

corpora pedunculata have received much attention because the idea persists that the size of these bodies, relative to the rest of the brain, is an indication of mental capacity (Wilson 1971). Among those ants examined by Vowles (1955) and Bernstein and Bernstein (1969), the corpora pedunculata are smallest in *Eciton hamatum* and largest in *Formica rufa* L., but the size differential in this case is related in part to the reduced size of the optic ganglia in *Eciton* (Vowles 1955). The optic centers in *C. morosus* are also reduced. Obviously, the relative size of the doryline brain in all species is predictably smaller than in ants with well-developed eyes (Werringloer 1932).

The worker nervous systems of *C. morosus* and *E. burchelli* and *hamatum* are similar in most respects. *C. morosus* does not have a conspicuous optic nerve like that of *Eciton* (Whelden 1963). Also, because *Eciton* is binodally waisted and *C. morosus* uninodal, the gaster of *Eciton* contains only one ventral compound ganglion. Wheeler (1910) indicated that the central nervous system of the adult ant "presents only eleven ganglionic masses," but it is now evident that there may be even fewer ganglia in some species. In the case of *C. morosus* there are only 8 such ganglia (including the fused supra- and subesophageal ganglia).

Ovaries have been described for the workers of *D. (Alaopone) orientalis* (Mukerjee 1933), *E. hamatum* and *burchelli* (Whelden 1963), and *C. morosus* (Gotwald 1971). These ovaries are composed of polytrophic ovarioles. In *D. orientalis* and *C. morosus* each ovary (i.e., on each side) consists of a single ovariole (Mukerjee 1933, Gotwald 1971), but in *Eciton*, the number of ovarioles per ovary ranges from 1 to 3 (Whelden 1963). Whether or not these workers actually lay eggs remains unknown. Ovaries may not be present in all doryline workers, for Hollday (1904) failed to find ovaries in *Neivamyrmex nigrescens* (Cresson) and Mukerjee (1933) and Gotwald (1971) each dissected a number of workers of *D. orientalis* and *C. morosus* respectively in which no ovaries were discovered. Inter- and intraspecific variation in doryline worker ovaries is generally limited to the number of ovarioles composing an ovary, and Whelden's (1963) data implies that ovariole number is positively correlated with worker size, thus reducing its value in relating the tribes phylogenetically.

CONCLUSIONS

While variations in conservative characters are of considerable importance to phylogenetic interpretation, most taxonomists ultimately rely on a potpourri of characters of moderate lability and must risk the chance of phylogenetically grouping together species or species groups whose similarity was arrived at convergently. Army ant behavior patterns (i.e., nomadism and group predation), for instance, have arisen convergently, to some extent, in nondorylines such as *Simopelta* (Gotwald and Brown 1966) and *Leptogenys* (Wilson 1958) and concomitant convergence

in some morphological characteristics should be anticipated. Indeed, Hermann (1968, 1969) found that the ponerine *Simopelta oculata* Gotwald and Brown lacks a furcula among its sting sclerites, a character it shares with all the dorylines and with none of the other ponerines examined thus far.

Certain doryline worker characteristics have a predictably higher taxonomic value than others. In external anatomy the suturing of the thorax (Reid 1941) and the structure of the mouthparts (Gotwald 1969) are taxonomically useful features and point to a polyphyletic origin for the dorylines. The sting apparatus is equally important in supporting the polyphyletic hypothesis. Head shape and habitus configuration, on the other hand, are allometrically determined in highly polymorphic species, and the utilization of such characters depends on the intelligent use of ratios (e.g. cephalic index) in comparative studies. The condition of the doryline waist may also be a poor indicator of phylogenetic relationships. Based on the number of segments in the waist, it is certainly easier to believe that the dorylines consist of four phyletic lines (the Aenictini, Dorylini, Ecitonini, and Cheliomyrmecini) than to assume that the Cheliomyrmecini and Dorylini, both uninodal, are closely related.

The alimentary canal is of little use to taxonomic interpretation within the Dorylinae. Proventricular structure is degenerative and the numbers of Malpighian tubules, rectal papillae, and ovarioles are often size-correlated and not dependable as meristic characters.

While the glands are, for the most part, structurally and quantitatively uniform throughout the dorylines, the identification of glandular secretions must be rated as an important target for functional and phylogenetic research. Interspecific differences in glandular secretions and functions may ultimately contribute in a significant manner to an understanding of evolutionary relationships in the Dorylinae.

The ant nervous system morphologically yields little phylogenetic information and is subject to such convergent variation as the reduction of optic centers in species which are poorly equipped visually (a condition which is, in turn, related to the convergent development of hypogaic lifeways). However, a comparative analysis of the numbers of central nervous system ganglia within the Dorylinae and the other ant subfamilies may be useful in establishing some phylogenetic relationships.

An analysis of the geographical distribution of the doryline tribes and of existing morphological and behavioral studies indicates that (1) the subfamily Dorylinae, as presently constituted, is triphyletic; that (2) the 3 lineages composing the Dorylinae are the Ecitonini-Cheliomyrmecini, the Dorylini, and the Aenictini; that (3) the Aenictini arose in tropical Asia and dispersed toward and eventually reached and spread in the Ethiopian Region; that (4) the Dorylini arose in tropical Africa and weakly dispersed toward Asia, with only a few species established in the Indo-Australian region; that (5) the