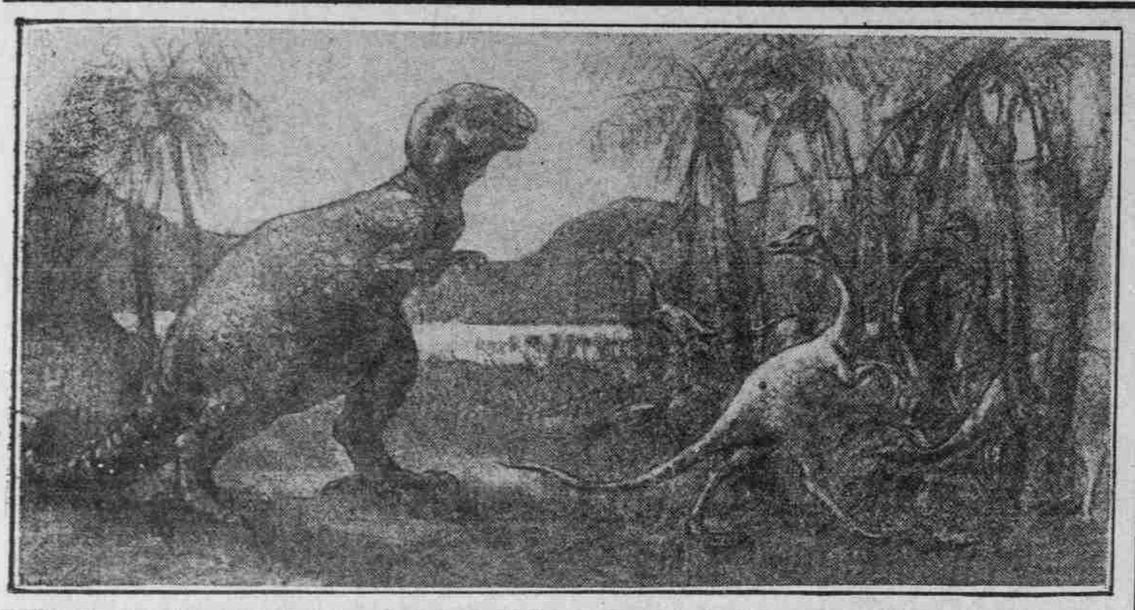
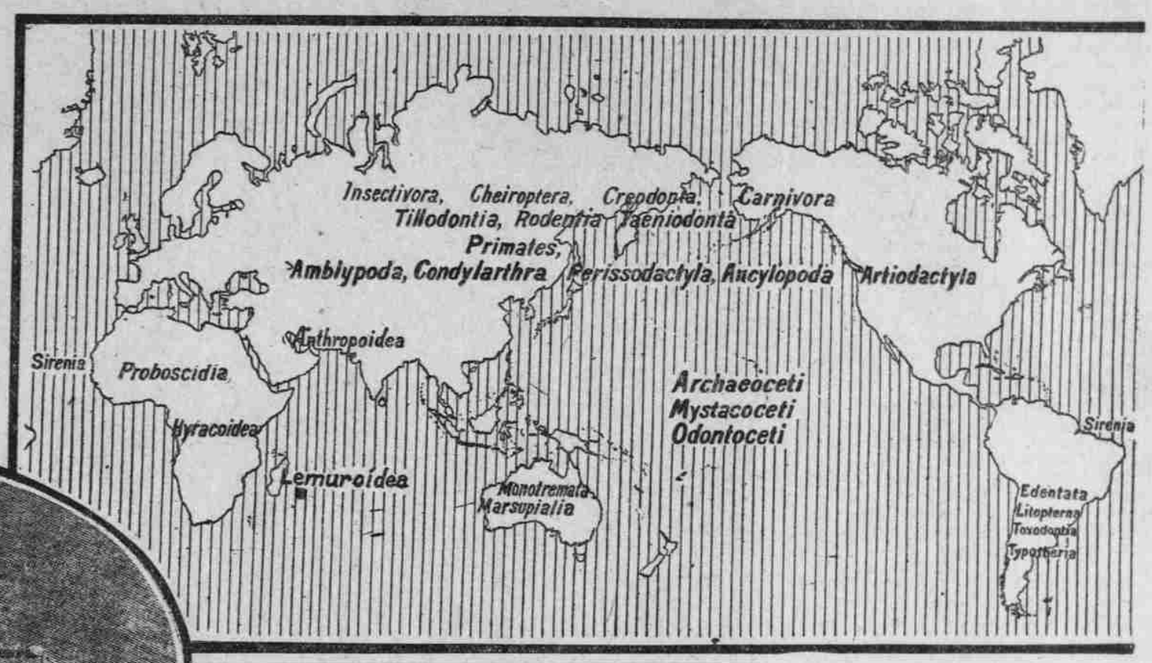
Proving Asia the Mother of Continents

Scientist Tells of Discovery of Birthplace From Which Reptiles and Mammals Spread Over Globe

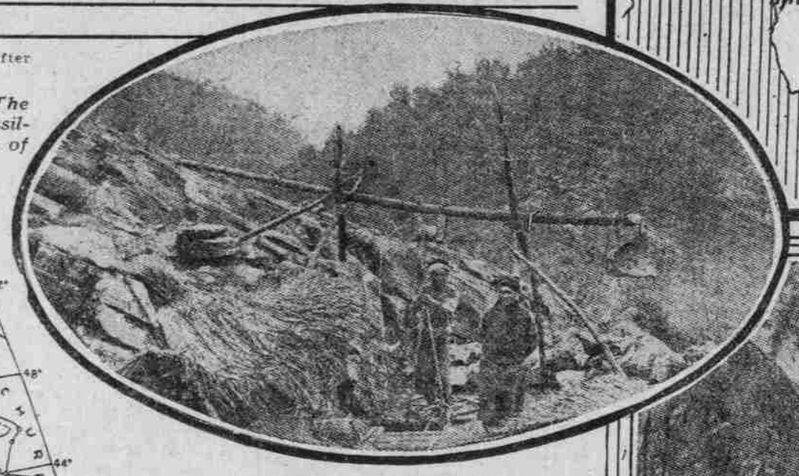


—Under Prof. Osborn's Direction Drawn by Elizabeth N. Fulda After Charles R. Knight and Erwin Christman.

American carnivorous dinosaurs discovered in Mongolia—The "Tyrannosaurus" faces a group of ostrich dinosaurs. Fossil-beds near the salt marsh of Iren Dabasu contain animals of related carnivorous types.

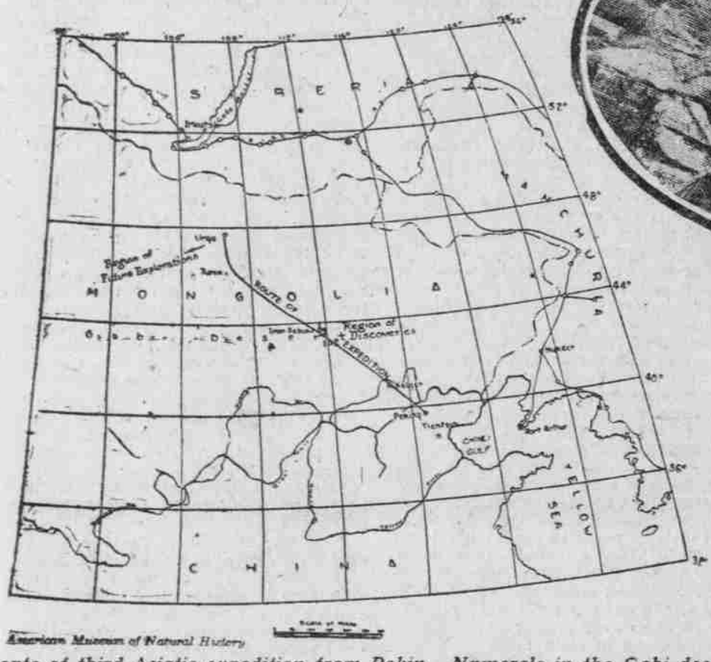


Hypothetical centers of mammal radiation, tertiary period. Henry Fairfield Osborn published this chart in 1900 to set forth the theory that northern Asia is the fossil homeland, containing all connecting forms of mammalian life.



American Museum of Natural History.

Fossil-pit that yielded the skull of an ancestral elephant. The natives have long sold to Chinese pharmacists fossils from pits like this one at Shihpatze on the Yangtze, where Walter Granger's men found the stegodon skull.



Route of third Asiatic expedition from Pekin. Numerals in the Gobi desert region mark discoveries: (1) Upper cretaceous dinosaurs; (2) eocene mammals; (3) lower miocene mammals.

—Under Prof. Osborn's Direc and Erwin Christman. ulda after Charles R. Knight tion Drawn by Elizabeth N. F

American herbivorous dinosaurs discovered in Mongolia. Spoonbill, or Iguanodont dinosaurs of the herbivorous type found in the Iren Dabusu fossil-bearing beds once ranged from southern England to the New Jersey coast.

Fossil discoveries of the utmost importance from a scientific standpoint were reported from China recently in news dispatches. In the accompanying article The Sunday Oregonian presents a more detailed account of these discoveries. For both the article and illustrations this newspaper is indebted to Asia, the American magazine of the orient.

BY HENRY FAIRFIELD OSBORN.

ALMOST at the outset a very important discovery has been made by the third Asiatic expedition of the American Museum of Natural History in co-operation with the American Asiatic association and Asia. This discovery gives the answer to one of the four great questions which the expedition undertook to solve; namely, whether ancient Asia is the mother of the life of Europe to the far west, of North America to the far east. It is a kind of realization of the discovery of a paleontologic Garden of of Eden — of the birthplace or Asiatic homeland from which many kinds of reptiles and mammals spread westward and eastward. The existence of such a center has long been a matter of pure theory on the part of paleontologists. As early as 1900 the writer of this article summed up his faith in the existence of such an Asiatic homeland, in the columns of Science, April 13, 1900, page 567, in a prophecy which may be paraphrased as follows:

We now turn to the northern hemisphere, to the Arctogaea or homeland area of animal dispersal in the dawn period of the mammalian life on the soil of the northern hemisphere. First, on opposite sides of the globe we observe two great colonies, one in Europe and one in the Rocky mountain region of America, which are full of different degrees of kindred in their mammalian life; yet they are separated by 10,000 miles of intervening land in which not a single similar form is found.

The fact that the same kinds of mammals and reptiles appear simultaneously in Europe and in the Rocky mountain region has long been considered strong evidence for the hypothesis that "the dispersal center is half-way between." In this dispersal center, during the close of the age of reptiles and the beginning of the age of mammals, there evolved the most remote ancestors of all the higher kinds of mammalian life which exist today, including, for example, the five-toed horses, which have not as yet been discovered in either Europe or America. That the very earliest horses known in either Europe or America are four-toed, indicates that their ancestors may have lost their fifth toe while still resident in the Asiatic homeland. The history of northern Asia remains unknown until the period of the ice age, when man first appears; yet theoretically we are certain that it was part of a board migration and dispersal belt which at one time linked together the colonies of France and Great Britain with those of the Rocky mountain region of Wyoming and Colorado. Though the kinds of animals which we find in these two far-distant colonies are essentially similar and every year's discovery increases the resemblance and diminishes the difference betwen the life of Europe and the life of the Rocky mountain region, connecting links are entirely unknown. It follows that northern Asia must be the unknown migration route between these two far-distant colonies.

All this was set forth in 1900. It was written with such confidence in the results of future explorations that all these various kinds of mammals were actually written down upon a chart, of which the readers of Asia will enjoy seeing a duplicate as a matter of scientific record. If the reader will observe closely the map on page 722, he will see that the home of the anthropoid apes is placed in southern Asia, in India—note the word Anthropoidea; but that the home of the more remote ancestors of man, Primates, is placed in northern Asia, where our expedition is now at work. Observe that four kinds of quadrupeds are placed in Africa, especially the elephant-mastodon family, or Proboscidea; and, as a most interesting verification of this kind of scientific prediction, the ancestors of the elephant family were actually discovered in northern Africa by the geological survey of Egypt, in 1902. But we have waited until 1922 to verify the prediction of the paleontologists as to the homeland life of northern Asia. This verification has come with unexpected suddenness and with a completeness beyond our fondest hopes, and there still remain four years in which the great expedition, under Roy Chapman Andrews, will fill out the details.

Professor Charles P. Berkey Tells of Early Spring in Mongolia.

"We have been out a month today and have covered 668 miles of reconnaissance. Now we are camped on the Bokuk Gol about 20 miles southwest of Urga. This is a great camp tonight—our 75 camels came in (caught up) tonight. These with our five motors and 26 men and seven tents make quite an imposing group on the Bokuk Gol valley side. It is very cold, and, with these heavy winds, it is very trying, but we have managed to work every day either in the field or on the road or on the notes. It was 17 degrees Fahrenheit this morning and we have had three snow storms within ten days. I am writing in a tent where I am writing in a tent where I am protected from the wind, but it is necessary to keep bundled up as if it were real winter—with leather vests, fur-lined coats and gloves and winter caps. I haven't had my heavy cap off, except the few times that I tried to wash my face, either day or night for ten days. We have come north fast and have, at the same time, climbed to an elevation of about 6000 feet; so perhaps we got ahead of the spring season. Fruit trees were in blossom when we left Pekin a month ago.

"But we are having a mighty good time. This rough life is a great recreation for me and it is agreeing with me in every way. My sleeping bag is one of the Peary stock that did service on north pole work; so when I get too cold, I go to bed. It is always comfortable.

"Our reconnaissance work is progressing very satisfactorily—better, indeed, than we had a right to expect to this point I take an aneroid reading every mile, and as much oftener as seems to be necessary, and sketch in the geologic structure in cross section. I now have a geologic section of 636 miles stretching entirely across the Gobi desert. We have found the country very different from what we were led to expect. Instead of being lost in the sand, we have found ourselves traveling on complex rock structure and across sedimentary basins of just the sort that we hoped to find. We have seldom had to go more than two or three miles in any doubt about our underground conditions. It has been great fun. As you know, I have a great liking for reconnaissance work and especially for structural interpretation. This has been an exceptional section and given all the problems any one could wish for. We have passed from ancient Precambrian rock of the most metamorphic history to comparatively recent beds of simple origin at least 15 times since leaving Kalgan. We have had faultings and warpings, domes and basins, galore. In addition, igneous exhibits of almost every kind from old, eroded, deep-seated granite bosses that now stand up in mountain form to little volcanic vents so recent that one can pick up scoria and bread crust bombs and cindery fragments that clog them.

"The next stop is to be 300 miles west. There will be some delay in Pekin because Dr. Henry Fairfield Osborn is to be there when we return, and we shall have to review our results with him and help plan out the work of the succeeding three or four years. I want to see the American museum take up real geological investigation in connection with some of the problems that come up in the course of the season, and the work I undertook will not be completed till that is carefully planned and organized. Then with the reconnaissance report perhaps my work on it will be ended."

Roy Chapman Andrews Reports the Discovery.

Mr. Andrews' letter of May 9, from Urga, is so dramatic that we may quote from it, with slight changes in phrasing:

"We left Kalgan on April 21. We got all the motorcars over the pass between China and Mongolia with no difficulty, although the pass has seldom been in worse condition. We ran for 250 miles, for the geologists were able to understand the main features rather easily. They began to make close observations at Kalgan, on the Chinese side, and carried their work right across the pass, describing and photographing every foot of the way. When we were half-way across Mongolia (between Kalgan and Urga) our attention was attracted by some interesting geologic exposures, and we stopped for camp. While we were preparing supper, Granger, Berkey and Morris (the three geologists of the party) began prospecting, and within a few yards of camp discovered some bones of dinosaurs. (This is the first discovery of giant reptiles, known as dinosaurs, in northern Asia.) The region promised to be so interesting that I left the geologists and Persenlu (a French mechanic) with all the food we had and pressed on with Colgate, our motor-car operator, and our photographers, Mr. Shackelford and Mrs. Andrews, toward Turin, 152 miles south of Urga, where we had planned to find our caravan.

"We reached Turin without a single accident and, as we approached the outskirts of this Mongolian town, we saw a large caravan and decided to camp. Then I suddenly recognized the American flag and realized that it was the caravan of the American museum expedition. It had been five weeks on the way from Kalgan and had just arrived one hour before us. Pretty fine connection for a 700-mile journey across the plains, was it not? We went over to the great rocky outcrop and pitched our tents. The caravan followed and reached our encampment one hour later. It was an inspiring sight as the 75 camels wound up from the plain with the American flag at the head. It made me realize, as nothing else had, that the third Asiatic expedition was really an accomplished fact; that all the long days and months of preparation in New York had resulted in this: it was a dream come true. Shackelford recorded in motion pictures the approach of the caravan from the moment the camels entered the rocky pass until they lined up in three long rows and kneeled to have their loads removed.

"The expedition corps is working perfectly. All the men are keen an enthusiastic, and the division into three units makes us all independent of one another, so far as work is concerned, whenever it is desirable. The motor cars are giving excellent service. The two trucks are far beyond our expectations, thanks to young Colgate's painstaking work on them in Peking.

"After spending three days in Turin, we came on to Urga, the capital of Mongolia, leaving the caravan at the camp. We struck a heavy snow storm but got through all right. We had been in Urga only a few days when a message from Walter Granger (fossil-hunter-in-chief) was brought to me, saying that the fossil locality near Turin had proved of immense importance. The dinosaurs were found to belong to the upper cretaceous period, the very close of the age of reptiles, and to be very similar in character to those of the Rocky Mountain region. On top of the dinosaur beds were discovered mammalian fossils belonging to the dawn period of mammalian life, the Eocene. Above this again were found fossils belonging to the lower Miocene, the middle period of mammalian life. Mingled with these were found remains of a giant mammal not found in either Europe or North America, but discovered some years ago in Baluchistan, southwestern India, and consequently known as Baluchitherium. This is the largest land mammal ever discovered."

We are thus able to announce from the third Asiatic expedition, under date of May 3, 1922, that strata of the closing age of reptiles overlain by two fossil-bearing strata of the earlier age of mammals have been discovered in the Gobi region of southeastern Mongolia. These are the first beds of this geologic age discovered in the northern part of the continent of Asia.

The best dinosaur-bearing beds of the upper division of the age of reptiles are in the vicinity of the small salt marsh, Iren Babusu, where a total thickness of about 150 feet of nearly horizontal strata is to be found. In these dinosaur-bearing beds there are at least two fossil bone-bearing levels in which the animals bear unmistakable resemblance to those found in the Rocky Mountain region of Wyoming, including two kinds of flesh-eating dinosaurs, remotely related to the famous Tyrannosaurus of the American museum; also to a smaller running dinosaur similar to the ostrich dinosaur (Struthiomimus) found in Wyoming and Montana. Mingled with these remains are dinosaurs known as the Iguanodonts (also abundantly represented in the beds of Montana and Wyoming), tall, two-legged herbivorous animals which ranged from southern England to the New Jersey coast of America. It is possible that these reptiles crossed via a north Atlantic land-bridge, but there is strong evidence against the existence of any kind of Atlantic land-bridge, such as the mythical Atlantis, during the age of mammals. The list also includes remains of crocodiles and of turtles, the affinities of which have not been determined. It is also discovered that the Gobi formation, a term applied by the Russian geologist, Obretcheff, is really a series of fossil-bearing beds, and not a single formation.

In the age of mammals two new series of beds are discovered, one of more recent and one of more remote geologic age. It is in the formed, named by our party the "Houldjin" beds, that there was found the enormous land mammal, probably related to a member of the odd-toed ungulates and possibly related to or identical with Baluchitherium, discovered by Forster Cooper in the fossil beds of Baluchistan, southern India. Also there are remains of fossil rhinoceroses, of large carnivores and of land tortoises of large size.

Still more important, because so closely linked with the Rocky Mountains, is the much older Irdin-Manha formation belonging to the dawn period of the age of mammals and lying right on top of the age of reptile beds. Here the keen eyes of Walter Granger, who has had 25 years' experience in the Rocky Mountain region, discovered the abundant remains of several kinds of small-hoofed mammals, closely similar to those found in the Rocky Mountain region near Fort Bridger, southwestern Wyoming. These animals are known as lophiodonts from their crested teeth. There are also remains of another family of odd-toed animals known as titanotheres, which were discovered by the American paleontologist, Joseph Leidy, in the Rocky Mountain region 56 years ago; also small, even-toed animals, ancestors of the ruminants.

These several discoveries are of epoch-making importance. The animals already found render it certain that we shall find more, that the discovery of ancestral four or five-toed horses, tapirs and rhinoceroses is simply a question of broader and more intensive exploration.

As described in the introduction of this paper, the discoveries already made of fossil reptiles and of fossil mammals of close European and of American relationship directly in the heart of Asia, constitute the fulfillment of one of the great objects of the expedition, namely, the establishment of the life-linking region between Europe and North America—discoveries most auspicious and encouraging. The splendid organization of the party, both in men and equipment, thanks to the liberality of its American sponsors and the inspiring leadership of Roy Chapman Andrews, encourages us in the hope that another of the main objects of the expedition will be realized, namely, that further light on the early history of man will also be forthcoming.

Strange Superstitions About Weddings.

Marriage being an ancient institution which vitally affects lives of men and women, it is not surprising that practically everything connected therewith has some superstitious belief or other associated with it. The majority of people believe that particular incidents, colors, days, flowers, etc., determine absolutely the weal or woe of the parties to a marriage. They avoid supposedly unlucky days for their weddings. They take pains to arrange everything so as to assure conjugal happiness and they worry themselves nearly to death if anything in connection with the ceremony takes an unpropitious turn.

If a bride marks her linen with the initials of her betrothed it is commonly believed that she will never have occasion to use it as his wife. It is regarded as very unlucky if her fiance sees her wearing any part of her trousseau before the day, or even the hour, set for the wedding ceremony. Only bad luck can be expected, many believe, if the bride makes her own wedding dress or if the making of the dress is begun before the day is named for the wedding.

Superstitious brides usually avoid velvet as a material for their wedding dresses, believing that it would be certain to bring them bad luck. Satin is favored because it is believed to assure good fortune. If one holds a wedding dress in the hands for five minutes and makes a wish the wish will "come true," many believe.

Brides are happy if the first flower they behold on their wedding day is white and unhappy if it is red; the white flower is supposed to augur happiness and the red unhappiness and care during the married life. If flowers are worn in the bride's hair, uncovered by a veil, she will be sorry she married. To leave her bouquet in the church and then turn back for it is considered equally portentous.

The girl who finds or snatches a flower from a bride's bouquet may expect an early marriage, while the one who dons a bridal veil or wreath in a spirit of fun will be an old maid, according to a popular belief. If the bridegroom appears with his tie awry it is a "sign" that he loves another girl and if a raveling is found on his clothes the supposition is that another woman loves him.

Many are convinced that the bride should not bake the wedding cake herself if she desires to avoid bad luck. She can be sure of good luck, they say, if she cuts the first slice of the cake. Any accident to the cake gives warning that the bride will experience sorrow in her early married life. If an unmarried girl carries a piece of wedding cake in her pocket during the honeymoon she will become a bride before the dress is worn out, 'tis said.