

Table 1. Late Cretaceous and Early Tertiary formations of southern, central and northwestern Alberta. Sources: Alberta Energy and Utilities Board (2002); Dawson *et al.* (1994); Eberth (2005); Gradstein *et al.* (2004); Hamblin & Abrahamson (1996); Payenberg *et al.* (2002).

to determine that information from an accurate locality description. This information is invaluable to palaeontologists both present and future, so we encourage you to either invest in a global positioning system (GPS) receiver or simply use topographic and geologic maps whenever possible.

Geology of the Upper Cretaceous of southern Alberta

During Late Cretaceous time (99.6 to 65.5 MYA), the middle of the North American continent was inundated by the Western Interior Seaway that connected the Gulf of Mexico in the south to the Arctic Ocean in the north. The climate was warm to tropical. The seaway and its margins teemed with life: large marine reptiles and invertebrates in the sea waters, dinosaurs, other animals and plants on the land. Over time, the sea would rise and fall, resulting in the deposition of different sediments carried in from the eroding continent. Sands were deposited in nearshore environments, whereas silts and clays were deposited in offshore, deeper—and quieter—water.

The formation and group names discussed previously are essentially defined by these changes in sediment deposition. For example, about 80 million years ago, most of Alberta lay under the Western Interior Seaway, which accumulated large volumes of marine mud, known today as the Lea Park Formation in northern and central Alberta and the Pakowki Formation (and portions of the Foremost Formation) in the south. As time passed, the sea slowly retreated and terrestrial sedi-



Figure 5. Fossil wood, probably from a giant conifer, in the Dinosaur Park Formation, Wolf Coulee, Dinosaur Provincial Park. Photo by Vaclav Marsovsky.

Crocodiles

Crocodile remains are common Late Cretaceous fossils, ranging from the Milk River Formation (Russell, 1935) up through the Scollard Formation (Johnson and Storer, 1974; Russell, 1987). They have also been reported in the Wapiti Formation of northern Alberta (Tanke, 2004).

Crocodiles are considered “living fossils”: they arose 200 million years ago (Romer, 1966) and are still with us today, largely unchanged. Alberta’s crocodiles are medium-sized (skulls about 40 cm long); none are as large as the “supercrocs” found in the southern United States and Africa (Colbert and Bird, 1954; Lucas *et al*, 2006; Sereno *et al*, 2001). Two genera are found in the Dinosaur Park Formation: *Leidyosuchus* and *Albertochampsa* (Wu, 2005). Figure 33 shows the skull of *Leidyosuchus* with a long, tapering muzzle and a constriction between the premaxilla and maxilla of the upper jaw. *Albertochampsa* has a wider, rounded muzzle without the constriction, more like the modern alligator. *Leidyosuchus* is the more common of the two (Wu, 2005).

Teeth (Figure 34) are the most common elements found, as they were continually being shed and replaced. They are often found in beautiful condition with colour-banded or jet black enamel, but they are fragile, often splitting lengthwise. They are rarely found with the root intact. The teeth are slightly modified pegs, set in sockets (alveoli). Most are curved cones, with two ridges (carinae). Two extra-long teeth grew a third of the way back in the lower jaws; the upper jaw was notched to accommodate them (Johnson and Storer, 1974). Crushing teeth, from the back of the jaw, are short and dome-shaped, with no carinae. Some are constricted at the base where the root begins. Note the small, arched opening in the base of the rooted tooth shown in Figure 34. The new tooth moved into its predecessor through this opening, and developed directly beneath it.

Whole or fragmentary scutes are also common. These bones were embedded in the skin, for protection. Crocodile skulls and dermal scutes (Figure 34) have a characteristic, deeply-pitted pattern on the outer surface. Scutes are oval or rectangular, up to 2 or 3 cm in size, with a smooth margin. The bases are smooth; weathered specimens may exhibit a faint “woven” pattern. Rectangular scutes are typical of the dorsal region.

A phalanx and unguis are shown in Figure 34. They are rarely found. Unguis are up to 4 cm long, tapering, slightly curved, and oval to triangular in cross section. They are similar to unguis of the large turtles and can be confused with them.

Vertebrae (Figures 34 through 37) are strongly procoelous and medium sized, up to 6.5 cm. Cervicals have the largest opening for the spinal cord. The first caudal vertebra (Figure 34) is unique in being convex on both ends of the centrum: it is the only vertebra in the crocodile body with this feature (Gadow, 1933). Vertebrae are usually found with the neural arches missing. The exposed sutural surface has a rough, corrugated appearance. Arches are usually missing because the fusion of the arch to the centrum took place later in life (Brochu, 1996). After death, the two pieces became separated easily.

CROCODILE SKULL ELEMENTS

Leidyosuchus sp.

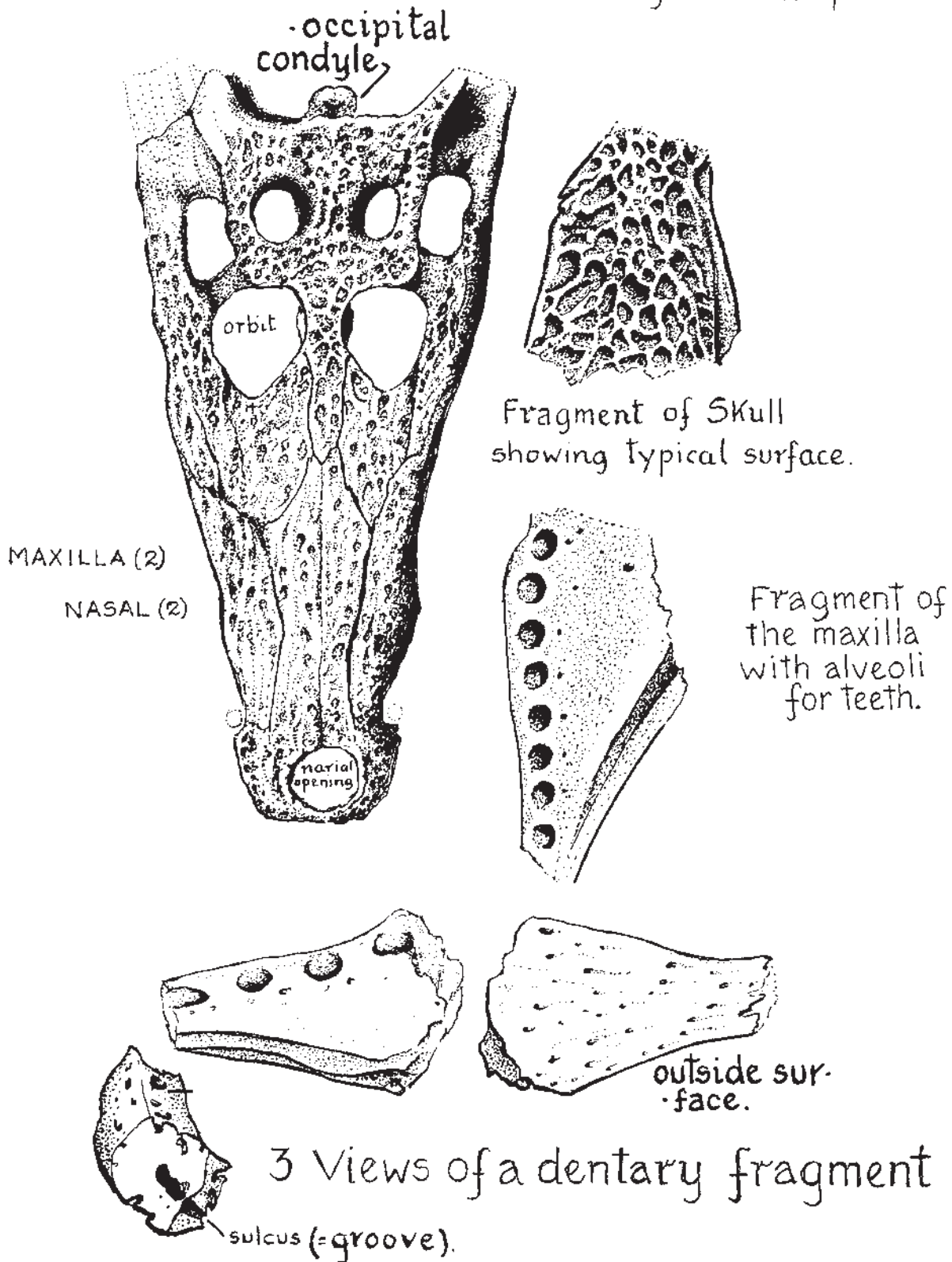


Figure 33. Crocodile skull elements.

TYRANNOSAURID - Unguals.

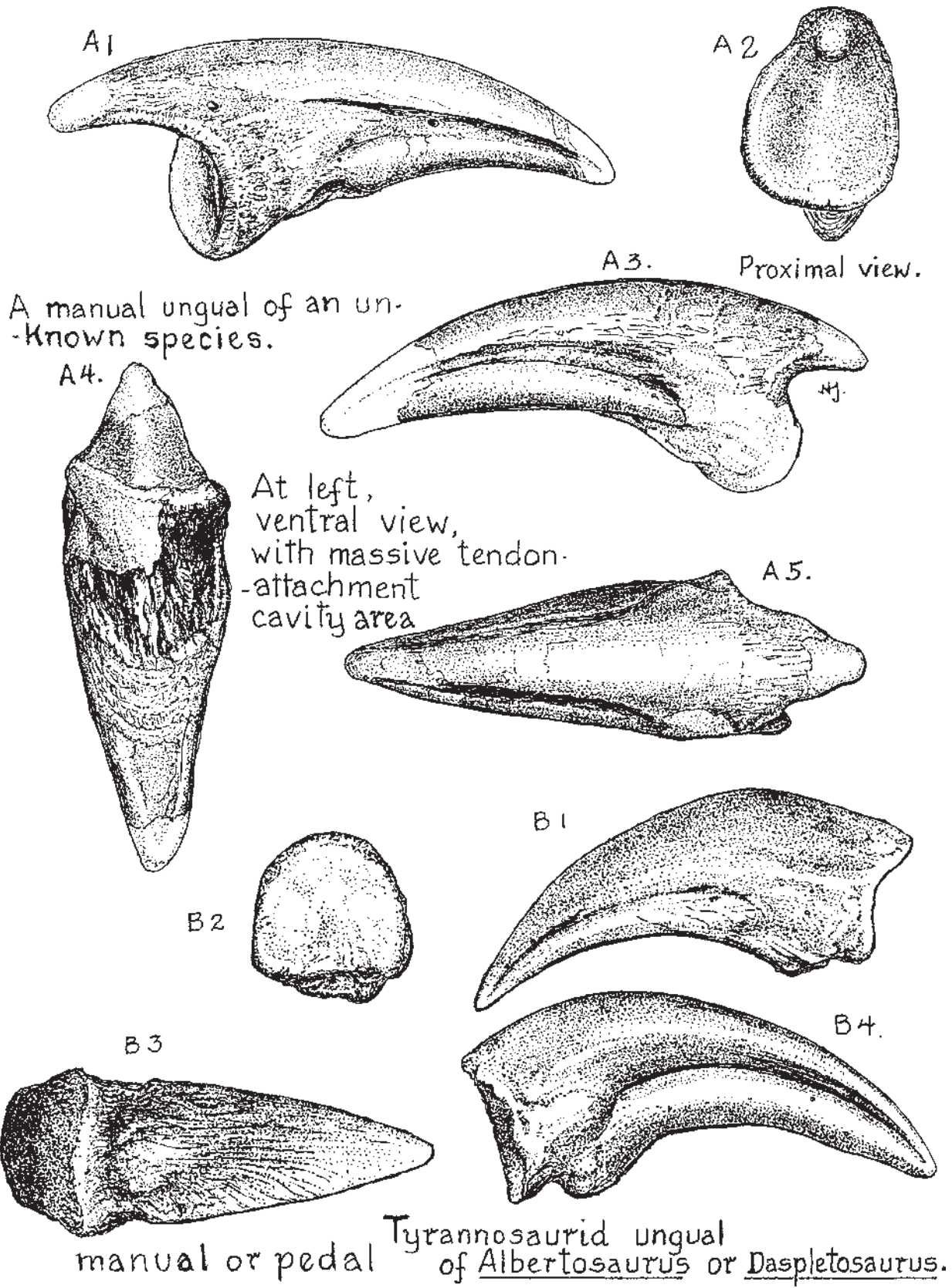


Figure 61. Tyrannosaurid unguals.