2 Ecology

Many studies have been made of the environmental factors that influence development and behavior of the human bed bugs. Several publications are so extensive (Hase 1917, Kemper 1936, Omori 1941, Johnson 1942) that they amount to small books. Quantitative studies of natural populations have been conducted by Mellanby (1939b) and Johnson (1942). For purposes of this work, I have tried to select the most significant material bearing on temperature, humidity, nutrition, reproduction, etc. The original publications should be consulted for further details.

No detailed investigations have been carried out on the microclimates where the bugs actually live in the nests of birds, or in hollow trees or caves where bats roost. Nidicolous bugs are certainly in close contact with their hosts during the period when the birds are in the nests. Cave-dwelling species stay on the walls and ceilings where the bats are roosting. Eggs are seen in cracks in the rocks and the bugs are commonly found running over the surface. Some cave dwellers like *Cimex cavernicola* Usinger, n. sp., show no obvious adaptations for cave life, but others like *Afrocimex, Stricticimex,* and especially *Leptocimex,* seem to be typical troglobionts with relatively long legs and antennae and pale color. The reduction of wings is a characteristic feature of cave insects, but it is also typical of parasites, so the small wing pads of cimicids are not necessarily connected with cave life. Unlike many cave insects, cimicids have well-developed eyes.

TEMPERATURE

Like other organisms, bed bugs are part of a complex ecosystem and are affected by diverse elements in their environment. Of the various factors, temperature is by far the most important, since it influences all aspects of the bugs' activities. Only in species that inhabit warm caves is temperature likely to be so uniform that it does not affect the rate of development or such vital activities as searching for food or mates.

The threshold for hatching, nymphal development, and adult activity in *C. lectularius* is between 13° and 15°C (Hase 1930, Mellanby 1935,