

er undergoes branching. The radius and radiale, as well as the tibia and tibiale, are segmentally divided from one another. Most of the bones that form the carpus, tarsus, and digits are elaborated from the posterior portion of the limb; this is referred to as *postaxial dominance*. Development proceeds by bifurcation distal to the ulna that gives rise to the ulnare and intermedium in the carpus, and of the fibula to give rise to the calcaneum and the intermedium or astragalus of the rear limb. The intermedium produces either a single centrale by segmentation or two centralia by branching.

Rather than development continuing by progressive bifurcation and segmentation across the carpus and tarsus into the digits, what appears as a new axis of development extends across the distal carpals or tarsals. This **digital arch** is essentially a continuation of the proximal–distal axis that extends down the limb, but it is recognized as a distinct entity because of the sharp angle the axis makes as it extends anteriorly from the ulnare or calcaneum. The angled extension into the hands and feet reflects the changes, discussed earlier, that occurred in the origin of the tetrapod limb (see the section “The origin of tetrapod limbs,” esp. Fig. 10.11). The digital arch initially appears as a band of tissue in the area where the precursors of the distal carpals or tarsals will differentiate. Condensation of this area proceeds by segmentation from the ulnare, giving rise to the fourth distal carpal, or from the calcaneum to give rise to the fourth distal tarsal. The fourth distal carpal or tarsal then bifurcates, giving rise to the metacarpal of the fourth digit and the third distal carpal, which in turn bifurcates to yield the third metacarpal and the second distal carpal,

Figure 10.17. Transverse sections through the two-digit stage of *Ambystoma mexicanum* hindlimb. **A**, Lower-power view showing the entire limb field depicting the development of the proximal carpal region and digits one, two, and three. **B**, Close-up of A, showing the cell orientations of the developing precartilaginous condensations. The perichondral cells (P) are elongate and flattened. The inner zone of cells (S) are rounded in cross section. Other abbreviations: c, centrale; F, Femur; f, fibula; i, intermedium. From Shubin and Alberch (1986).

