# Galaxy
## SCIENCE FICTION

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**GLADIATOR AT LAW**
By Frederik Pohl and C. M. Kornbluth


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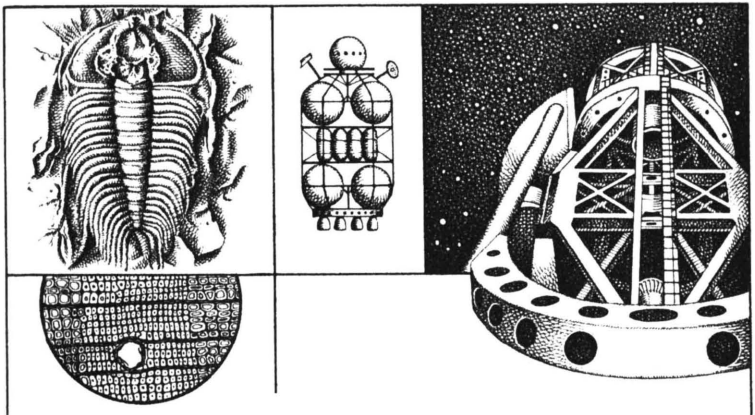

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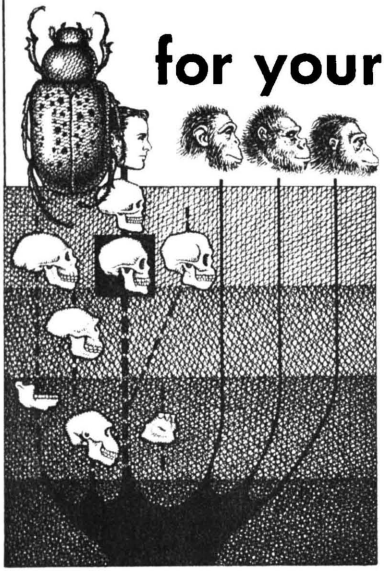


By WILLY LEY

## LARGEST OF THEIR KIND

SOME time ago, I received a letter, not from an individual but from a whole high-school class in Kansas, asking for an article on the question of which mammal, bird, reptile, fish and so forth is the largest in its class, past or present. When I started looking things up, I began to realize—as you will in a little while—that Kansas was as logical a place as Hollywood to

ask this particular question. Kansas may not have any extremely large animals to offer at this moment, but it certainly is a state with a gigantic past!

To begin somewhere, let's start at the top, with the mammals. The largest land mammal of the present period is, by a comfortable margin, *Loxodon africanus,* the African elephant. An old bull will stand 11 feet tall and reach a weight of from six to eight tons. If one can put full trust in the reports of big-game hunters, bulls standing 11½ feet tall have been shot in Africa, but I'd feel much happier about these reports if the trophy had ended up in some museum where a measurement can be repeated in case of doubt. At any event, the African elephant is, on the average, half a foot taller and a ton heavier than the nearest runner-up, which is, of course, *Elephas indicus,* the Indian elephant.

IN the not-too-remote past, however, it would have been the African elephant who would have been designated as runner-up. No, *not* to the mammoth—at least not to the Siberian mammoth, which was smaller than the Indian elephant. But one European variety of mammoth, found in Austria and now on exhibition in the Natural History Museum of Stuttgart, topped the African elephant by 30 inches, and another variety of extinct elephant, *Elephas trogontherii,* found in southwest Germany near Wiesbaden, topped this giant by another 10 inches.

Even this super-elephant, though, was not the largest land mammal of the past. The record, as far as present knowledge goes, is held by *Baluchitherium grangeri,* a "hornless rhinoceros" from the Tertiary period of southern Asia, which was 27 feet long and stood around 18 feet tall. The present Indian rhinoceros could have walked under a standing Baluchitherium without ducking.

But mammals do not live on land only. The marine mammals of today hold the record not only over the land or marine mammals of the past, but also over everything else that ever moved, including the dinosaurs.

The largest whale is probably the kind called the Blue Rorqual, *Balaenoptera sibbaldii* (or *B. musculus*). Even conservative naturalists grant this monster a body length of 80 to 85 feet. (Statements that can be found in print go as high as 101 feet.) The weight of a fully grown specimen of this whale is estimated to be close to 150 tons. Even if this should be wrong by a couple of dozen tons or so, the large whales of today are considerably heavier than brontosaurus, which is cal-

culated to have weighed in at 38 tons on the hoof. The whales of the geological past, being far smaller than those of the present, would take at best fourth or fifth place.

Proceeding to the birds, one at once gets into the dilemma of what to go by, linear dimensions or weight. The bird with the largest wing-spread of the present time is the Wandering Albatross, the *albatros errante* of the South Americans or *Diomedea exulans* of the ornithologists. The largest ever measured had a wing-spread of 12 feet and weighed 15 pounds. The condor, both South American and Californian, comes close with a maximum spread of just about 11 feet, but it weighs as much as 31 pounds. In the recent past, there was an even larger California condor that topped the wing-spread of the albatross and was probably heavier, too, than the existing type.

Naturally, the flightless birds are the biggest, for ground installations always weigh more than airborne equipment. The largest of today, the African ostrich, may look down at you from a height of eight feet and weigh 160 pounds.

ONLY a few centuries ago, however, the African ostrich would have been runner-up to several other bird giants.

The biggest of the New Zealand moas, *Dinornis maximus,* was not a lot taller (probably just a matter of inches), but must have weighed more than twice as much. This moa was certainly still alive in 1600, the date for which the giant ostrichlike bird of Madagascar is mentioned as still living, though only by hearsay, not from personal observation of the reporter.

The Madagascar bird, *Aepyornis ingens,* stood 10 feet tall. It was of lighter build than *Dinornis,* but it did lay the biggest bird egg known to science—almost 14 inches long, with a cubic content equal to that of 7 ostrich eggs or 185 eggs of the kind that come by the dozen.

The largest—or, rather, most massive—of extinct birds well known to paleontologists was *Diatryma gigantea,* from the lower Eocene of Wyoming. This heavy bird, possibly related to the cranes of today, had a skull almost 20 inches long, with a beak to match. Some seven feet tall when standing erect, it must have weighed well over 300 pounds.

We now come to the reptiles and there, as everybody knows, the past greatly outshines the present. But the present is not doing as badly as most people think.

The large Indian crocodile, *Crocodilus porosus,* which shows

a most remarkable preference for salt water and long swims in the ocean, would not look too much out of place in a Cretaceous landscape. One specimen, of which the skull is in the British Museum, has been measured by Boulenger and found to be 33 feet long, with a circumference of 13 feet 8 inches!

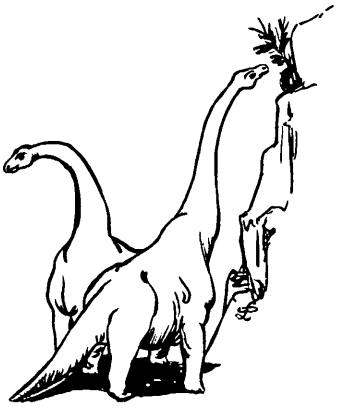
The largest living turtle is a hefty animal, too. It is the leatherback turtle (*Dermochelys*) of the high seas, which grows to an overall length of nine feet, the carapace measuring 6½ feet, and the weight of such a giant is an authenticated 1450 pounds.

The largest living snake is the South American anaconda (*Eunectes murinus*), of which many a wild tale has been told. Zoologists usually say that this snake will reach a length of "well over 20 feet" and generally will be willing to settle for 25 feet as the limit. But one reputable source mentions a specimen that measured 30 feet. However, it was measured after death (understandably so) and if you stretch a dead snake of such length for measuring, you may add one or two feet to its "live length" without meaning to.

The largest lizardlike reptiles of today are, of course, the monitors. The East Indian *Varanus salvator grows* to a length of 10 feet, while the still larger *Varanus komodoensis*, from the small island of Komodo in the Sunda Sea, is two or three or maybe even four feet longer. Both are very long-tailed, so that these figures are slightly misleading. The heaviest Komodo monitor actually weighed was just about 100 pounds.

ALTHOUGH all these are respectable figures, they shrink by comparison with reptiles from former geological periods. The one exception is the Indian crocodile. I don't know of any extinct true crocodile that grew as big. But the monitors are just small leftovers. Only some 20,000 years ago, Australia had a monitor lizard that was more than 20 feet long and may have reached 30 feet.

The largest extinct reptiles were the sauropod dinosaurs of the type of the well-known brontosaurus. Diplodocus was probably the longest because of an elongated tail; measurements lie between 70 and 75 feet from nose to tip of the tail. Not longer, but more massive by far, and probably the heaviest of the dinosaurs was *Brachiosaurus brancai* from the Upper Jurassic period of East Africa. The length of the humerus (bone of the upper arm) of Brachiosaurus is 84 inches, as compared to 47¼ inches for the same bone in Diplodocus. Brach-



Brachiosaurus Brancai
Upper Jurassic of East Africa

iosaurus could still breathe while walking along the bottom of a 40-foot-deep lake!

The largest leatherback turtle would also look quite small next to *Archelon ischyros,* from the Upper Cretaceous of Kansas. This marine turtle of some 60 million years ago must have been 13½ feet long when alive and heavy in proportion, presumably around 3500 pounds. Its armor had been somewhat reduced for the sake of mobility, but there is little need for armor in a turtle with a three-foot skull and a beak like a guillotine.

For company, *Archelon* had 20-foot mosasaurs, swimming reptiles with four big paddles, a flat tail and long teeth.

Above the waters where Archelon and the mosasaurs competed for fish, the largest flying animal of all Earth's history wheeled on leathery wings, also looking for fish. This was *Pteranodon ingens* —mostly wings, with a ridiculously small body and legs, but with a large though paper-thin skull and a long sharp beak. The wing-spread of Specimen No. 2514 has been computed at 26 feet 9 inches.

The amphibians of today are generally small. A 10-inch salamander is "big" and a two-pound toad something worth mentioning. Still, in Japan there lives a salamander, called Hanzaki and Hazekoi by the Japanese, which grows to slightly over five feet in length. This is *Megalobatrachus maximus,* the Japanese giant salamander that was discovered about 1825 by the German traveler von Siebold and caused a small sensation in scientific circles in its time—not only because it is the largest living amphibian, but also because it was the first case of an animal having been known in fossil form before being discovered alive.

To find really large amphibians

in the geologic past, we have to go back to before the dinosaurs to encounter the labyrinthodons, so named because of the strange construction of their teeth. One especially familiar but exceptionally badly named species was *Mastodonsaurus acuminatus,* from the Triassic of northern Europe, with a three-foot skull and an overall length of about 12 feet.

THE fishes are another class where the present holds its own well as compared to the past, even though it has to be admitted that the record-holders belong to an ancient type — namely, the sharks. The basking shark (*Selache maxima*) is known to reach a length of 30 to 35 feet, while the whale shark (*Rhineodon typus*), recently made famous by Thor Heyerdahl and his Kon-Tiki expedition, is well established with 45-foot specimens, and even 60 feet has been tentatively accepted as a possible maximum size.

Past geological periods have not yet furnished anything larger than the whale shark among the extinct fishes. A possible exception is a fossil shark called *Carcharodon megalodon,* from the Miocene of the Vienna area. Only the teeth are known so far, and if the size of the shark was in proportion to the size of these teeth, it might have been larger than *Rhineodon.*

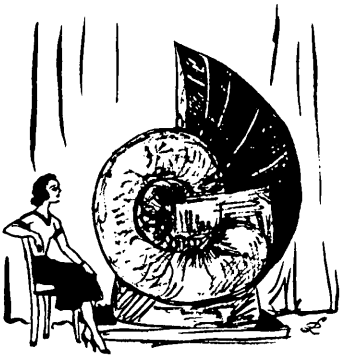
Now don't dismiss the invertebrates as tiny. True, they usually are, for a one-inch beetle will be considered a big fellow and a six-inch earthworm "enormous" and the African snail *Achatina fulica,* which the Japanese spread over a large number of Pacific islands as a food supply during the Second World War, is known as the "giant snail." Its shell is five inches long and its overall length nine inches; it is the second largest of the land snails of our era. (The largest, also African, is about a foot long.) But there are a number of other impressive exceptions from the rule that most invertebrates are small.

The largest clam of our time—and of the past, too, as far as is known—is *Tridacna gigas,* which occurs near the Philippines, on the Great Barrier Reef of Australia and generally in that area. It can reach a size of five feet and a weight of 500 pounds. Its virtually indestructible shells were brought to Europe for centuries and were often used as basins for holy water in small churches, especially in Bavaria and Austria. "Two-thirds of my class should make excellent naturalists; they have been baptized from Tridacna shells," a south German zoology instructor once said to me.

The largest molluscs are the giant squid, the *Kraken* of the Norse, but unfortunately nobody can give any definite figures. One killed by the crew of the French corvette *Alecton* in 1861 could not be actually measured, since the crew of the ship, although they tried hard, failed to hoist it aboard. But the monster was directly alongside the ship, so that a good and reliable estimate could be made—50 *feet without the tentacles!*

No giant fossils of a comparable type are known, but armorless octopi would hardly fossilize. They would be eaten by a large variety of marine creatures before mud or sand could cover the body. However, some octopi produce shells the way the living nautilus does and such shells fossilize easily. You can see long rows of these *ammonites* in every museum.

The largest known is, so to speak, a childhood friend of mine. "I knew him well," of course, long after its discovery. The enormous thing was found in a quarry at a place named Seppenrade in Westphalia in 1895. Since *pachys* (Greek) means "thick," it was promptly christened *Pachydiscus seppenradensis*. The diameter of the shell is 8¼ feet. The weight of the fossil, more precisely a *steinkern* or internal mold, is 7700 pounds. And the octopus that grew it lived during the Upper Cretaceous period.



Pachydiscus seppenradensis
Upper Cretaceous, West Germany

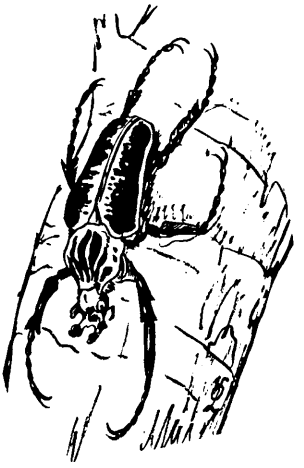
EVEN something as unlikely to be gigantic as a jellyfish can grow to enormous size. At Nahant, Mass., Prof. Louis Agassiz measured one in which the bell was 7½ feet across and the tentacles more than 120 feet long! In the southern Pacific, one kind seems to grow to a diameter (without tentacles) of three to four feet as a rule. At that size, it weighs about 90 pounds.

A twelve-foot earthworm may sound as unlikely as a 90-pound jellyfish, but such earthworms exist in Australia. They have as many as 500 segments and are

fairly thin when extended, about ½ inch. The handbook I consulted states that the only bird known to eat these earthworms is the Australian laughing kingfisher. I can add one other—I saw a photograph of a domestic duck swallowing hard but successfully. Yet this is not the longest worm by any means. The "broad fish tapeworm" will reach a length of 60 feet, with a width of ¾ inches! But a parasite is obviously a special case.

When it comes to insects, one has to ask, of course, "what kind?" The largest living butterfly is a moth and so are the runners-up. The record is held by the South American owl moth with a span of 11 inches. The south Asiatic Atlas moth measures 10 inches in wing-spread, but has much wider wings than the owl moth. Our North American species do not compare too badly, the cecropia moth reaching 7½ and the polyphemus moth 6½ inches.

Among the beetles, the elephant beetles of South America and the goliath beetles of Central Africa run in very close competition, both being four inches long in good specimens. The hercules beetles of tropical America measure up to 6½ inches in length, but much of this is just the long projecting horn. In actual length, a "walking stick" from Borneo



Central African Goliath Beetle
(Goliathus regius)

probably wins with 11 inches, but it is quite thin.

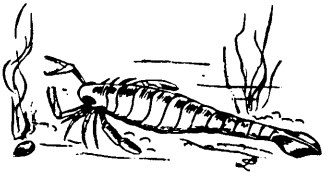
How about the insects of the past? In the far remote past, the Carboniferous period, insects like dragonflies were the largest. The biggest present-day dragonflies, from tropical America and Borneo, span between 6½ and 7 inches maximum. *Titanophasma,* from the Carboniferous of Europe, had a wing-span of 18 inches. For quite some time, it was thought to be the largest, but then *Protodonata* with a 2½-foot spread was found in the Permian of Kansas.

CRUSTACEANS and, in general, arthropods still have to be mentioned. When the New England coast was first reached, stories of lobsters of incredible size went back to Europe. One famous natural history book of the sixteenth century, by the municipal physician of Zurich, Dr. Konrad Gesner, even contains a picture of a 6-foot lobster eating a man. Gesner stated that this is what he had been told, but neither he nor his artist had seen a lobster of such size.

The fact is that the American lobster runs larger than the European lobster and that old specimens reach considerable size. The largest really established measured 23¾ inches and weighed 34 pounds.

In sheer size, a spider crab from the Japan Sea, *Macraucheira kaempfferi,* surpasses this lobster, since it stilts along over the ocean floor on legs spanning six feet. Its body, though, is not much larger than a fist.

The largest arthropod known became extinct some 450 million years ago. It thrived during the Silurian period and is known to science as *Pterygotus.* The overall length was nine feet; it belonged to a completely extinct group called the eurypterids. We don't know whether they lived in fresh water or salt water. But they were obviously carnivorous and the terror of anything smaller that happened to come within reach.



Pterygotus from the Silurian Period

And there you have a condensed record of the giants of the past and present. Incidentally, Man rightfully belongs on this list. Despite those who insist on viewing him as small and puny, he actually is a member in good standing of the one per cent or less of the Earth's total life population that can be called giants! Figure it out for yourself — he averages 5½ feet in height and 130 pounds (extremes are 8½ feet and 600 pounds) with an arm-spread of 5 to 8 feet. What's small about that?

I'm sorry that this survey squeezed out the letter section this month. It will be back in next month's department—which will be astronomical all the way through because of the close approach of Mars at the end of June.

—WILLY LEY