

# The Distribution of Animals

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In the preparation of this paper an attempt has been made to gather together the opinions of as many zoologists as possible. Knowledge of most of the animals of the ash-shower country is, however, confined to observations on discontinuous areas, and the paper will serve mainly to show us how little is known.

Soil animals are greatly affected by the environmental conditions encountered in ash-shower country. This may be illustrated by studies of earthworm distribution. In the north of the North Island the earthworm fauna consists very largely of species of the sub-family *Megascolecinae*. In the South Island and the southern part of the North Island most of the species belong to the sub-family *Acanthodrilinae*. The southern boundary of the range of predominantly megascolecine species coincides almost exactly with the northern boundary of the ash-shower country. The boundary of the range of the predominantly acanthodriline species also lies within the ash-shower country. Among the reasons for this pattern of distribution of earthworms are the following:—

- (1) Ash-shower soils are not generally a favourable environment for earthworms, due to their seasonal aridity and frequently to their coarse physical structure.
- (2) A few species of earthworms have entered the ash-shower country from surrounding unaffected areas, and have become established in ash-shower soils.
- (3) There has been insufficient time for local specialisation or subspeciation since the last great Taupo shower.

In some places unusual conditions, superimposed on the normal soil characteristics, have produced a more favourable environment for earth worms.

Such conditions are:—

- (1) The presence of native forest on Taupo ash; the litter from the trees produces an ecological niche for small species of earthworms which are peculiar to leaf-mould, and are not otherwise found in ash-shower soils.
- (2) The deposition of a material such as Roto-mahana mud on Taupo ash has an enriching effect, and promotes the growth of forest trees. Conditions for earthworms have consequently been improved, with a resulting increase in their number and variety.

- (3) The planting of large areas of exotic forest on ash-shower soils has greatly altered the soil environment and influenced the distribution of earthworms by providing large and continuous areas of soil with a constant and abundant source of organic matter and protection from excessively arid conditions. Earthworms have entered the soils under exotic forests from all directions, and have spread throughout them.

Forster, working on the distribution of *Opiliones*, notes "that the fauna seems to be too recent for speciation and subspeciation, and seems to be derived from Manawatu and Wellington".

Salmon, working on *Collembola*, has found that the species in the ash-shower country have entered from surrounding areas, mainly the north-east.

Knowledge of the terrestrial animals of the ash-shower country is fragmentary. A little is known about the introduced mammals; the distribution in this case is related more to points of liberation and centres of settlement, past and present, than to the ecological characteristics of ash-showers.

Among flightless birds, wekas and kiwis were formerly more common, stoats, rats, cats and dogs probably being the cause of their decline, but nevertheless large areas have been little interfered with, and Bull, in an unpublished report, has discussed the status of many rare birds.

The freshwater invertebrates of the ash-shower country are little known. Some facts concerning the distribution of brown and rainbow trout are brought out in data supplied by Allen. A superficial examination shows that the two species are roughly divided by a line extending from Hawkes Bay to Taranaki, and suggests that their distribution may be related to ash showers. Closer study shows that the pattern is more complex, and may sometimes be due to the liberation pattern since both species are introduced. The present distribution is however probably due largely to ecological factors, and reflects different requirements of the two species. The factors involved are generally obscure. The "troutless" areas are either on soft rock where the river beds do not form suitable gravels for spawning, or may be climatically unsuitable, possibly due to excessively high temperature. The correspondence with the ash-shower boundary seems only very approximate, with major divergences at both east and west ends. Perhaps it might best be taken as an illustration of the danger of approaching a problem with preconceived ideas of its answer.