

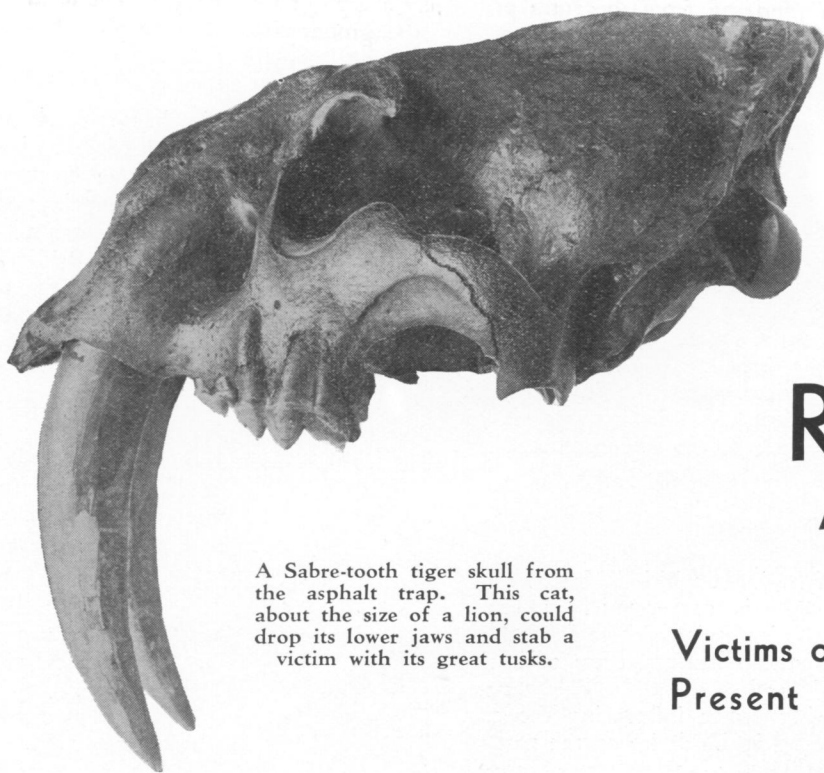
PALEONTOLOGY

## Fossils

from

## Rancho La Brea

"A Classic of Science"

Victims of Asphalt Quagmire Link  
Present With Prehistoric Past

A Sabre-tooth tiger skull from the asphalt trap. This cat, about the size of a lion, could drop its lower jaws and stab a victim with its great tusks.

In the great numbers of kinds of beasts and birds entombed in the asphalt pools a large percentage are of types no longer living on any part of the earth. Many of these have their nearest relations in the life of still earlier ages. Such are the sabre-tooth, mastodon, ground-sloth and others. The elephant, camel, and horse, have close relatives living today on other continents. With these two groups are other species, as the coyote and puma, the rodents, many birds, and plants like oak and cypress that have intimate resemblance to species at home in California today. If the whole group of animals and plants from these pools could stand before us, the assemblage would be that of a foreign age or land, but among them would be many friends of our out-of-doors today. Here we face the reality of another world of life shown in many strange phases, and yet the beginning of the present reaches back to overlap that early time.—John C. Merriam in *The Living Past*, 1930.

DEATH TRAP OF THE AGES, by John C. Merriam, in *SUNSET*, Vol. XXI, No. 6, October, 1908.

A FEW miles west of the city of Los Angeles, there is situated an extensive deposit of asphalt which has been largely quarried for commercial purposes. It has been known for many years that certain portions of the asphalt contain large numbers of bones; and skeletons were found to be so numerous

in some places, that in quarrying it was not profitable to attempt the separation of asphalt from the layers in which they occurred. The bones appeared so fresh and well-preserved, and were so near the surface of the ground, that there seemed to be little reason for considering them as other than the remains of domestic cattle, sheep, horses, dogs, and other animals, and the attention of investigators interested in prehistoric life was not attracted to them. Only very recently has it become known that the skeletons present in such numbers represent many strange, extinct animals which lived in an earlier geological period, and that the asphalt beds at this locality form one of the most remarkable accumulations of prehistoric remains in the world.

The asphalt deposit lies in an open space between two groups of derricks marking important oil belts immediately to the north and south. In this area almost pure asphaltum forms the surface of the ground, or is only a short distance below it, over about a quarter of a square mile. Other deposits extending interruptedly to the east, and reaching well within the thickly settled portion of the city, would probably add not less than half a square mile to this area. At numerous points bitumen has recently been oozing out over the surface, outbreaks of this nature occurring in many places as puddles connected

with little crater-like vents. Near the middle of the area is a lake or pond bordered by quagmires of soft asphaltum. The water of the pond is heavily loaded with oil and tar, and through it great gas bubbles several feet in diameter are constantly rising with a loud splash.

## Extent of the Deposit

According to the geologists who have most carefully studied the asphaltum beds of this region, they are located immediately over a sharp fold in strata which have been heavily impregnated with petroleum. At the summit of the fold the strata have been broken up to some extent, and for a long period small quantities of oil and gas have been seeping out and passing to the surface. As the oil passed upward, the lighter portions disappeared through evaporation, and the residue formed tar springs and pools. In the course of time, the tar has dried and hardened locally to the consistency of asphalt. This accumulation continued until the great deposit exposed here had been formed. What the actual thickness of the beds is has never been determined, but the bottom is not reached in quarrying to a depth of fifteen feet.

## Scattered Bones and Teeth

In many places where the asphalt comes to the surface, scattered pieces of bones and teeth are seen in it. Where

cuts have been made in quarrying, some sections show bones scattered irregularly through them. In other places certain layers will be found nearly barren of remains, while other fairly defined strata show a mingled mass of bones, and pieces of partly lignitized wood in a matrix of pure asphalt.

The skeletons are all remarkably fresh and well preserved, and excepting a deep discoloration by the asphaltum, they are hardly to be distinguished from those of animals recently killed. In cases where the fossils are exposed on the surface they may be mixed with bones of modern sheep, cattle and horses; and it is not remarkable that all were at first considered to be of recent origin.

In the collections that have been made in the asphaltum up to this time, quite a variety of creatures are represented, of which the great majority are mammals and birds. Of birds there are many kinds, among which ducks, geese, pelicans, and eagles and condors are recognized. The smaller mammals include mice, rabbits and squirrels. The larger members of the mammalia are represented by extinct species of coyotes, gigantic wolves, bears, sabre-tooth tigers, horses, bison, deer, camels, elephants and large sloths of an extinct group. Beetles and centipedes have also been found, and doubtless many other animal forms are there, but have not yet been recognized.

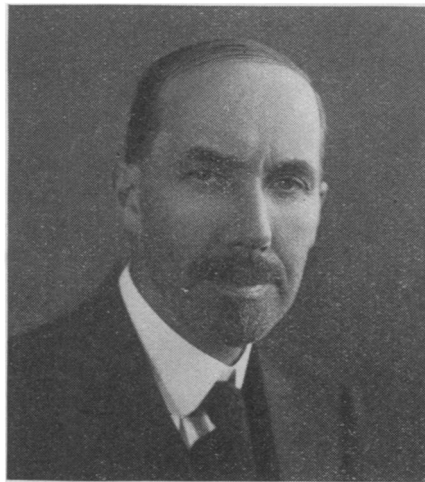
### Two Extinct Wolves

One of the most common animals in the asphalt is a large wolf, one of the largest members of the true dog family known among either living or extinct species. Associated with it, though relatively rare, is a smaller wolf closely related to the existing coyotes. The large species is possibly represented outside of this state by a few fossil teeth found in Indiana and Texas. From the asphalt beds more than fifty good skulls with parts of many other skeletons have been obtained. Bones of the large wolf are much more common than those of the smaller one, and it is probably fair to assume that it was a more abundant animal than the coyote in this region at the time the beds were accumulating. Judging from the great number of remains found it certainly must have been very common in this region. The great wolf differs from all of our existing species in its larger and heavier skull and jaws, and in its mas-

sive teeth. Judging from the form of its skeleton it was less agile, and not so swift-footed as the coyotes.

### The Sabre-Tooth Tiger

Next to the large wolves the carnivorous animals most frequently discovered are the sabre-tooth tigers, of which thus far excellent material of over twenty individuals has been found. Though fossil cats of this group are known from nearly all parts of the world, and the type has been in existence for many geological periods, there has never before been found such a remarkable accumulation of their remains as occurs here. In all parts of the beds where collections have been made their bones are represented. At one locality eighteen



DR. JOHN C. MERRIAM  
*President of the Carnegie Institution of Washington.*

complete skulls, and at least one complete skeleton, were found within an area of less than two square yards. . . .

### The Giant Ground-Sloth

Another animal found frequently in the asphalt beds is the ground sloth, a peculiar creature, related on the one side to the living South American sloths, and on the other side to the armadillos. No representative of the group is known among the existing animals of the world, and most of the extinct representatives known are from South America, where they were abundant for a long period. The ground-sloths were much larger than their living cousins, some of them attaining the size of a large ox, and certain South American forms were even larger. They were powerfully but clumsily built, and the designation sloth is evidently not en-

tirely inappropriate for them. The teeth of the ground-sloth indicate that they fed upon plants. Their feet were provided with very large and powerful claws, which were evidently used in digging or scratching for food.

The ground-sloth remains found in the asphalt consist of many parts of the skeleton, including feet with the enormous digging claws, and skulls with the teeth. In some instances nearly the whole of the skeleton has, evidently been buried in the asphalt, but a portion of it has afterward been exposed and destroyed. . . .

### Bison, Camels and Mammoth

Of the hoofed, herbivorous animals found in the asphalt beds, extinct species of horse and bison are the most common. Occurring less frequently are camels, deer, goats, a small and previously unknown deer-like animal, and the mammoth. Nearly all of the horses are young animals, and the bison are usually represented by calves. The horses belong to a species much like the modern type. The bison were heavy-horned species, somewhat larger than the existing American buffalo. Of the mammoth only portions of the tusks and limb-bones have thus far been found.

The bones of the birds are very common and are mingled with those of the other animals, particularly the carnivora. Of beetles, the wing covers and even the whole bodies are found, and with them are occasional remains of centipedes, and the bones of various rodents.

From the occurrence of so many peculiar intermingled animal remains, in which the proportion of carnivorous animals and of young ones is relatively large, it may be judged that the accumulation of bones found here has taken place under conditions materially different from those under which bone deposits have commonly formed. In most instances fossil bone beds represent the natural collection of remains by stream wash, or simply the dust-covered skeletons accumulating on open plains. In such cases most classes of animals are represented among the skeletons in somewhere near the proportion which they bore to the other forms of life. In the asphalt beds the percentage of carnivora and of young animals appears much larger than it could have been in any normally balanced fauna, and there must have been some extraordinary reason for the presence of these classes in such relative abundance. (*Turn page*)

The asphalt deposits as a whole have evidently formed from the slow accumulation of bituminous material around tar springs. Springs of this kind, such as are in existence at the present time in this region and elsewhere, generally send out a great deal of water with the bituminous material, the tar accumulating on the floor and around the margins of ponds of water. After a time the tar accumulates in such a quantity that it may of itself form a large pool. With evaporation of the more volatile materials the bitumen gradually hardens, but in warm weather the surface is always soft and sticky, and when the mass has accumulated to a sufficient extent it may flow and spread for a considerable distance.

In all stages of the accumulation of asphalt the gummy surface presented to the atmosphere acts as a trap for unwary animals. Where pools of water are present, water birds of all kinds are caught in the soft tar about the margins of the ponds. When once the wing feathers are smeared over the birds are helpless, and in attempting to wade out to dry land they are hopelessly mired. Land birds and mammals in smaller numbers are caught in attempting to reach the water, while insects and other tiny creatures are snared. . . .

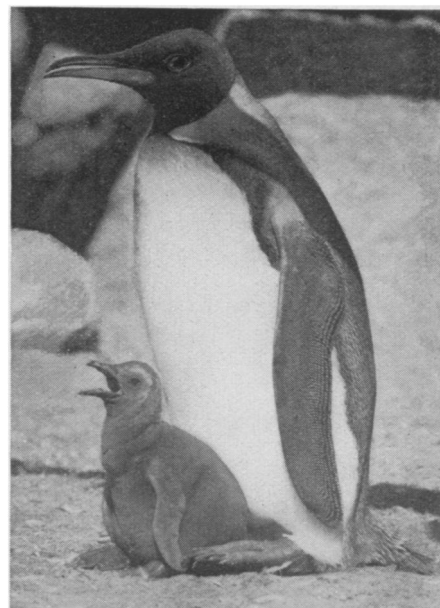
The fauna of the asphalt beds of Los Angeles so far as most of the types of animals are concerned, corresponds very well with what is found in the tar deposits at the present day. Of the birds a large percentage are water forms, and of the larger herbivorous mammals nearly all are young animals, like the colts and calves caught in recent times. The large number of car-

nivora present also corresponds with what is noticed around recent asphalt pools, where unwary cats and dogs are only too frequently lost in attempting to reach struggling birds or small mammals that have previously been caught in the tar.

There seems, then, to be every reason to believe that the Los Angeles asphalt deposit with its great freight of bones has been formed in a past geological period, much as the deposits are being made about tar springs at the present day. The peculiar ducks and pelicans and condors, the young camels, bison, horses, and deer, with the mammoth and the ground-sloth, have sunk in the pitch, and in their struggles have enticed the wolves, bears and the sabre-tooth cats. Sometimes a single struggling animal may have attracted several wolves or tigers, and around its body a combat was carried on which ended in both the victor and the vanquished being swallowed in the tar. In other cases the presence of several puppies or kittens together with an adult of middle age leads one to suspect that a young litter has broken loose to fling itself upon some mired bird or mammal and has been trapped together with the mother which came to their aid.

The accumulation of the asphalt beds has probably gone on slowly for a long period. Sometimes it ceased entirely. At times conditions were such that few if any animals were trapped. At other periods a great variety of creatures was caught in such numbers that their bones were matted together in thick beds, which we now recognize as strata in an ancient geological formation.

*Science News Letter, December 13, 1930*



#### THE ONLY KING PENGUIN

*Ever hatched in captivity chipped its shell a while ago in the great Carl Hagenbeck private zoo at Stellingen, Germany. Since the above photograph was made the chick has become an orphan; its father died and its mother deserted it. Devoted keepers keep it fed with fish, and it has grown to almost adult size.*

tures by the action of aluminum chloride on tetra-hydro naphthalene—a commercial coal tar product used in the dye industry.

It was this condensation product which has recently been found to give the blue fluorescence. A search is now being made for other compounds of known constitution which show the same property. This has been successful in that several compounds related to benzantracene have been shown to give a similar spectrum and also to be cancer-producing. Benzantracene is built up of four benzene rings cemented together. It is believed that substances in coal tar which predispose to cancer are similar in nature.

While not all cancer-producing substances show this spectrum and while some which do show the spectrum do not cause cancers, the new test is likely to be of assistance in uncovering the origin of cancers which develop spontaneously.

*Science News Letter, December 13, 1930*

#### MEDICINE

## Cancer-Causing Substances Flash Own Danger Signal

**A** PECULIAR blue-violet fluorescence may provide a test for cancer-producing compounds.

This new weapon in the investigation of artificial cancers is due to Dr. W. V. Mayneord and I. Hieger, two scientists at the Cancer Hospital Research Institute in London. They find that when substances known to cause cancer in mice, are illuminated with a beam of ultraviolet light a blue spectrum appears.

The existence of such substances

was first discovered because the employees in the shale oil and coal-tar industries were found to be particularly susceptible to the disease. Later it appeared that cancer may be produced artificially by prolonged contact with many tar-like liquids obtained by heating common substances—for instance, skin muscle and hair—to the temperature at which iron begins to glow dull-red. The workers of this laboratory have recently shown that a similarly harmful substance may be obtained at low tempera-

Experiments at the Bureau of Standards indicate that actors or talking movies must "speak louder" in a theater in the winter time, because the quality of winter clothing worn by the audience absorbs more sound than summer clothing.