

### Fusion of Gastral Sclerites

The fusion or non-fusion of the tergites to the sternites of the first 2 gastral segments depends partly on whether these first 2 segments are the third and fourth or the fourth and fifth abdominal segments. In the species examined, when the first 2 gastral segments were abdominal segments 4 and 5, the sclerites of these segments were, without exception unfused (*Aenictus* workers, Ecitonini workers, the subfamilies Myrmicinae, Myrmeciinae, and Pseudomyrmecinae). When the 2 gastral segments were abdominal segments 3 and 4, segment 3 was fused, except in the males of *Neivamyrmex* and the workers of the subfamilies Dolichoderinae and Formicinae. In addition, in the Ponerinae, segment 4 was fused also.

Within the Ponerinae, the first and second gastral segments form an unexpandable gastral girdle. In the genera *Gnamptogenys* and *Rhytidoponera* the relationship of the tergite and sternite of abdominal segment 3 seemed to be intermediate between fusion and non-fusion. The sclerites pulled apart neatly along a "sutural" line but little membrane could be seen at the attachment of these 2 sclerites. Abdominal segment 4 of *Cerapachys* sp. and *Sphinctomyrmex steinheili* was likewise intermediately fused. Functionally these segments may be viewed as fused in that they provide little means for gaster expansion and are of a similar protective nature. In the Formicinae and Dolichoderinae, the unfused third abdominal segment contributes to the high degree of gastral expandibility present in these ants.

### Phylogenetic Considerations

Wheeler indicated in 1928 that the family Tiphidae, in his estimation, was the most likely candidate among the solitary wasp families to have been ancestral to, or to have shared a common ancestry with, the Formicidae. Since that time, most hymenopterists have agreed with this conclusion, although in 1938, Morley still maintained that the Formicidae arose, through a "missing link," from mutillid stock. Wheeler and subsequent authors have discounted the Mutillidae as playing any role in the ancestry of the ants. Brown and Nutting (1950) have offered the following evidences of the close relationship between the tiphids and the ants: the presence of the first radial crossvein in the forewing of many tiphids (although weakly developed) and ants; the presence of primitive antennal segment numbers (13 in the male and 12 in the female); the development of the first antennal segment into a lengthened scape; the tendency toward the separation of the first postpropodeal segment from the remainder of the gaster by a constriction; and the tendency toward loss or weakening of the wings in the females. These authors found that the wings of *Anthobosca* (Tiphidae, Anthoboscinae) and *Plumarius* (Plumariidae) are quite antlike, but dismissed the latter as being ancestrally related to the ants because the male *Plumarius* (at that time only males had been described for the genus) lacks a number of other "protoformicid" features. Evans (1966), in describing the first *Plumarius* female, has concurred with this