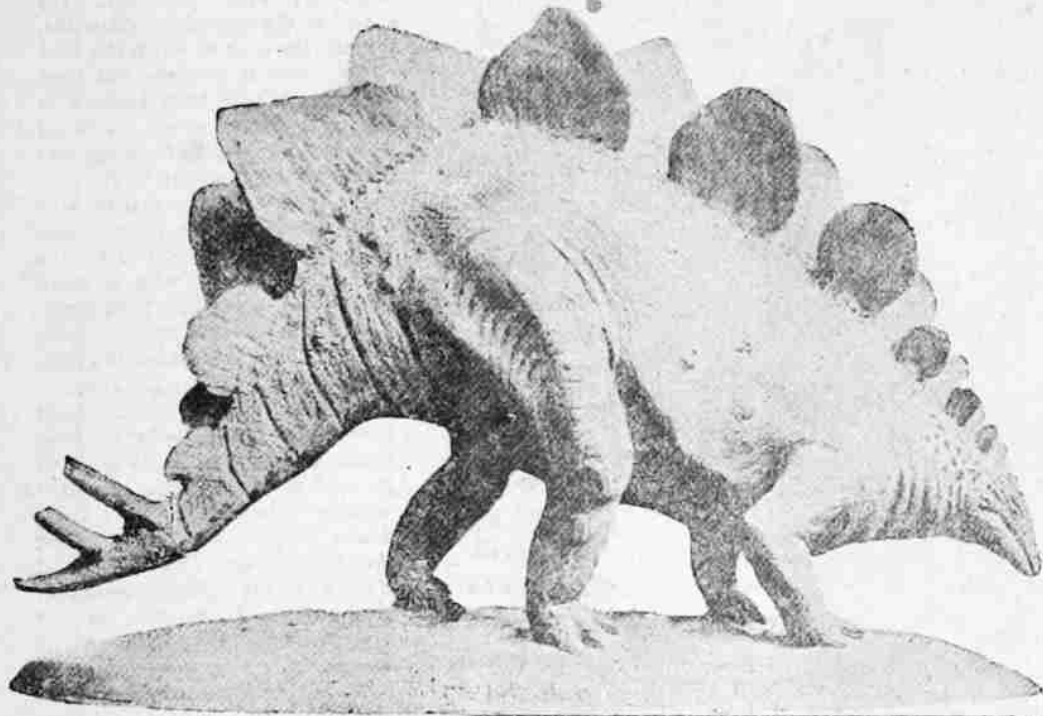
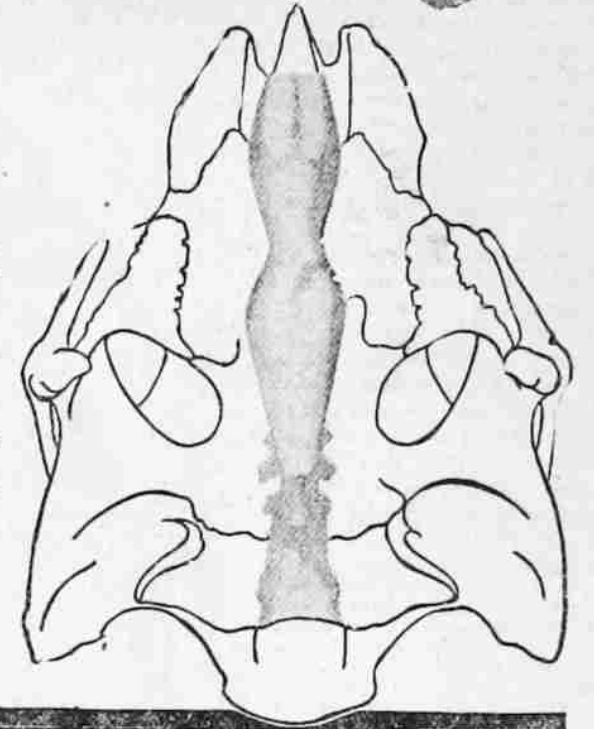


The Aeroplane Dinosaur of Million Years Ago

Science Reconstructs One of the Weirdest of Prehistoric Monsters with Hollow Bones, Great Air Cavities Within Them and a Series of Enormous Plates Along Its Back for Coasting Through the Air Like Some Gigantic Gliding Machine

The Reconstruction of the "Father of All the Birds," Showing Its Bird-Like Head and the Movable Plates Which Served It as Gliding Planes. (Photo Reproduced by Courtesy of the American Museum of Natural History.)

The Outline Shows the Shape of the Skull of the Gliding Stegosaurus; in the Centre Is Seen the Little Two-and-a-Half-Ounces-of-Brain Which Controlled Its Movements.



By Dr. W. H. Ballou.

BACK about a million or so years ago, during what is now called the Jurassic Period, when most of the earth was a steaming swamp, Nature carried on what was certainly her most fantastic experiments in animal making. This was the time of the dinosaurs, gigantic reptilian creatures whose weird, nightmarish shapes were strongly suggestive that Mother Nature had an extreme case of creative indigestion after a course of cosmic Welsh rarebit. As a matter of fact she was specializing in bulk at that time at the expense of brain. Ages afterward she had learned her lesson and the dinosaurs were wiped out.

But among this collection of monsters none has so interested modern men of science, who by studying the fossil book of the earth are restoring this erased page, than the creature named Stegosaurus. Stegosaurus ran from fourteen to twenty-eight feet between the shoulders of his forelegs and those of his back legs. His tall ran about the same length. Neck and head ranged from six to ten feet. The average Stegosaurus was about thirty feet long from the tip of his bird-beaked head to the end of his pronged tail, and stood about twelve feet high at the hips. The forelegs were extremely short; the back legs almost three times as long and in a manner kangarooish. It was not, however, his size that aroused the curiosity of science and set Stegosaurus apart. It was a most extraordinary equipment of huge plates in double file all along its back.

For nearly half a century every paleontologist in the world has attempted to explain the reason for these plates and there have been more harsh words passed over the remains Stegosaurus than over any other animal past or present.

This controversy has now been set definitely at rest by the astonishing discovery, that in the Stegosaurus Nature was trying her apprentice hand at the first aeroplane!

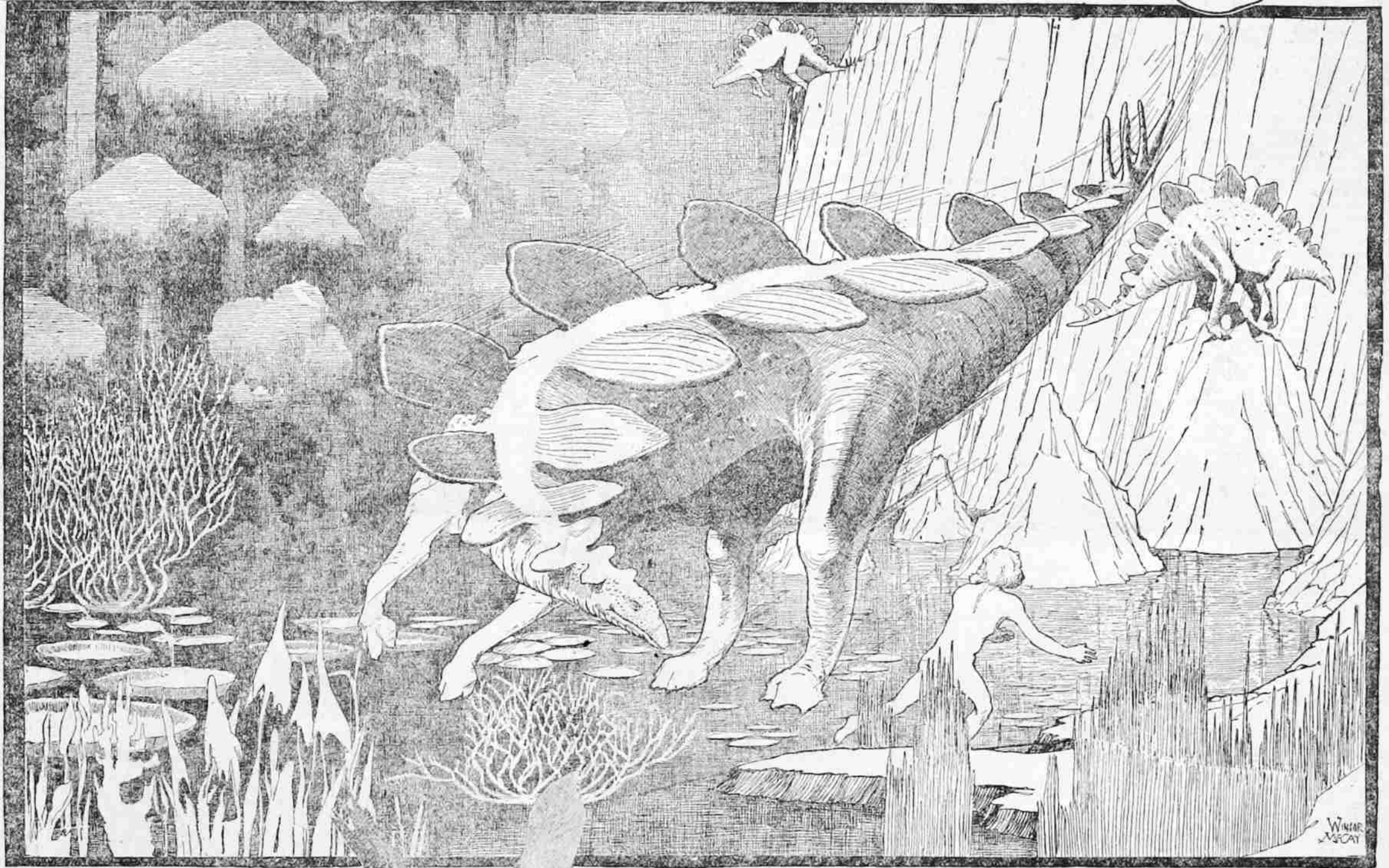
This discovery came about through the finding of a perfect specimen with skull and the masses of skeleton bones joined together just as they were in life, a specimen so complete that from it the experts of the National Museum at Washington, where it was sent, had no difficulty in reconstructing the whole musculature of the creature and what they believe to be almost a photographic appearance of it in life.

The first inkling of the truth came when it was certain that the series of mysterious plates which ranged from just behind its head two-thirds down its tail were not attached to the spinal column, as had been thought. They were not bone, but of a horny nature, flexible and easily manipulated by the muscles of the great body.

The plates were, in fact, gliding surfaces immeasurably like those of the planes of to-day, which could be raised or lowered at the instance of their owners, carrying the huge bodies through the air in gigantic leaps or enabling their owners to glide down through the air from one elevation to a lower one. Furthermore, it was found that the weight of this dinosaur was not nearly so great as had been surmised. Its great bones were hollow, like those of the birds, and contained large air chambers. There is evidence that the plates or planes were very light and buoyant.

The little flying squirrel progresses through the air to-day somewhat as this dinosaur did ages ago. Its skin forms a surface by which it is enabled to volplane from heights to the ground or from limb to limb of the trees. Back in the steaming Jurassic time the Stegosaurus was the weird and titanic flying squirrel of its age. With its huge plates placed alternately on each side of its back it could depress these to form planes that buoyed it in a swift rush from elevation to elevation, or that like the old gliders from which the aeroplane was evolved, lifted up the body under the driving impetus of the enormous hind legs, carrying it in flight for hundreds of feet. A weird spectacle, indeed, if man could have seen it, must have been the sightings of these monsters. But many thousands of years had still to pass before even the hairy ancestors of man could evolve.

Of course, the Stegosaurus could not fly like the birds. Even if the reptile had flapped its plates ever so swiftly it could not have risen above the ground by their means alone. It had, nevertheless, partial command of the air and so is entitled to be considered the father of all heavier-than-air machines.

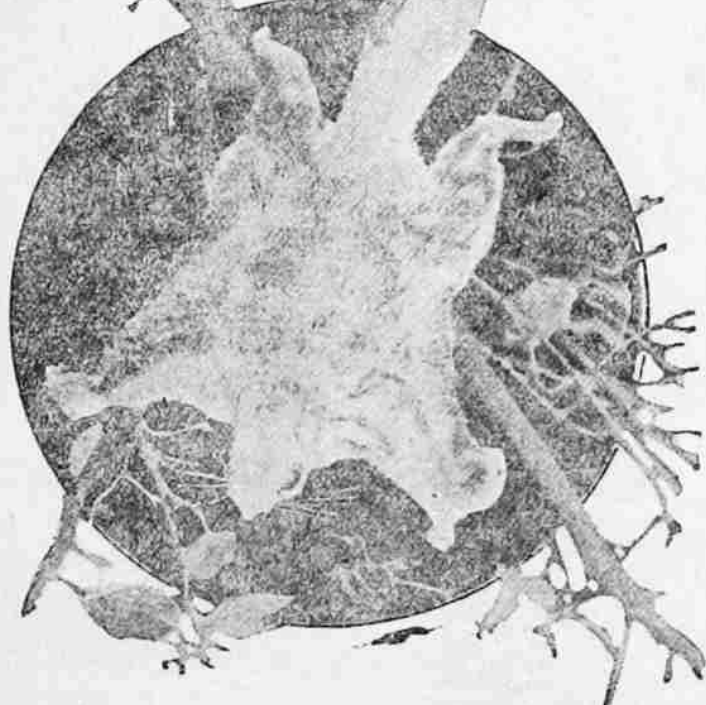


And in some ways even more astonishing, it would seem to be the father of the birds. He was the factory in which the first bird was built. Science is asking the question if these plates were not the first step toward the feathered wings of the air dwellers.

The only actual wings existing when Stegosaurus lived were those of the primitive dragon fly—who was about three feet long and whose scientific name—Paleodictyon— is thus justified by its size. It took this dragon fly, science believes, about nine million years to get out of the water and convert its legs into wings. If the birds evolved from Stegosaurus they beat the record of the dragon fly considerably. The Stegosaurus started in early in the Jurassic era and spread from the far north in what is now Alberta down through Wyoming and Colorado, where their herds were the most numerous, to the Gulf of Mexico. Out of this period certainly came the birds. After the reptile bird the fossil scaled and feathered Archaeopteryx followed the first mammal flier, the bat. The Jurassic might well be termed the wing-evolving era of the geological ages.

Of Stegosaurus' relationship to the birds Professor Osborn, of the American Museum of Natural History, has written—and this before the recent discoveries have confirmed and gone so much further than his own conclusions—that the partly armored dinosaurs, known as Stegosaurus, are related to the iguanodonts and belong to the bird-poleis group, Ornithischia. The small Triassic ancestors of this great group were herbivorous, ornithischian dinosaurs.

So, not only the Stegosaurus, but also their ancestors, were evolving flight functions. We know with fair certainty that out of this group finally arose the living fossil, the ostrich—part reptile, part mammal and part bird—which, although it has wings, cannot fly, but uses its wings as an aid to swift walking and running. Also out of this group arose the living fossil diving birds, such as the penguin, which, although it cannot fly in air, can fly under water by aid of its wings, and swiftly, too.



The Little Flying Squirrel of To-day, Which Coasts Through the Air by Means of the Wide Surface of Skin Beneath Its Legs. Precisely as the Gliding Dinosaur Was Enabled to Do by Means of Its Movable Plates.

Note, by the way, in the illustration of Stegosaurus, the crouching attitude of the bird just before it leaps into the air. And with all of its handicaps to flight, it went on specializing in functions of flight for the benefit of its descendants, carrying on with a considerably larger scale, the evolutionary processes of its ancestors. Of these Professor Gregory states:

"Each year we hold a seminar on this subject, in which the rival claims of the dinosaurs and other reptilian groups to close kinship with birds are considered. Far back in the carboniferous ages the

remote common ancestors of birds, dinosaurs, flying reptiles and other reptilian groups were very primitive lizard-like reptiles with extremely small brains, comparatively sluggish habits and a highly variable body temperature."

Stegosaurus, then, retained the sluggishness and infinitely small brains, but got as far as flappers on his back and a beak. If he could come back to-day the aviators could rig him up in a few minutes.

Further evolution toward life in the air was made by Stegosaurus in hollow bones and hollow air chambers in some of its larger bones, making for skeletal lightness, and also showing that his weight, estimated by his bulk, has been largely over-estimated. Dr. Barnum Brown reduces to several tons, hollow-boned dinosaurs accredited by their discoverers with twenty or more tons. In the bulk of an animal the chief weight lies in its bones rather than its flesh and cavernous abdomen. Dr. Gilmore has presented the interesting features of this great reptile as shown by reconstructing its entire skeleton, listing its associate creatures and

working out its peculiar environment, as follows:

"The extensive collections of Stegosaurian remains in the National Museum have, with few exceptions, been obtained from two important, though widely separated fossil deposits. These are the quarry in Albany County, Wyoming, and the one in Fremont County, Colorado. The former was the source of the greatest accumulation of fossil remains of this reptile known and from which the wonderfully complete skeleton of the species Stenops, herein figured, was obtained. There were obtained in this quarry the fossil remains of eleven other species of dinosaurs, some turtles, fish and one small mammal. The Stenops skull was the most perfect yet found.

"The skull shows that the drawings which have appeared in numerous world's periodicals are wrong, incorrect in their details and wrong in their interpretations. The cranium was long and slender, wedge-shaped, the apex directed well forward; the nasal openings were long and well forward, and the eye-sockets were large, covering one-fifth of the length of the skull. While the horned dinosaurs, with skulls from seven to nine feet long, were the largest-headed vertebrates ever known, the Stegosaurus are the smallest-headed, when the great bulk of their bodies are considered. The eye cavities are larger than the brain case. An alligator has a brain ten times larger. The elephant has a brain of eight pounds, or twenty times larger than that of Stegosaurus.

"The jaws have 184 functional teeth, so small and weak as to be a source of wonder and conjecture as to the real feeding habits. (This was a step forward to get rid of teeth and substitute the sheath bill of birds.) They would at least indicate that their food consisted of the most succulent plants."

The neutral, or spinal canal, was excep-

"Stegosaurus was the weird and titanic living aeroplane of its age. It could move the huge plates to form surfaces that buoyed it in a swift coast from elevation to elevation or glide hundreds of feet through air under the impetus of its enormous hind legs. What a weird spectacle, indeed—if man could have been there to witness it—would have been the flights of these monsters!"

tionally large, to make way for nervous brain matter, for which there was little room in the skull. At the lower end was a sacrum brain, twenty times larger than the skull brain, for the control of limbs and tail of the reptile.

Dr. Gilmore's description of how was found the perfect specimen from which the conclusions under discussion were made, is most interesting:

"Stegosaurus died either in water or along the banks of one of the large streams of Colorado. If he died on the banks, before decomposition set in, a freshet bore the carcass down stream, and when the water subsided the body stranded on an old river bar. Before reaching the bar the softer tissues relaxed and allowed the projecting plates along the back to droop, and upon coming into shallow water their points were caught in the sand. The current acting against the carcass forced it over on the plates, folding them back up, beneath the ribs on the lower side. The larger plates above the hips and base of tail, which were doubtless strongly attached, retained their natural positions. As decomposition proceeded the lower left side bones settled in the sand, spaced much as in life, while the bones of the right side were piled above the back-bone, above the upstanding hip bones. The action of the current laid out all of the bones in the same direction. Sand speedily covered the settled skeleton, making conditions right for fossilization.

"During the oncoming ages the sand accumulated to a depth of thousands of feet, the great pressure finally consolidating the skeleton into hard sandstone, in which our perfect fossil was found imbedded."

Crude aeroplane or glider as the Stegosaurus was, the principle of all flight was there in the parallel rows of flaps upon his back. Certainly he was the factory in which the first bird was built.