

ants (Gray and Lamb 1968, Gotwald 1971), but is constant in some genera.

Since the intestine and rectum constitute the proctodeum, they are lined with a cuticular intima similar to that of the stomodeum (pharynx, esophagus, crop, and proventriculus). The rectal papillae may be of potential value as meristic characters. Whelden (1963) reported a range of 3 to 6 rectal papillae in *E. hamatum* and *burchelli*, and Mukerjee (1933) noted 2 papillae in the worker of *Dorylus (Alaopone) orientalis* Westwood. There are two such papillae in *C. morosus* (Gotwald 1971).

The mandibular gland of *C. morosus* does not have the conspicuous reservoir of some ants, for example like that shown by Janet (1898a) for *Myrmica rubra* L. In *Eciton* this reservoir is reduced, and although Whelden (1963) described it as a chamber, it appears more duct-like. In numerous myrmecine and formicine ants, mandibular gland secretions serve as alarm substances (Wilson 1963, 1971, Cavill and Robertson 1965, Regnier and Wilson 1968, Wilson and Regnier 1971), and field experiments with New World army ants of the genera *Eciton*, *Nomamyrmex*, and *Labidus* suggest that the mandibular gland of doryline ants also produces alarm substances (Brown 1960).

While the maxillary glands of *C. morosus* are composed of cells like those found in *Eciton*, the maxillary gland ducts open directly into the buccal tube and not into a special diverticulum of the buccal tube as in *Eciton* (Whelden 1963). Additionally, the maxillary glands of *C. morosus* are much smaller than those of *Eciton*, which Whelden (1963) described as sometimes forming a single compact gland "from the base of one mandible all the way across the front of the head to the base of the other mandible." The ducts of the maxillary gland cells of *C. morosus* unite to form a single common duct in each gland which in turn open into the buccal tube, while those of *Eciton* do not form a common duct but instead open individually into the buccal tube (Whelden 1963).

The pharyngeal glands of *C. morosus* differ little from those of *Eciton* (Whelden 1963). The structure of the glandular walls and the irregular nature of the lumen of each lobe in *Cheliomyrmex* and *Eciton* are identical. However, the spines that characterize the lining of the main chamber of each gland in *Eciton* were not identified in *C. morosus*. These glands are peculiar to the ants and evidence indicates that pharyngeal gland products are transferred with regurgitated crop liquids from workers to queens and larvae (Wilson 1971).

Although the labial glands of *C. morosus* and *E. burchelli* and *hamatum* are similar, the cuticular wall of the common labial duct is much thicker in *C. morosus*. The absence of an expanded reservoir in each gland in *Cheliomyrmex* and *Eciton* is typical also of nondoryline ants, although Forbes et al. (1961) described a large, thin-walled reservoir for the labial gland of *C. pennsylvanicus* (subfamily Formicinae). While such a development is not surprising, *C. pennsylvanicus* possesses two pairs of tracheal air sacs in the region of the labial gland (Keister 1963),

either of which might have been mistaken to be salivary reservoirs.

Detailed morphological descriptions of the metapleural gland, a gland found only in the ants, were provided by Janet (1898a, b), Tulloch (1936), and Tulloch et al. (1962). The openings of the secretory cell ducts into the accessory structure or chamber in *Eciton* occur singly or in groups (Whelden 1963), similar to the condition found in *Myrmecia nigrocincta* F. Smith (subfamily Myrmecinae) (Tulloch et al. 1962). In *C. morosus* the openings are similarly distributed over several sieve plates. The metapleural glands are structurally consistent in those ants examined, although the glands are absent in some castes of some species, including the males of the Dorylinae (Brown 1968). The metapleural glands have been traditionally regarded as a source of colony odor, an hypothesis recently modified by Brown (1968). Maschwitz et al. (1970) found that metapleural secretions of some species are effectively antibiotic against certain bacteria and fungi and that the secretions protect the body surface and nest against microorganisms.

The gross morphology of the poison filaments and Dufour's gland of *C. morosus* was examined by Gotwald (1971). The Dufour's gland in *C. morosus* and *Eciton* (Hermann and Blum 1967) is a simple, elongated, terminally-bulbous structure. It does not show the same potential as a taxonomic character among the doryline tribes as it does in some Formicinae, where it is often variably bilobed (Wilson and Regnier 1971). Dufour's gland is the source of chemical trail substance in some ants [e.g., *Solenopsis* (Wilson 1959, 1962)]. In others, such as the formicines, its secretions serve to spread and enhance penetration of formic acid from the poison gland and to act as alarm pheromones (Wilson and Regnier 1971). Although the function of the Dufour's gland in the dorylines has not been established, trail substance in *Neivamyrmex* and *Eciton* is of hindgut origin and not from Dufour's gland (Watkins 1964, Blum and Portocarrero 1964).

Even though the poison apparatus (i.e., the glands, muscles, and sclerites of the sting) was not examined in detail in this investigation, its taxonomic potential must be noted. Interpretations of ant phylogeny based on poison apparatus morphology were offered by Hermann and Blum (1967), Hermann (1969) and Robertson (1968). The phylogenetic scheme for the ants provided by Robertson (1968) refuted the durable arrangement proposed by Brown (1954), but included an unrepresentative sample of ant species (e.g., the dorylines were not included). Hermann (1969) noted some morphological variations in the sting apparatus within the subfamily Dorylinae which support, to some extent, the polyphyletic hypothesis for the origin of the dorylines.

The nervous system of the ants has not been examined in a phylogenetic context. Certainly numerous morphological and functional studies exist, including those of Janet (1899), Vowles (1955), Markl (1966), and Bernstein and Bernstein (1969). The