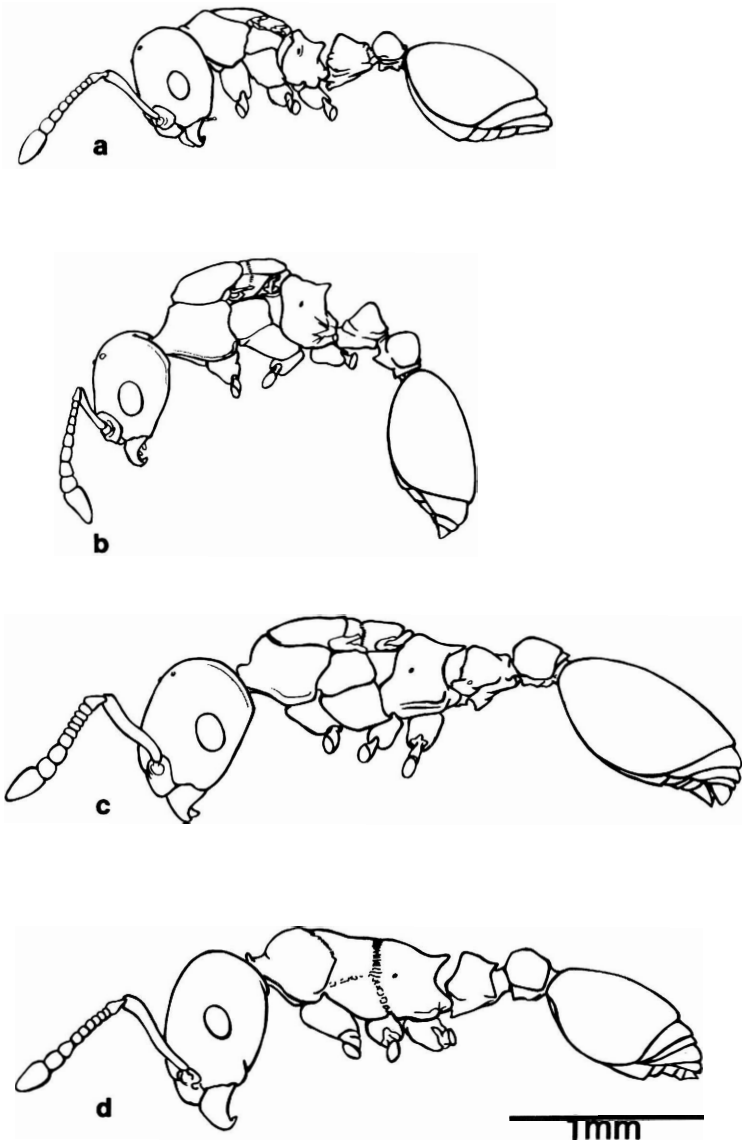


Fig. 2: Lateral view of intermorphic (2a) and gynomorphic (2b) females of *L. wilsoni*, and of a queen (2c) and a worker (2d) of the host species, *Leptothorax* sp. B of the "*L. muscorum*"-group.

with short, stiff erect and suberect hairs; erect or suberect hairs absent on petiole. Legs with sparse, appressed, short hairs and scattered erect hairs. Antennal scape with moderately abundant appressed hairs and a few erect hairs clustered at distal end; funiculus with dense suberect hairs. Numerous very short, erect hairs present on compound eyes. Maximum length of erect hairs on body 0.06 mm. Coloration blackish-red with neck, mandibles and legs somewhat lighter, antennae brown with a darker apical club.

Paratypes: intermorphic females from Mt. Monadnock.

The two paratype intermorphic females differ little from the holotype. One paratype is slightly smaller than the other two females (head length 0.59 mm, head width 0.53). In both paratypes the petiole in dorsal view is weakly hourglass-shaped, not subcylindrical, and in one specimen the node apex viewed from the rear is weakly concave, not flat. In addition, in side view, the anterior and posterior faces of the petiole are weakly convex in both specimens.

All three intermorphic females are wingless. However, some additional females taken in the field have had wings. These are strongly reduced in size, being $1/4$ – $1/2$ as long as the expected normal wing size for a *Leptothorax* queen the size of the *L. wilsoni*. In addition, the forewing venation differs markedly from that seen in other *Leptothorax* s. str. (fig. 4). Intermorphic females of *L. wilsoni* are therefore brachypterous. The literature mentions only few other examples of brachyptery in ants, among them *Nothomyrmecia macrops* (Taylor, 1978), *Monomorium subapterum* and *M. rubriceps* "cinctum" (Wheeler, 1917), and *Pogonomyrmex huachuacanus* (Cole, 1968). Brachypterous females also occur in *Vollenhovia emeryi*, a species from Japan that is now established in the District of Columbia, USA (S. Cover, pers. comm.)

Paratype: gynomorphic queen from Quebec. Fig. 2b.

Total length 3.28 mm, head length 0.63, head width 0.56, scape length 0.47, maximum eye diameter 0.19, alitrunk length 0.97, alitrunk width 0.55, length of petiole 0.28, height of petiole 0.31, width of petiole 0.16, length of postpetiole 0.17, height of postpetiole 0.25, width of postpetiole 0.31, length of hind femur 0.51, length of hind tibia 0.42.

The gynomorph differs from the holotype in its bulky, fully developed alitrunk (fig. 2b). In addition, the petiole in dorsal view is

hourglass-shaped, the node apex in rearview is distinctly concave, and in profile its anterior and posterior faces are weakly convex and concave respectively.

Paratype: male from Mt. Monadnock. Fig. 3.

Total length appr. 3.4 mm, head length 0.50, head width 0.52, maximum eye diameter 0.23, alitrunk length 1.11, alitrunk width 0.52, length of petiole 0.33, height of petiole 0.20, width of petiole 0.16, length of postpetiole 0.17, height of postpetiole 0.23, width of postpetiole 0.25, length of forewing 3.05, length of hindwing 2.35, length of hind femur 0.66, length of hind tibia 0.59.

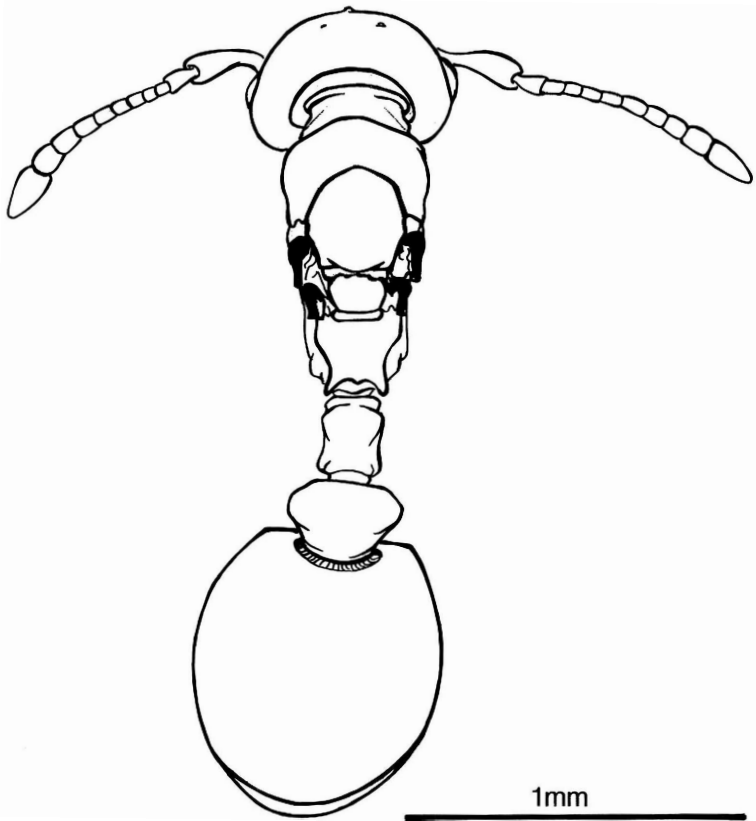


Fig. 3: Dorsal view of an intermorphic female of *L. wilsoni*.

Habitus in general like males of other *Leptothorax* s. str. Alitrunk with Mayrian furrows. Propodeum lacking teeth or spines. Petiole lacking anterior peduncle, node low and much rounded, anteroventral tooth very small. Postpetiole with a distinct ventral tooth (fig. 5). Head, much of the alitrunk and the petiole foveate-reticulate, the sculpturing in general somewhat weaker than in females. The postpetiole is largely smooth and shining except for weak foveate-reticulate sculpturing on the ventral surface and traces of it on the sides. Compound eye with scattered short, erect hairs. Body covered with tapering, curved, suberect hairs. Coloration blackish-red.

Type locality: holotype, intermorphing paratype females, and male.

Mt. Monadnock, Cheshire Co., in southern New Hampshire, USA. The type specimens were collected in an open, scrubby forest (canopy height varying from 1.5–3 m) of birches, alders, mountain-ash, spruce, and pine that is revegetating a forest site previously destroyed by fire. The precise location is along the “white-dot-trail” at 700–800 m in elevation.

Gynomorphic paratype: The gynomorphic female was found on Mont du Lac des Cygnes, Parque National des Grands Jardins, Quebec, Canada, at about 950 m in elevation near the tree line in a habitat with thoroughly arctic vegetation (black spruce, dwarf birch, lichen).

Derivatio nominis:

The ant is dedicated to Prof. Dr. E. O. Wilson, MCZ, Harvard University, Cambridge, especially since it was found, as he put it, “in the backyard of Harvard University.”

Disposition of types:

Holotype female, the gynomorphic female and the paratype male, and voucher specimens of the host species are deposited in the Museum of Comparative Zoology, Harvard University, Cambridge, Mass. One intermorphing paratype female each has been deposited in the British Museum, London, and in the Los Angeles County Museum, Los Angeles.

Diagnosis (Fig. 2):

Both gynomorphic and intermorphing queens of *L. wilsoni* are easily distinguished from queens of all sympatric *Leptothorax* s. str. (*L. retractus*, *L. sphagnicolus*, *L. acervorum*, *L. spp.* A, and B) by

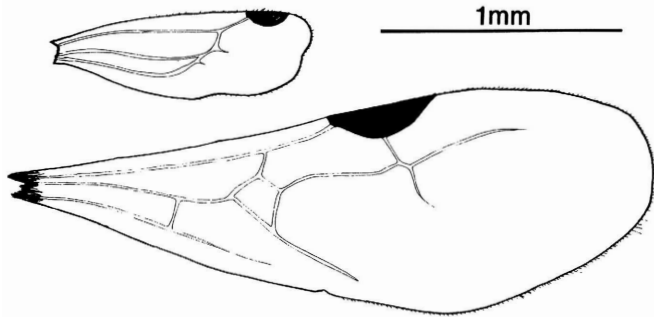


Fig. 4: Right forewing of an intermorphic female of *L. wilsoni* (top) and the female of the host species, *L. sp. B* (bottom).

their rudimentary subapical mandibular teeth, relatively short propodeal spines, the strongly developed postpetiolar tooth, and the distinctive foveate-reticulate sculpturing of the head, alitrunk, petiole, and postpetiole (Note: foveate-reticulate sculpturing is found in other species but is often mixed with rugulae or replaced by weak rugoreticulate sculpture.) The rudimentary subapical mandibular teeth are an especially distinctive feature. The only other *Leptothoracines* with this trait (the genus *Harpagoxenus*) are larger than *L. wilsoni*, lack foveate-reticulate sculpture, and possess distinctive antennal scrobes. Pending the discovery of additional specimens, *L. wilsoni* males may be tentatively distinguished by the fine foveate-reticulate sculpturing that covers the entire petiole, giving it a weakly shining surface. In males of all other sympatric *Leptothorax* s. str., at least the dorsal third of the node is smooth and shining; frequently most or all of the node, and sometimes the entire petiole as well is largely free of sculpturing and strongly shining.

One intermorphic female of *L. wilsoni* was dissected. The ovary consisted of a receptacle and six ovarioles. The Dufour's gland was large compared to that in females of the host species.

Biological observations:

Field data provide some information on the ecology of *L. wilsoni*.

Mt. Monadnock:

1) July, 14, 1988. One colony, containing four brachypterous,

intermorphic females, several *L. wilsoni* and host males, eight *Leptothorax* sp. B workers, and brood. No fertile queen was found. The colony nested in a rotten stick with a diameter of about 3 cm. (1 paratype female, paratype male)

2) July, 18, 1988. One dealate, intermorphic female, collected in the early afternoon on a stone. (paratype female)

3) July, 18, 1988. One dealate, intermorphic female, collected in moss together with a colony of *Leptothorax* sp. A, a species closely related to *L. sp. B* (Heinze and Buschinger, 1987). The *L. wilsoni* female was attacked by the *L. sp. A* workers and died two days later. (holotype)

4) October, 19, 1988. One colony, consisting of a fertile, physogastric *L. wilsoni* intermorph, several dozen host-workers, two host females, and brood, nesting in a rotten stick of about 5 cm diameter. The two host females were dissected, they both were inseminated, the ovarioles however, were undeveloped and contained no corpora lutea.

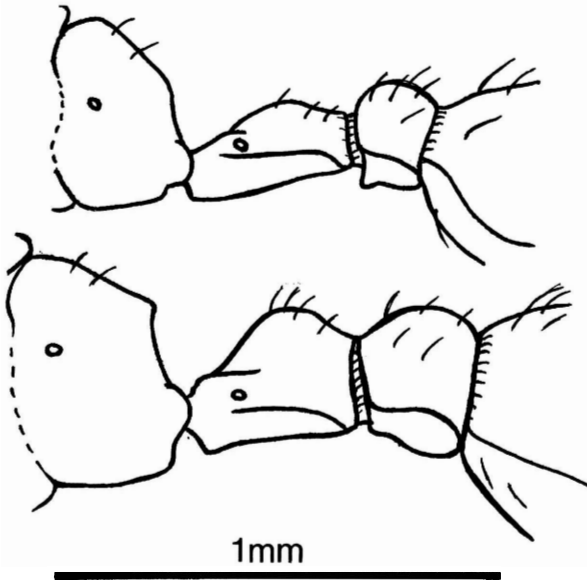


Fig. 5: Propodeum, petiole and postpetiole of males of *L. wilsoni* (top) and the host species, *L. sp. B*. (bottom).

In total, 64 colonies of *Leptothorax* sp. B and 43 colonies of the closely related *Leptothorax* sp. A were collected on Mt. Monadnock. Two colonies of *L.* sp. B were parasitized by *L. wilsoni*.

Mt. du Lac des Cygnes:

5) July, 23, 1988. One colony with a gynomorphic female, several host workers, and two larvae. The colony was nesting under a rotten branch.

At Mt. du Lac des Cygnes 14 colonies of *Leptothorax* sp. B and 12 of *L.* sp. A were examined.

Apparently *L. wilsoni* is a workerless species that parasitizes colonies of an undescribed large black or dark brown *L.* "muscorum", provisionally named *Leptothorax* sp. B (fig. 2c, d). Since no fertile host queen was found in the three colonies taken in the field, most probably *L. wilsoni* does not accept the host queen. It thus is not a truly inquiline parasite like *Doronomyrmex kutteri* or *Leptothorax faberi*, in which the host queen is allowed to remain in the nest, but resembles *Doronomyrmex goesswaldi*, in which host queens are eliminated (Buschinger and Klump, 1988).

Four winged females of *Leptothorax wilsoni*, which were collected on July 14 at Mt. Monadnock, were kept in the laboratory at room temperature, together with the host workers and males of both the host species and the parasite. Males of both species were very nervous early in the morning as soon as 5:30 a.m.; all activity, however, ended at about 9:30 a.m. No mating was observed, but three days after the collection all four females had shed their wings. On August 4 fighting among the dealate parasites was observed, the females attempted to sting each other and tore at legs, antennae and postpetiole. After one female had successfully been adopted by callows of a *Leptothorax* sp. B—colony from Mt. Monadnock, a young *L. wilsoni* female was put into a queenright host colony. Aggressive behavior of host workers toward the female was not observed. The *L. wilsoni* female apparently avoided contact with the host workers and during the first hours gathered herself with the host males in the nest, grooming and licking them, especially the mouthparts and prothorax. One day later the *L. wilsoni* female was found clinging to the postpetiole of the host queen with her mandibles and trying to sting her. These attacks, which lasted for only several minutes each, continued for some hours. No successful stinging, however, could be observed; the stinger slid off the sclerites of

the host queen's gaster. Nevertheless, only half an hour after the first observation of fighting the host queen appeared shaky and shivery, and held her gaster in an unnatural angle. Finally the host queen left the nest; she was found dead outside the nest on day three of the experiment.

Of the two females that remained in the original colony from Mt. Monadnock, one was attacked by the other on August 9. The extremities and antennae of the attacked female were cut off, and eventually she died.

Further experiments will give some more detailed informations on colony-foundation behavior and regulation of queen number in this species.

SUMMARY

Male and female of *Leptothorax wilsoni* are described. The species apparently is workerless and parasitizes colonies of a species belonging to the *Leptothorax* "muscorum" group (sp. B). Nests of the new species were found on Mt. Monadnock, New Hampshire, USA. *L. wilsoni* has brachypterous females with a reduced thorax, a gynomorphic parasitic female from Mt. du Lac des Cygnes, Quebec, Canada, most probably belongs to the same species. *L. wilsoni* differs from its host species and other *Leptothorax* in the reduction of subapical mandibular teeth, the relatively short propodeal spines, and the distinctive foveate-reticulate sculpturing of the head, alitrunk, petiole and postpetiole.

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APPENDIX

Shortly after this manuscript had been submitted, additional colonies of *Leptothorax wilsoni* were found on Mt. Monadnock

and at a new locality in New Brunswick, Canada. On April 24, 1989, a colony, containing a fertile intermorphic female of *L. wilsoni*, *L. wilsoni* brood, several *Leptothorax* sp. B. workers, and an uninseminated *L. sp.* B female, was collected in a pine forest off Berry's Mills Road, Moncton, Westmorland Co., New Brunswick (R. J. Stuart, University of Vermont, Burlington, pers. comm.). On May 18, 1989, two colonies, each containing an intermorphic *L. wilsoni* queen, brood, and *L. sp.* B workers, were collected at the type locality on Mt. Monadnock, New Hampshire.

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