An Animal With 3 Brains—And What It Did With 'Em

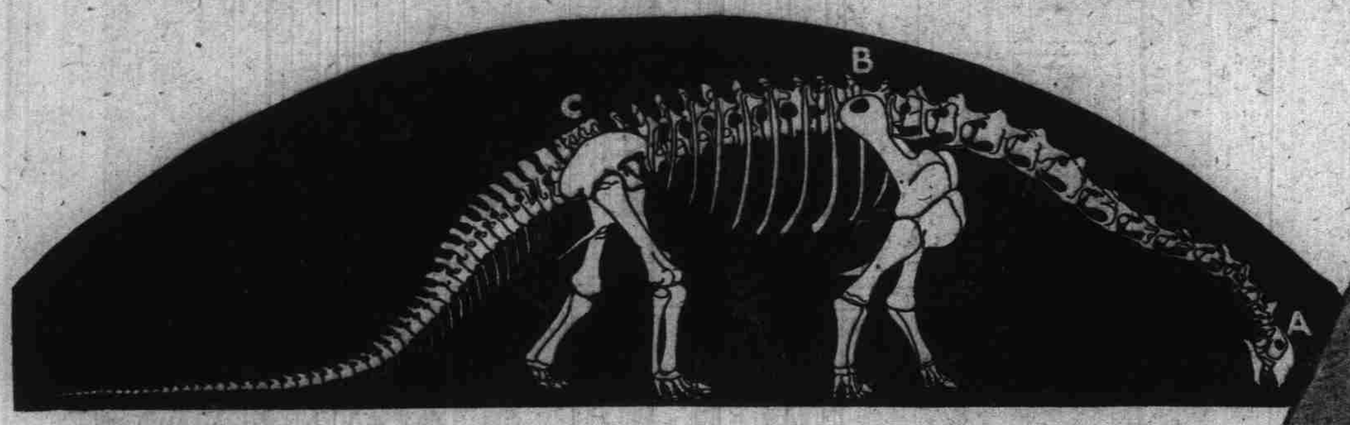

Diagram of the Monster's Spinal Column Showing the Spinal Cord—37 Feet Long—and Three Brains.

The Skeleton of the Puzzling Monster Showing (A) the Location of the Tiny Head Brain; (B) the Larger Middle Brain and (C) the Very Large "Sacrum Brain" Which Worked Its Tail and Hind Legs.

The Not Unpleasing Face of the Three-Brained Dinosaur and Its Toothful but Otherwise Somewhat Vacant Smile. Reconstruction by Artist Christman of the American Museum of Natural History, New York.

Science Puzzled by a Prehistoric Monster Which Had a Big Brain to Work Its Tail and Mammoth Hind Legs, a Smaller One for Its Forelegs, a Very Little One in Its Skull, and Was, Despite Its Unusual Gifts, the Original Complete Bonehead of Our Earth

The Reconstruction of the Dinosaur Which Professor Osborn Declares to Be the Most Perfect Ever Made of Any Fossil Creature. Beside It Is a Modern Automobile, Illustrating by Comparison the Enormous Bulk of the Creature.

By Dr. W. H. Ballou.

WHAT was perhaps Nature's most curious experiment in brain making, millions of years before she evolved man's organ of thought, has just been revealed by scientists studying the fossil remains of a most interesting extinct monster called the camarasaurus.

The camarasaurus had three brains! One was in his head, the second was located in a cavity of the spinal column just between the foreshoulders. The third was located in the sacrum, or section of the backbone between the massive upper joints of camarasaurus's back legs—or what in man would be the hips.

But what is still more astonishing, the brain in the head was almost inconsiderable in weight and size—being no larger than a hen's egg and weighing about two ounces—while the brain above the back legs probably weighed almost two pounds! Even the middle brain topped the head brain by almost a pound. The latter was, indeed, so small that it was hardly more than a bulb at the tip of the spinal cord.

While, therefore, at first glance it would seem that an animal endowed with three brains ought to have been so intelligent that it could have ruled earth at least as well as man with his one brain, analysis of the organs, their position and comparative magnitude shows that they certainly weren't arranged just right for intellectual victories.

As a matter of fact, in spite of his triple endowment, he was the prize bonehead of old earth. Dr. W. D. Matthew, of the American Museum of Natural History in New York, describes him as a thing "directed wholly by instinct, a slow-moving animal automaton." Its skeleton has been mounted in the museum, together with a large model, cast in bronze, of the reptile as he is believed to have looked in life.

There is little in nature to-day with which to compare this dinosaur, and there are few creatures of the past that had many of his characterstics. The skeleton is 55 feet long from tip of snout to tip of tail, is 14 feet high at the shoulder, with the head towering 20 feet above the floor in natural attitude, but with its body stretched upward on the hind feet, the skull would rear twice that height. The name was given him because of the large air chambers in his bones, and hence he is called the "chambered saurian." Also, he has been named the "dredger dinosaur," because he had scoop-shaped teeth.

And in this monster's enormous bulk and weight lie the reason for his three brains. The small head brain wasn't big enough to control all the tons of muscle and bone. It was less trouble for nature to enlarge the spinal cord at the two points indicated—was easier than to enlarge the bones of the head to accommodate a larger organ there. Nature, taking always the easiest way, made the sacrum brain big enough to take care of the mighty tail and hind quarters of the dinosaur; the middle brain looked after the body from the beginning of the neck to the forequarters. The brains in the head were concerned solely with such functions as the senses of sight, hearing, smelling and perhaps conscious feeling.

The real governing, co-ordinating faculty seems to have existed in the entire spinal cord. Perhaps, accurately speaking, the brain of this weird creature could be said to be a thick cord brain, 37 feet long, with three bulbs on it; which seems even more remarkable even than the three-brain way of putting the matter.

The deduction is therefore that the brain was co-ordinated along the entire backbone, with the functions as we know them to-day from the workings within our own craniums, distributed at points in larger cavities for the control of the movements of the animal. Camarasaurus, then, as has been said, gives us a glimpse of the very first attempts of nature in brain evolution. He was also one of the first animals to have a backbone made of bone, his predecessors, considerably further back, having cords of cartilage as the beginnings of spines.

The restoration of the skeleton and appearances as in life of camarasaurus are the results of eight years more or less continuous studies of four savants, members of the leading scientific societies of America and Europe. These men comprise Prof. Henry Fairfield Osborn, President of the Museum; Dr. W. D. Matthew, Curator of Paleontology; Dr. W. K. Gregory, evolutionist; Dr. C. C. Mook, anatomist, aided by Erwin Christman, animal sculptor. The bulging, tremendous muscles were worked by Gregory, who with Christman and Osborn, executed the portraiture as in life. Professor Osborn states: "I believe the heads separately, and the appearance as in life of the reptile as a whole, to be the most scientific portraits of a great dinosaur and the most probable likenesses that have yet been executed."

Professor Osborn says that "camarasaurus lived 15,000,000 years ago." Heretofore, under the Walcott tables, dinosaurs originated 9,000,000 years ago, and were the dominant animals on earth up to 3,000,000 years ago. Very recently, Dr. Thomas Crowder Chamberlain, geologist of the Chicago University, and one of the greatest scientists in his line, demonstrated that all geological time tables must have radical revision, as he had positive evidence that the first glacial period was 75,000,000 years ago, prior to the Cambrian Age. Under this revision, if camarasaurus was the dominant reptile 15,000,000 years ago, the footprints of the first known dinosaurs found in the Connecticut Valley would have to be set back from 9,000,000 years ago to 18,000,000 years ago. In other words, the new tables make everything twice as old as formerly.

We are dealing here, then, with an utterly new conception of earth life. The gigantic camarasaur, it seems, was the dominant animal for a period estimated at 3,000,000 years, at a time when heretofore we were led to believe that there were only amphibians, precursors of reptiles, on earth, and none of these of very large dimensions. And what is more, the four savants say:

"Our general conclusion is that this dinosaur was a very broad, massive, slow-moving sauropod (lizard-footed)—in fact, the most massive reptile in proportions that ever has been found."

The double row of teeth are entirely different from what one would expect in any reptile or other animal. They are spoon-shaped, the spoons bending in. When the mouth opened and shut, these teeth worked precisely like the scoop of a modern dredge. Undoubtedly, the first of his kind to be evilved, he had amphibian-like teeth for cutting food. This dinosaur's food—in fact, the only food he could get at the time—was vegetation growing in swampy lakes and the leaves of the overhanging trees along the shores.

Cutting teeth were not sufficient for filling the rapidly expanding bodies of these rapidly increasing sauropods. Cutting teeth could snip off the vegetation in part, but were not adapted to the succulent roots down in the mud. So we have here one of the most perfect illustrations of how the functions of all animal life undergo changes to get food. As fast as their teeth developed for the purpose the huger sauropods grew in proportions. It would not be surprising if further excavations of the Colorado formations, say by miners, should unearth skeletons much larger, even twice as large, since, so far, the surface has only been scratched.

Yet Despite This Same Enormous Bulk the Brain in Its Head Was Only the Size of a Hen's Egg. Man's Brain Is Shown in the Diagram in Comparative Proportions to the Egg. These Two Photographs Illustrate Why the Dinosaur Has Gone but Man is Still Here.

Camarasaurus also used his front feet to aid in digging up roots in the lake mud. In so doing he developed long, heavy claws on them, and hence the necessity for brain control at the top of his forelegs. His hind feet had to hold him down while he was digging. The result was that the hind feet became semi-flat, without much in the claw line. When the hind feet flattened out sufficiently, later camarasaurus could stand on them without sinking much in the mud. The flat hind feet also enabled them, when on shore, to stand on them, with the aid of the huge tail, tripod fashion, and reach much further up into the succulent foliage of the trees. When some carnivorous enemy, hoping to catch the herbivorous creature ashore, attempted to seize him the camarasaurus swiftly swung on the pivot of his tail and sprang back into the swampy lake and its shelter of water and mud.

The skeleton of camarasaurus seems to divide itself into three nearly equal parts, say, 18 feet each of neck and head, back and body, and tail. It seems to be characteristic of animals, even to-day, that a long neck predicates a small head. You will note the same characteristic in human beings, more especially in women. There is the difference, however, in that the giraffe, with long neck and short head, and the woman with long neck and small head, have good brains, while our camarasaur was not so provided. The neck of the camarasaur had to be extended. In process of extension his head constantly reduced in size to make for longer-reaching neck.

The camarasaur had no particular need of skull brains. He had nothing much to think about except getting several tons of food daily into his cavernous body and an occasional escape from his enemies. Because of the smallness of the opening of his mouth and the tube down his throat, the process of swallowing so much food was slow and undoubtedly kept him at work daily much longer than our longest union hours. This fact aided in his later and complete extinction. As his favorite swampy lakes were uplifted and drained, all those of his kind not buried outright were unable to find foods soft enough to force down the long, slender throats.

There is another peculiarity. Dr. Mook possesses just a fragment of the skin of the camarasaur. It appears to have been smooth and slimy, yet with boney ossicles on it. If you look at an alligator you will note that his heavy hide is marked off in plates. Not thus with the camarasaur. It is not known just what function these boney ossicles on his skin stand for, probably preventatives of some kind of irritation by the heavy plant life, prickles or briars possibly, certainly not as protection against its enemies, any carnivore of which would have bitten right through him.

Camarasaurus had several other peculiarities all his own. His neck, instead of sticking out from the upper part of his body, curved and broadened downward to the trunk above the fore legs. Likewise his tail broadened downward to the point above his hind legs, instead of sticking out at the top of his body.

The whole animal seems to merge into one massive structure, in which every section is massive except the top of the neck, the head and the lower end of the tail. Even the last named did not end in a whip lash. Most dinosaurs have smaller, shorter fore limbs, much like our arms and hands in skeletonic structure.

No so with camarasaurus. He stood on his fore legs, and they were legs, like a mammal. He certainly looks like a fighter from Fightersville. He must have made an ugly gash on an enemy with his fore legs and big claws. He may have swung his massive tail with a knockout blow. His shoulders and hams look Sullivanic. We find nearly all other types of herbivorous dinosaurs in quarries in the deadly embrace of carnivorous dinosaurs, showing that they were rather easy prey. The fossil skeletons tell us how the carnivore killed and ate the herbivore. Not so in this case. We have yet to find what carnivorous enemy got the best of camarasaurus, if any.

Such instances, even if known to any specialist, will only prove that the combats took place after the camarasaur became bewildered by upheaval of swamps and wandered on dry land in a weakened and dying condition.

Scientists have a traditional hypothesis that dinosaurs were not ancestral to any later type of animals, because they are alleged to have specialized away from modern types instead of towards them. When we find resemblances to dinosaurs in later animals, we are told that these are "parallels of evolution." This hypothesis will bear much revision. If camarasaurus was the dominant animal, or reptile, of so long ago as fifteen million years, he must have been ancestral to later types at least in part.

Mammals and men have twenty-eight of his bones, however modified by time for environmental conditions. Maybe some other animal of his time passed them on to us and maybe not. There was moropus, a later horse-like mammal, with similar fore feet and huge claws for digging. There is the giraffe with similar long neck and small head, but with the number of neck bones reduced to seven. There are the humans with long necks and small heads, with the same reduction of neck bones as the giraffe.

Some of us and many other mammals inherit flat feet from some reptile that got flat hind feet by reaching high for its food. Why not inherited from camarasaurus? The fact is, camarasaurus lived in an age so far distant that he couldn't specialize away from the coming generations. He had to specialize with all his might toward us. It was the later dinosaurs that got off the trolley and went wandering far afield. This chap seems to have built a solid foundation for many types that came after him, clear down to the present.

It required fourteen million years to modify reptile skeleton and bones to produce a man. The whole tail of camarasaurus had to go by the board. All those cavities along his spine had to unloose their brain material so it could be brought up into a vastly modified skull. The big air chambers in his bones had to be closed. While his fore legs and feet had to be immensely modified to produce our arms and hands, but few modifications had to be made for the four legs of our domestic animals and quadrupeds generally.