

FIGURE 3—SEM illustrations of degradation affecting the endocuticle. (A) Circular pit on the lateral inner surface of an abdominal tergite (25 weeks). The spiral pattern reflects the helicoidal structure of the microfibrillar layers of the endocuticle. Scale bar is 40 μ m. (B) A column of several endocuticular layers remains after annular degradation of the endocuticle on the same tergite. The surrounding area shows a sponge-like structure. Scale bar is 40 μ m. (C) Detail of (B). Scale bar is 10 μ m. (D) Cluster of endocuticular column-like remains inside a telson (2 weeks). Scale bar is 40 μ m. (E) Detail of the surface of one of the columns from (D). Scale bar is 20 μ m. (F) Detail of the margin of one of the columns from (D). Scale bar is 40 μ m. (G) Sponge-like inner surface of the same tergite illustrated in A-C. Scale bar is 40 μ m. (H) Spongy layer of the same tergite infilled in places with probably amorphous crystalline material. Scale bar is 20 μ m. (I) Labyrinthine degradation on the inner surface of an abdominal sternite (2 weeks). Scale bar is 40 μ m.

tegrated when they were disturbed. The morphological features that survive were determined by the nature of the mineralization (and are described in the section on mineral precipitation). The firmness of the carcass likewise depended on the extent of mineralization.

25 weeks.—The carcasses remained complete. Some of the limbs fell off due to their weight, usually the heavy raptorial limbs. Mineral formation gave some carcasses a degree of rigidity. The setae remained intact and the propodus and dactylus of the raptorial limbs were still robust. One carcass displayed remarkable decay patterns on the inner surface of the abdominal tergites (Fig. 3A, B, C), accompanied by reduction of the cuticle to a spongy network (Fig. 3B, G, H).

The descriptions of the morphological stages of decay are, of necessity, simplified. After one week the variation among carcasses in each sample batch increased. The state of the cuticle sometimes varied even within a single animal. However, the following simplified sequence could be recognized (see Fig. 5): (1) Swollen-within 3 days expansion of the internal tissues (due to osmotic uptake) led to the unfolding of the raptorial limbs and stretching of the arthrodial membranes; (2) Ruptured-by 1 week the exoskeleton started to split, either between the last three thoracic tergites or between the thorax and the abdomen; (3)Partially decomposed-by 4 weeks carcasses showed progressive weakening of the cuticle, decay of the soft-tissues, and disarticulation and fragmentation of the exoskeleton when disturbed. The connective tissue between the segments of the individual appendages, and between the telson and the last abdominal somite, was more decay-resistant than that elsewhere.