

Section 3: Heads Up? Sauropod Biomechanics.

Fun Facts

- Tail of *Diplodocus* was as long as a school bus and as heavy as three grand pianos.
- A hummingbird is a feathered dino, as is the California Condor.
- Dinos with claws usually ate meat; dinos without claws (more hoof-like) were herbivores.
- Some dinos had big heads but small brains—their heads were full of muscles and bone; brain of *Apatosaurus* was size of a computer mouse.
- Dino dentition consisted of cutting, tearing, chewing, and grinding teeth but varied by species; gastroliths (stomach stone swallowed by animal) were used for digestion.

Q&A

Q: What distinguishes a dinosaur from other animals?

A: Skeletal differences, especially their hip bones; share with archosaurs (including Crocodylia) the presence of extra openings in the skull and jaw; with birds share lightly built bones, bony structure of legs, hinged ankle, and other aspects of skull and jaw; limbs tucked under body so can breathe and walk at same time; were nest builders and sang to young. But since dinosaurs are such a diverse group, not all dinosaurs have all of these characters shared with birds.

Q: How did *Diplodocus* support its weight? Did it need water?

A: Walked on all four legs, with most of pressure on front of their feet (determined by footprint); didn't need to be in water to support skeleton, since fossil remains found on terrestrial deposits not associated with aquatic areas.

Q: What are the advantages of very long necks?

A: Allowed them to graze below their standing level; heads could go where bodies could not and didn't have to move much while eating.

Q: What is the purpose of having a metal fiberglass model in a museum when a real fossil is available?

A: Allowed for studying the range of motion, which is not possible on real fossils. Also, fossil dinosaurs rarely complete or articulated.

Q: How do we know how dinosaurs moved?

A: Scientists made appropriate measurements on real fossils (e.g., *Apatosaurus louisae*) and plugged them into a computer model and tested validity by modeling movement of living animals, including the giraffe, to see if simulated movement was accurate.

Q: How were the tails of these giants used?

A: Powerful muscles would have allowed these dinos to swing tails quickly; fossil tails shown in bent position so could have moved tail side to side to produce whip-like sound, even a sonic boom similar to crack of bull whip; could have warned predators or impressed a mate; perhaps also as balance.

Q: What were their most acute senses?

- A: Many plant-eating dinos had good senses of sight, smell, and hearing.
- Q: How were some sauropods able to browse higher up on trees, given that their long necks were parallel to the ground or angled slightly downward?
- A: Some of the largest sauropods had very long front legs, which allowed them to browse on plants as high as six meters (about 20 feet). In general, there was plenty for sauropods to eat at their level and they didn't need to go above or below their reach. Different sauropods would feed at different tiers, thereby partitioning their environment for more efficient use of available resources.
- Q: Were there bipedal herbivorous dinosaurs?
- A: Yes, *Pachycephalosaurs*, the ostrich-like dinosaurs of the Ornithopod group, and some duck bills of the same group.
- Q: How did *Apatosaurus* walk?
- A: Walked on tiptoe, based on footprint trackway evidence.