

PALEONTOLOGICAL INVESTIGATIONS IN THE 111 RANCH AREA

By

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Knechtel (1938) reported fossils from the 111 Ranch area about 16 miles southeast of Safford, Arizona, and from a study of the fauna determined the age of the assemblage to be Upper Pliocene. Knechtel states that the fauna is "not greatly separated" in time from the Blancan fauna of Texas but less advanced than the Hagerman fauna of Idaho. He also considered the 111 Ranch fauna to be older than the Arizona Curtis Ranch fauna but younger than the Benson fauna of Arizona. Lance (1958), on the basis of a more extensive fauna collected by University of Arizona field parties, assigned the sediments in the 111 Ranch area to Blancan and Early Irvingtonian time. During the summer of 1959 a number of additional genera were collected and the area was mapped in some detail.

Most of the 111 Ranch fauna has been identified to genera, and species determinations are currently being undertaken. The faunal list and stratigraphic section is given below.

| STRATIGRAPHIC UNIT | FAUNA |
|------------------------------|---|
| 11 Sand and Gravel | <u>Equus</u> , <u>Neochocerus</u> , Diatoms |
| 10 Limestone, chert and tuff | Camelidae |
| 9 Silt | Sciuridae <u>Lepus?</u> |
| 8 Silt, tuff | Microtinae <u>Sylvilagus?</u> |
| | Neotoma? <u>Equus</u> |
| | <u>Dipodomys</u> Antilocapridae |
| | <u>Reithrodontomys</u> Glypodontidae |
| | <u>Geomys</u> Mastodon |
| | <u>Sigmodon</u> Ground sloth |
| 7 Clay and silt | |
| 6 Limestone | <u>Testudo?</u> |
| 5 Silt | <u>Nannippus</u> , <u>Plesippus</u> , Camelidae |
| 4 Clay, silt | |
| 3 Limestone | |
| 2 Clay and silt | |
| 1 Tuff | Diatoms |

The vertical distribution of the horses indicated in the list above is the most informative factor for determining the time relationships of the section. No Nannippus or Plesippus have been found in place above the unit 5-6 contact. Equus has not been found below the unit 8 silt. Plesippus is generally considered to be a Blancan guide fossil and Nannippus is not considered to have extended past the Blancan (Wood et. al., 1941). The obvious conclusion is that the Blancan-post Blancan boundary must fall within units 6 or 7.

The remainder of the fauna listed above can not, at this time, be utilized for a definitive age determination within the Pleistocene. All the data available, however, supports the age determination deduced from the study of the horses. Glyptodon, Dipodomys, Geomys, Sigmodon, Neotoma, and Lepus have been found only in Blancan or younger beds (Wood et. al., 1941; Wilson, 1937; Hibbard, 1958). Reithrodontomys and Neochocerus have been found only in beds younger than Blancan (Hibbard 1958; Flint, 1957). The rodents and edentates alone indicate that unit 8 at the 111 Ranch is no older than Blancan and is probably post Blancan.

Flint (1957) places the Blancan-post Blancan boundary within Kansan time. On the basis of this time designation, much of the 111 Ranch section may be of Kansan age. It has been commonly thought that periods of continental glaciation and the

alternating interglacial intervals should be reflected in the sedimentary record of nonglaciated areas by alternating zones of valley fill and erosional surfaces. Since the stratigraphic section at the III Ranch shows no evidence of a prolonged erosional interval it may be argued that the entire section is of Kansan age. However, there is evidence that tectonics and vulcanism played a major roll in controlling the sedimentation in Southeastern Arizona and this may mask the climatic factors (Melton, this DIGEST).

The rodent quarry at the III Ranch contained at least eight genera of rodents and two genera of rabbits. Such a large accumulation of genera would not be expected to occur in such a restricted area today. Since rodents generally spend their lives within a rather restricted territory, in the magnitude of miles or less, it is probable that the fossils in the rodent quarry were transported for some distance. Because of the good preservation of the fossils it appears unlikely that they were transported any great distance by streams. It is also unlikely that the fossil accumulation represents forms which migrated through the area over long periods of time since the good preservation of the rodents and the fossilization of vertically standing plant stems indicate rapid burial. It is possible that the fossil accumulation represent fossil owl pellets. The rodent specimens, with few exceptions, were concentrated in pockets a foot or less in diameter. All these pockets were located in one zone which measured about one foot thick, 15 feet long and four feet wide. One such pocket contained over 40 jaws and skulls. The posterior parts of the skulls in every case are missing in the same manner as they are commonly missing in recent owl pellets because it is the habit of owls to kill their prey by crushing the posterior part of the skull. If the III Ranch fossil rodent fauna does represent a collection of fossil owl pellets, then the specimens may have been brought in from an area of perhaps 20 miles in diameter.

Gordon Bradshaw of the University of Arizona, Zoology Department, has kindly given me his unpublished data on approximately 300 owl pellets which were collected 3.7 miles south of Safford at an elevation of about 3000 feet. This locality is about 10 miles from the III Ranch. Bradshaw's list of rodent genera from the owl pellets is:

Sylvilagus
Thomomys
Neotoma
Dipodomys

Mus
Reithrodontomys
Perognathus
Sigmodon

Excluding Mus, which is a genus introduced by man, only two of the above genera are not represented in the fossil fauna, Thomomys and Perognathus. Four of the groups in the III Ranch fauna are not represented in the recent owl pellet fauna-Sciuridae, Microtinae (voles or lemmings), Geomys, and Lepus. However, two of these groups, Lepus and Sciuridae, are known to exist in the area today. The present westward limit of the range of Geomys is central New Mexico. The significance of the presence of Geomys in the III Ranch area in regard to paleo-environmental interpretations is not known. However, the presence of voles or lemmings in the fossil fauna is of considerable importance.

Voies or lemmings in the fossil fauna suggests a cooler and wetter climate than now occurs in the area. Lemmings are not present in Arizona today, the furthest that they extend south and west is into southern Kansas. Voies are present in Arizona today, a total of two genera and three species. However they all occur at high elevations; the lowest elevation where voies have been collected in Arizona, according to Hall and Kelson (1959), is 6300 feet in the case of one species in northern Arizona. Most of the elevations reported for Arizona voies are around 8000 feet. The elevation of the III Ranch is 3400 feet and the elevation is not over 4500 feet within a ten mile radius of the fossil locality. A difference of a minimum of about 2000 feet between the lowest reported recent vole occurrence and the fossil locality or a 4° latitude difference between the present southward limit of the lemmings and the fossil locality is indicative of a cooler climate during the time the Microtinae lived in this area, a minimum of 1° or 2° F. cooler or a maximum of 13° F. cooler.

Hall and Kelson (1959) report that the "environmental factors favoring Dipodomys

are (1) arid or semiarid climate, (2) proper drainage, (3) any combination of soil and climatic factors to provide an abundance of seed plants with light ground cover,⁴¹ Thus, while the presence of *Microtinae* suggests a cooler and wetter climate, the presence of *Dipodomys* indicates that the rainfall was not great enough to support tree growth. Perhaps the rainfall was a little below 20 inches per year.

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