

### Comparison With Italian Cave Fauna

The fauna of Italian caves (Baggini, 1961) yields some interesting comparisons. Troglaphiles are the predominant category (48%), with troglonexes 36%. Troglobites (16%) are still the smallest group, but nevertheless represent more than twice the New Zealand percentage. The actual number of species for Italy is far greater, 726 against 123, but only a small part of New Zealand is under consideration. The difference is partly due to the prevalence in Italy of certain individual groups such as Copepoda, Annelida, Collembola and Acari.

The relatively small number of terrestrial forms recorded in New Zealand is undoubtedly due to the virtual absence of bats from our caves, and hence a smaller, less varied food supply. In countries where bats colonise caves in large numbers, their guano maintains a permanent community of coprophages and their predators. Although bat skeletons are often discovered, they are nearly always solitary and there is no evidence that large colonies ever existed. The only significant source of animal droppings is the rat. Fresh and decayed droppings are indeed the basis of a food cycle. Collembola, Isopoda, Myriapoda and Acarina all feed on these, and are in turn devoured by beetles and their larvae.

### Evolution

Regressive evolution is exhibited in many of the cave species. This, in some cases, may be more apparent than real. Beatty (1948) showed that lack of colouration in subterranean aquatic amphipods is due to their ancestral pigment being of the carotenoid type which is light sensitive. Viré (1904) found that pigmentation of some cave species occurred after exposure to light (cited Beatty, *loc. cit.*). Maguire (1961) however, considered from his experiments, that carotene was not light-sensitive and that pigmentation was dependent on nutrition. Carotenoids in an available form must therefore be lacking for hypogean populations, even though present in cave sediments. The Puriri Cave amphipod community of colourless specimens would appear to offer a parallel situation.

In terrestrial isopods that contain a melanin type of pigment (Baldwin and Beatty, 1941; Maguire *loc. cit.*), and in Coleoptera (Krekeler 1958; Barr 1960b), it is postulated that the loss of pigment and degeneration of eyes, both characters of neutral survival value in total darkness, may be caused by genetic factors, through the action of mutation pressure unopposed by selection pressure. It is further stated by Allee *et al* (1949): "If selection favours an increased development of one character while another character has a diminished survival value in a given habitat, there will be a shift in the alleles in many gene systems with a consequent degeneration of the character that is losing importance." This is particularly evident in trechine beetles such as *D. mayae*, where legs, mandibles, antennae and tactile hairs are greatly increased in length. The New Zealand cavernicolous isopod *Styloniscus phormianus* displays varying degrees of depigmentation and ocular reduction (to 2 ocelli). Vandel (1958a) has stated that ocelli do not diminish in number until depigmentation of the cuticle is complete.

With regard to lack of wings, Lindroth (1949), mentioned by Southwood (1962) concluded that stability and isolation of habitat favoured flightlessness, and that the gene for the fully winged state would be selected against in such environments.

Subterranean living has produced not only morphological changes but contraction of the life cycle also. This phenomenon is associated in the Trechinae, with a reduction in the number of ovarioles (Deleurance, 1958). In extremely adapted Coleoptera, a single large egg, rich in nutriment, is laid. The resulting larva neither feeds nor moults but encloses itself in a cell in which it eventually