



Figs. 34–35. Schematized diagrams showing up- and downward movements of the anterior abdominal segments in Aculeata. 34, ground-plan condition; 35, apomorphic condition correlated with the formation of additional petiole: the tergal muscles in the second segment come to act as levators and depressors of the abdomen. d=depressor, l=levator, r=retractor. Roman numerals indicate segment numbers.

muscles No. 8 in these formicids increase their power by expanding area of muscular attachment. In the ponerine tribes Amblyoponini and Ectatommini, and Cerapachyinae, the muscles No. 10 also increase the power of the muscular contraction, because these muscles are expanded in length by shifting of origins from the posttergum to the pretergum of the third segment (Fig. 18).

In the case of the primary petiole (i.e., the constriction between the first and second abdominal segments), the development of presclerites includes producing new articular parts (cf., TAYLOR, 1978). This is also the case for the additional petiole, but the manner of alterations in the musculature are different between the primary and additional petioles in Aculeata. In the formation of the primary petiole sternal muscles serve as depressors, whereas in the additional petiole tergal muscles serve as depressors. Because the first abdominal segment is fused to the thorax proper in Hymenoptera (i.e., propodeum), certain sternal muscles in the first segment can take their origin on the upper anterior edge of metafurca, which is a Y-shaped structure projecting from thoracic sternal plate. The contraction of these muscles lifts up obliquely the lower part of the anterior margin of the second abdominal segment, thereby depressing the metasoma (Figs. 34 & 35). On the other hand, because the sternal muscles in the second and third abdominal segments can not take their origin beyond the anterior