

mutations or saltations of relatively recent phylogenetic origin, which in some species (*L. latipes* and *neoniger*) may continue to exist side by side with the primitive ( $\alpha$ -) form. Or the  $\alpha$ -form may be a reversional or atavistic occurrence in colonies that normally bring forth only  $\beta$ - forms.<sup>1</sup> In species like *F. ciliata*, *microgyna* and *Stenammina tennesseense* the  $\alpha$ - form has not yet been seen. *Formica oreas* may also be included in the same category, though the female of this species is less extreme, — hardly more so, in fact, than the female of *F. dakotensis*.

A discussion of the more general question as to how far the species, subspecies, and varieties of the Formicidæ show evidence of having arisen by mutation instead of continuous variation would require more space than can be given in this article. In my opinion, the mutation theory not only plausibly indicates how the species, subspecies, etc., have arisen in this group of insects, but also throws light on the development of caste or polymorphism within the confines of the single species. It is difficult, however, with the means at our command, accurately to separate the phenomena of trophic variability from those of mutation proper, as I shall endeavor to show in a future paper.

---

<sup>1</sup> Similarly the peculiar wingless, or "ergatoid" males of *Formicoxenus*, *Anergates*, etc., may be regarded as  $\beta$ - males, *i. e.*, as saltatory aberrations or extreme mutations from the normal winged type, which has been suppressed in the phylogeny. It should also be noted that the different ergatoid females of forms like *Leptothorax emersoni* are not continuous variations, but mutations which differ from one another by the presence or absence of whole characters — *e. g.*, ocelli, thoracic sclerites, etc., at the same time that they exhibit true variations, *i. e.*, differences in dimensions.