INTRODUCTION

The traditional approach to ant systematics relies entirely upon examination of external morphology with no direct emphasis on genetic characteristics. The size, number, and morphology of the chromosomes are, themselves, useful characters, but their value is enhanced by the fact that chromosomal rearrangements can result in speciation.

Historically, cytotaxonomic studies of Formicidae were initiated when HAUSCHTECK (1961) reported the chromosome numbers of five European species. Subsequent research revealed a general trend toward higher diploid numbers in Formicinae than in Myrmicinae and a correlation of long chromosomes with low numbers. IMAI (1966) reported that ant chromosomes are relatively small and difficult to work with compared to those of many other organisms. After studying 19 Japanese species, IMAI (1966) concluded that (1) myrmicine genera show a wide heteroploid relationship, whereas formicine genera show nearly polyploid relationships ; (2) variation in number is wide among related myrmicine species but narrow among formicine species ; and (3) in general, chromosome numbers vary greatly within the Formicinae.

Presently, after 20 years of related studies, ca. 500 of the estimated 15,000 living ant species have been karyotyped. These data are useful in the attempt to reconstruct formicid evolution. IMAI *et al.* (1977) proposed three hypotheses for the chromosomal evolution of the ants : (1) the fusion hypothesis—the ancestral species had a high number of chromosomes (ca. 40) with subsequent evolution toward lower numbers ; (2) the fission hypothesis—ancestral species had low chromosome numbers and modern species have evolved toward higher numbers ; and (3) the modal hypothesis—the present mode is essentially that of the ancestral mode.

Sibling species that are practically indistinguishable on the basis of external morphology may often be recognized by their karyotypes (IMAI *et al.*, 1977). Additionally, morphologically distinct species of some Formicinae reveal identical karyotypes. Identical results were observed among 12 species of the myrmicine genus *Pheidole.* The general rule that karyotypes are rather uniform within species but dissimilar between species does not hold in these cases. However, when cytological investigation reveals significant chromosomal differences between morphologically " identical " species, close examination occasionally discloses visible differences.

Chromosome polymorphism was first detected in a myrmicine ant when populations of the Japanese ant *Pheidole nodus* were identified with haploid chromosome numbers of 17 to 20 (IMAI and KUBOTA, 1972). Every haploid karyotype consisted of 11 submetacentrics or subtelocentrics and two acrocentrics or telocentrics. However, there was considerable variation in the number of metacentrics and telocentrics.