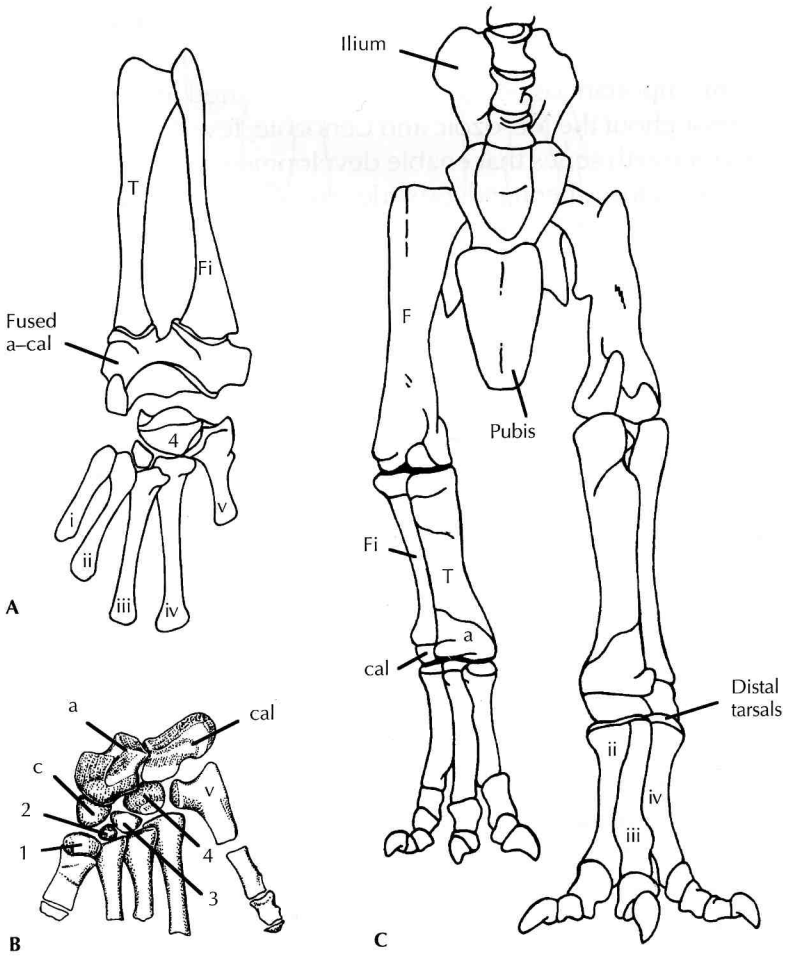

Figure 10.22. Foot structure in advanced terrestrial diapsids. **A,** A modern varanid lizard. In contrast with the primitive diapsid condition illustrated by *Hovasaurus* (Figure 10.21K), the astragalus and calcaneum fuse early in ontogeny and are closely integrated with the tibia and fibula. The main joint in the foot is between the astragalocalcaneum and the fourth distal tarsal. The sequence of ossification of these elements retains the pattern of early diapsids. **B,** The Upper Permian archosaur *Proterosuchus*. The astragalus and calcaneum articulate with one another, somewhat in the manner of crocodiles. The fifth distal tarsal is either lost or incorporated into the head of the fifth distal tarsal. **C,** The dinosaur *Tyrannosaurus*. As in birds, the astragalus and calcaneum have become integrated with the tibia and fibula. The proximal tarsals form a hinge joint with the distal tarsals. Movement of the hind limbs is in a parasaggital plane, in contrast with the sprawling gait of lizards and crocodiles. Abbreviations as in Figure 10.8. From Carroll (1987).

eages that have greatly reduced or lost their limbs, and in highly derived aquatic families.

Other diapsid lineages, leading to larger forms such as crocodiles and dinosaurs, began to modify their limb structure in the Late Permian and Triassic. This is particularly evident in the dinosaurs, which switched from a sprawling to an erect posture. Members of this group show considerable bone loss, fusion, and change in functional relationships. In the rear limb, the proximal tarsals are incorporated with the tibia and fibula and form a simple hinge joint with the distal tarsals (Fig. 10.22).