

but does lean toward his theory that the social parasitic stages were derived from a *rufa*-like form.

Brun (3) believes that the theory of the mixture of odors, which has been used to explain, in a purely physiological way, the tolerance of one species toward another in the artificial alliances of certain species of ants, must be given up, as entirely untenable. These artificial alliances do not depend upon the mixture of odor, but depend entirely upon complex associative brain processes, especially in the realm of individually acquired mnemonic engrammes.

Cornetz (5) believes that the apparent coöperation of several ants in moving particles of food too large to be handled by a single individual is simply the result of the stimulus that causes the solitary ant to return home. When an ant starts on a foraging trip it receives, in some manner, an impression that later guides it back to the nest. When it finds a morsel of food it takes it, and returns by an almost direct route. Several ants, having hold of a morsel too large for a single one, are each guided by this direction-sense toward the nest, with the result that the combined efforts of many holding and pulling the piece of food are used to bear it. This gives at first sight the impression of mutual aid, but is in reality only "a fortuitous coincidence of purely individual actions." There is even actual hindrance to one another when many have hold of the same morsel. Likewise, other actions at first sight mutualistic are believed to be simply the result of individual activity or of a certain tendency toward imitation, comparable to the flocking of sheep. Thus, Cornetz saw an isolated worker digging at a new nest some distance away from the principal nest. In another instance seven workers were engaged in working at a gallery far from the nest. These carried eggs, larvae and even adults from the original formicary, in which, however, most of the colony remained. This division was in no sense beneficial to the entire community, but was probably the result of several workers following one that had started the new gallery. As the worker is merely an undeveloped female, the tendency to establish a new colony is not surprising, as often other female characters are more or less developed in individual workers, even parthogenetic reproduction, and the nest-forming habit is typically female. When one worker begins to dig a new nest, others coöperate