

## THE ANT FAUNA OF SWAMPS IN THE CANTERBURY MOUNTAINS

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1. Introduction and description of the areas referred to:

In 1938 I received from Dr. Skwarra a copy of her admirable work on the ants of the East Prussian sphagnum swamps, and with it a suggestion that I should visit the sphagnum swamps in this country to find out whether the ants of this hemisphere have developed the same habit.

In the course of the investigation I visited the following areas:

1. Scamander swamp, Lake Coleridge.
2. Swamp at the foot of Mt. Horrible, Cass.
3. Sphagnum gully by Lake Lyndon.
4. Swamp at the foot of the Rome Ridge, Arthur's Pass.
5. Margaret's Tarn swamp, Arthur's Pass.

It should be explained that these are all mountain swamps of small area, in no way to be compared to the enormous swamps such as the Zehlaubbruch, in which Dr. Skwarra did most of her work. Although they all contain more or less of sphagnum, they differ significantly in other respects, and I propose to describe them in some detail.

The Scamander creek, for the last few hundred yards of its course before it flows into Lake Coleridge, is bordered by some acres of swamp. The belt nearest the river consists of niggerheads (*Carex secta*), etc. (small colonies of *M. nitidum* nest in dead portions of these), succeeded by a wider belt of reeds and grasses. All this area was more or less under water at the time of my visits. The next belt, otherwise resembling the previous one, contains beds of sphagnum, usually with archeria, pimelea, anisotome, and other dwarf plants growing in them, and with other mosses growing in the sphagnum in some of the larger beds. The largest bed which I found measured about eight yards by five, and probably the whole area of sphagnum would scarcely amount to a quarter acre. Finally,

an interrupted belt of toe-toe (*Arundo conspicua*) separates the sphagnum belt from the shore.

*Monomorium nitidum* and *Monorium suteri* have taken complete possession of the sphagnum in this swamp, their nests being found in even the smallest beds, but never closer to each other than four or five feet. They do not appear to nest in the sodden soil at the edge of the swamp; probably fluctuations in the water level would make this impracticable.

The Mt. Horrible swamp at Cass lies at the foot of the mountain, and is separated from the plain by a low ridge of moraine. It is of considerable extent. It contains several islands of dry land rising steeply from the swamp (these are shown in the photograph) and the hillside rises steeply on either side of it. Sphagnum beds are scattered over its whole area, especially at its upper end, and the islands are in places fringed with sphagnum which overlaps the dry ground. It is in this respect especially that this swamp differs from that by the Scamander Creek, where none of the sphagnum is at the edge of the swamp.

Here too *M. nitidum* and *M. suteri* have taken complete possession of the sphagnum, both in the outlying beds and along the shore line.

The sphagnum which I visited at Lake Lyndon lies on either side of the stream in a steep gully. Some of the beds are ten or twelve feet across, "lebensraum" for perhaps three or four colonies, but the most careful search showed no sign even of foraging ants. This was surprising as *M. nitidum* is abundant on the hillside, and I found one colony nesting in sodden earth in very wet swamp by the edge of the lake.

The Rome Ridge swamp lies by the roadside above the Arthur's Pass settlement just beyond McGrath's Creek. It contains many dwarf trees and shrubs, and is for the most part carpeted with sphagnum and other mosses. *M. nitidum* reigns here without competition from *suteri*; possibly the altitude is the limiting factor for the latter species.

The fifth area to be described is the swamp round Margaret's Tarn, on the track to the Bealey Glacier. The sphagnum here consists of isolated tufts a foot or so across, fringing the tarn, it contains no ants. But in among the sundews and liverworts, wherever the sodden earth rises a few inches above the level of the water, I found flourishing colonies of *M. nitidum*.

In addition, I have examined various small patches of sphagnum in the Arthur's Pass and Castle Hill areas without finding ants.

## 2. MONOMORIUM (NOTOMYRMEX) SUTERI Forel

*Monomorium suteri* resembles *M. nitidum* very closely. It is slightly larger in most cases, and a little less variable in size. With a good lens it may readily be distinguished from *nitidum* ( $\alpha$ ) by the

form of the clypeus which is sharply emarginate anteriorly in the latter species, slightly so in *saturz*, and (b) by the short but definite spines on the pronotum, where *nitidum* has only indefinite projections (the "undentlich abgegrenzte Beulen" of Forel's description). The readiest method of observing these differences in the field is to hold the live ant gently by one leg between the thumb and forefinger, when it will open its mandibles to bite at the fingers and thus show the anterior margin of the clypeus.

As already stated, this ant is common in the Seamander and Mt. Horrible swamps, although in both places *nitidum* is very much more abundant. Its nests are two or at the most three inches across, and present no features of special interest; in many cases it is hard to see any attempt at cell construction. There is nothing on the surface to betray the presence of the nest. I have never even been able to detect any excavated material lying on top of the sphagnum.

A few workers are usually to be seen hunting on the surface of the moss, but in general, like all New Zealand ants with which I am acquainted, this species is largely subterranean in its habits. Large numbers of cocoons are usually to be found in its nests; I have also taken specimens of a blue-grey aphid, and one nest at Mt. Horrible contained many ectoparasitic mites. On October 1st, 1932, I took males and winged females at Mt. Horrible; these had evidently wintered in the nests. A colony taken at the same time has now been living in captivity in a block of sphagnum for four months; very little is seen of them, but a few workers come up when pieces of meat, etc., are placed on the surface.

In January, 1937, I found this species nesting in a very dry position near Culverden; the ants were active, but (possibly on account of the dry position) almost every one had patches of white on different parts of its body. At Mt. Horrible I found one nest in dry earth under moss a foot or so above the level of the swamp. Apart from these two cases I have never found it except in sphagnum and other mosses in swamps. But it resembles *nitidum* so closely that I may easily have overlooked it in mistaking it for that species, and without a more systematic search I should not care to suggest that swamps are its normal habitat.

### 3. *MONOMORIUM (NOTOMYRMEX) NITIDUM* Smith.

This very adaptable ant is everywhere in the swamps. In Christchurch gardens where cultivation makes it difficult to construct tunnels, I have seen it running about on paths almost as freely as *Lasius niger* in English gardens. In riverbeds or in swampy soil a few foragers are usually to be seen. But in sphagnum it takes full advantage of the loose medium to work in, and the ants seldom appear on the surface at all. By parting the sphagnum gently, however, one frequently sees workers carrying dead insects, etc., to the nest.

This ant also pastures coccids in its nests. Apart from aphids of the same species as those referred to under *suteri*, I have seen no other inquilines in its nests in swamps. The remarks of Dr. Skwarra on the paucity of swamp inquilines in Europe apply equally to New Zealand.

The nests resemble those of *suteri*, except that the cells are more solidly constructed in the larger colonies. In November in the Scamander swamp, many colonies had excavated large central cells, usually round the roots of *archeria*, *anisotome*, etc.: this was presumably to make room for the winged forms. In pure sphagnum, they sometimes content themselves with cutting off the leaves and leaving the stems to form their cells; when nesting under a tap-rooted plant like *anisotome*, they build fragile platforms from the root to the surrounding moss; under *Archeria*, they cut away the moss entirely and pile up their exceptionally sticky larvae on the roots of the heath; in the close-growing moss which sometimes covers dead sphagnum, they cut shallow cells two or three millimetres beneath the surface.

At the Scamander swamp, I found a remarkable nest in a tuft of reeds which was growing in perhaps two inches of water. The base of this tuft, which was at the most three inches across, was enclosed in moss which rose to about the same distance above the water, and in the cavity thus formed there was a flourishing colony of a small race of *nitidum*. Their food must have consisted almost exclusively of the excreta of their numerous coccids. I have noticed in this species that colonies with many coccids usually contain large numbers of small individuals, whereas those without coccids seem to have a smaller number of larger ants.

Dr. Skwarra records that cell walls in East Prussian sphagnum nests are permeated with fungus hyphae which help to strengthen them. I can find no trace of hyphae in the nests of *nitidum* and *suteri* which I have examined, and the cell walls usually fall to pieces when lifted.

#### 4. Conditions governing the sphagnum nesting habit in *M. nitidum*:

No one who has collected ants in sphagnum swamps will doubt that such places afford perfect conditions for ant life. The colonies are quite as exuberant as those on dry land and are as numerous as in the most favourable localities elsewhere, and when I have visited them the larvae have been as advanced as those in earth nests nearby. When in the Mt. Horrible swamp in October, 1939, I took a series of thermometer readings which are instructive in this respect. I had only one thermometer, so could not synchronize my measurements; but the results showed that the temperature half an inch below the surface of the sphagnum was from two to five degrees Fahrenheit higher than on the surface, in the sun and wind, and slightly higher than in earth at the same depth on the

hillside. The day was sunny, with a fairly strong N.W. wind. From a depth of one inch downwards, the temperature fell rapidly, but the ants had most of their larvae in the upper layers. Furthermore, the sphagnum remains moist in even the driest weather, when ants in earth nests are driven far underground in search of moisture; so it is clear that in respect of temperature at least sphagnum-dwelling ants need be under no disadvantage.

Nevertheless it is clear that the ants have an aversion to sphagnum; if they had not they would colonize the sphagnum at Lyndon and the numerous smaller beds at Arthur's Pass and Castle Hill. We may assume that the sphagnum in any area is first colonized in one of two ways: either a female alights from her marriage flight on a bed of moss which is completely surrounded by water, accepts the inevitable, and brings up her first brood in the moss; or else colonies founded in the earth of the swamp in abnormally dry conditions are driven up into the sphagnum when the water level rises.

But in the Mt. Horrible swamp (and to a lesser degree in the Rome Ridge swamp at Arthur's Pass) we find colonies in sphagnum where the ants have only to walk two or three feet to reach dry land rising steeply from the swamp; in positions closely resembling the ant-free sphagnum of the Lyndon and other areas. They can hardly have been driven into the moss by the competition of other colonies on the hillside, as *nitidum* is no less abundant on the hillside at Lake Lyndon. Nor can they have been migrating shorewards—in the first place, why should they have stopped where they are instead of going a few feet further to the dry hillside, and in the second place some of these nests are in sphagnum adjacent to the very wettest parts of the swamp. It seems to me that these nests, can only be accounted for in one way: females from a sphagnum nest alight from their marriage flight, recognize the sphagnum as familiar material, and at once found their colonies in it without bothering to look further. In other words the individual experience of these females has overridden the apparent disinclination of their species to nest in sphagnum. The theory is hardly susceptible of proof, but in the hope of getting evidence one way or the other I have taken two colonies of *nitidum* from the Scamander swamp and planted them in the Lyndon sphagnum to see if they are able to colonize it.

#### LITERATURE CITED

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