ISJ (Figs. 8 and 9). Conversely, the morphologically complete SVJ, comprising articulating cartilages and the AL, displayed a similar histology to what has been described for b.2.d specimens (Fig. 6). Histology indicated that the IMJ and the ISJ became morphological mature in accordance with pneumanization and absorption of loose connective tissue in the tympanic cavity during b.5.d to b.6.d.

B.6.d to b.28.d

No specific histological changes were evident in mature IMJ and ISJ from b.5.d to b.6.d. Using transmission electron microscopy on simple diarthroses, we elucidated that the synovial osteochondral junction contained few collagen fibers but abundant electron-lucent fibers. The ECM fibers, corresponding to the densely-stained fibers under light microscopy, were elastic fibers comprising electron-lucent elastin cores surrounded by small numbers of peripheral electron-dense microfibrils (Figs. 8, 9 and 10).

We observed that endochodral ossification in the SVJ components extended gradually towards the AL. Articular cartilages subsequently thinned, lost typical

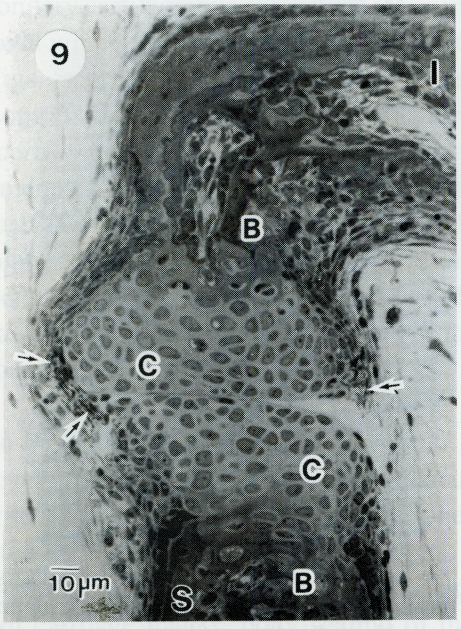

Fig. 9. Mature Incudostapedial joint (ISJ) in a b.6.d mouse. Articular cartilages of the simple joint are connected by the joint capsule, which contains densely-stained fibers (arrows).

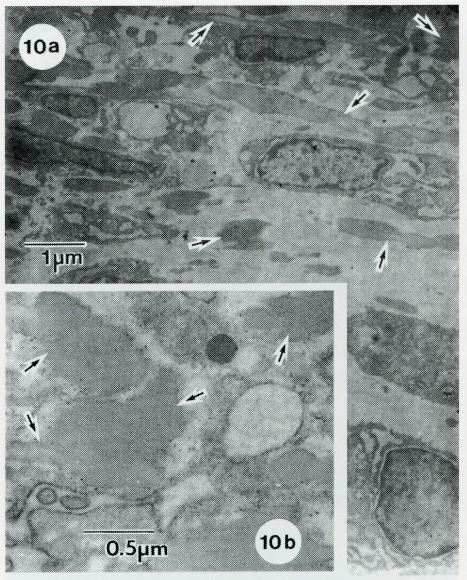

Fig. 10. Transmission electron microscopy of the mature Incudomalleal joint (IMJ) (Fig. 10a) and Incudostapedial joint (ISJ) (Fig. 10b) in b.11.d specimens. The synovial osteochondral junction of both Incudomalleal joint (IMJ) and ISJ contains abundant elastic fibers (arrows).

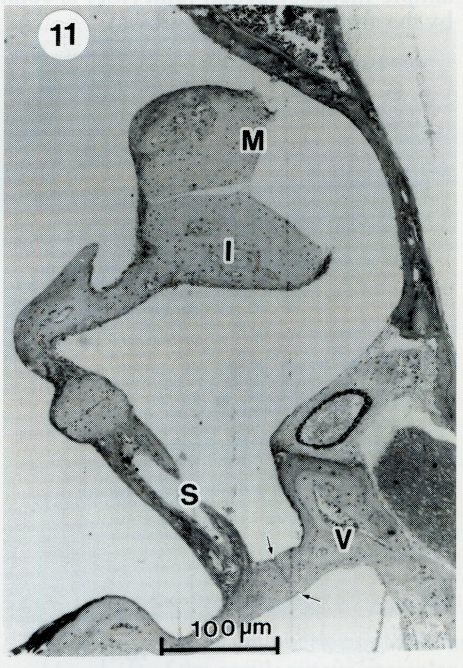

Fig. 11. General view of pneumanized middle ear cavity in a b.14.d mouse. The ossicular chain containing mature Incudomalleal joint (IMJ), Incudostapedial joint (ISJ) and Stapediovestibular joint (SVJ) is suspended in the cavity. Arrows indicate SVJ.