

INTRODUCTION

The social behavior of the army ants *Eciton burchelli* and *Eciton hamatum* characterized by alternating, cyclic phases of nomadic and statary activity, is directly dependent upon and synchronized with the development and reproduction of successive all-worker broods appearing at regular intervals (SCHNEIRLA, 1938, 1944 a, 1944 b and 1949). Schneirla's studies show that the larval stage of development of these holometabolous insects occurs in the nomadic phase of activity, and that this phase ends when the mature larvae spin cocoons. In the statary phase which follows, this same developing brood, now enclosed in cocoons, undergoes its pupal period of metamorphosis. Midway through each statary phase, the single queen of each *Eciton* colony lays many thousands of eggs over a period of about six days (SCHNEIRLA, 1953 a). Hence, the embryonic and early larval development of the next brood of ants occurs at the same time that the previous brood is undergoing late pupal development. The statary phase ends when the new adults (or callows) emerge from their cocoons, thus initiating another nomadic phase of activity.

This intricately synchronized life cycle, and its complex behavioral aberrations, continues throughout the year, resulting in the production of polymorphic, all-worker populations ranging near 120,000 individuals every thirty-six days in *burchelli*, and about half as many in *hamatum*. Once a year, at the onset of the dry season, a sexual brood of approximately 1,500 males and about six queen-type females are produced (SCHNEIRLA, 1953 a).

Until SCHNEIRLA's studies, little of the present evidence on the behavior pattern and nothing of the life cycle of these interesting ants were known. Through his work, preserved specimens of their various developmental stages first became available for study, for along with observations on colony behavior of all colonies studied in the field, SCHNEIRLA collected and preserved samples of the adult and developing brood populations. These samples were made available for the present morphological investigations of *Eciton burchelli* and *Eciton hamatum* development.

A review of the literature shows that previous studies of *E. burchelli* all-worker brood development are lacking. Even the most general descriptions of the external morphology of the larvae at any stage are scarce and incomplete. The worker larvae of *E. burchelli* were first described by EMERY (1899 and 1901) and G. C. WHEELER (1943) has added further details to this description. The external morphology of *E. hamatum* worker larvae was described in a preliminary manner by G. C. WHEELER (1938 and 1943) and a more detailed account of this form is reported by TAFURI (1951). Using specimens collected by SCHNEIRLA, TAFURI investigated the developmental morphology of *hamatum* worker larvae with an account of the growth of these polymorphic forms expressed as a ratio of body length to imaginal leg-disc size at successive stages. Also a description of some of the internal anatomy of *hamatum* larvae throughout development is given.

The present investigation was undertaken to study the external and internal morphology of *E. burchelli* throughout most of the stages of larval development to its conclusion, and to determine whether differences in developmental growth rate and in structure exist among the various polymorphic forms of the larval brood. It was found that in the various polymorphic size-groups of *burchelli* larva there are differences in the size and growth rate of the imaginal leg discs throughout development, as well as differences in terms of the 'phase-day' age at which developmental changes in the leg discs and in the labial or spinning glands occur. The times at which such changes are first observed in larvae of the different polymorphic size-groups are correlated with changes in colony behavior and function reported from field studies on this species, and appear to depend upon certain factors underlying differential growth and development of these ants. The present paper is therefore devoted to the description of the external and internal anatomy of *Eciton burchelli* larvae, with emphasis on the developmental morphology of the leg discs and the labial glands.