

Preliminary Report  
on the  
Paleontology of the  
Livingston Reservoir Basin  
Texas

BOB H. SLAUGHTER

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# PRELIMINARY REPORT ON THE PALEONTOLOGY OF THE LIVINGSTON RESERVOIR BASIN, TEXAS

BOB H. SLAUGHTER\*

## INTRODUCTION

DURING THE WINTER of 1964-65 an area in Southeast Texas was prospected for paleontological localities worthy of salvage efforts before they are inundated by waters to be impounded by the Livingston Dam, which is to be constructed just west of Goodrich. The work was sponsored by the National Park Service (Southwest Region).

The Quaternary deposits of the Trinity River and its tributaries were mapped in detail and the bedrock geology was mapped in reconnaissance. Two Pleistocene terraces are recognized, both of which contain vertebrate fossils. In addition, the highest terrace contains freshwater and terrestrial mollusks, and the lower terrace has produced excellently preserved logs.

Fossil leaves and marine invertebrate and vertebrate fossils were recovered from Jackson rocks of Eocene age.

## METHODS

Areas where terrace flats are preserved were mapped, with topographic maps as a base. No complete sections were found exposed, but several outcrops proved adequate for description of terrace lithology. Samples from promising localities were quarried and returned to Southern Methodist University, where they were processed for the recovery of vertebrate microfossils and mollusks. The sections were measured at the better exposures and the outcrops recorded in color photographs for future reference.

\* Shuler Museum of Paleontology, Southern Methodist University.

## BEDROCK DEPOSITS

## EOCENE

At locality 1 (see map), over fifty feet of Jackson Formation are exposed. Several lignitic lenses occur, one of which is almost three feet thick. Plant fossils are available in these lenses, but preservation is inferior to those present at other localities.

A marine facies of the Jackson is exposed in the bed of White Rock Creek at locality 2. A two-hundred-pound sample was taken there, and a few invertebrate macrofossils were recovered from the outcrop. Identifications of these specimens are as follows:

|                               |                     |
|-------------------------------|---------------------|
|                               | Invertebrates       |
| Gastropods (snails)           | Pelecypods (clams)  |
| <i>Conus</i>                  | <i>Pinna</i>        |
| <i>Turritella</i>             | <i>Glycimeris</i>   |
|                               | <i>Venericardia</i> |
|                               | <i>Ostrea</i>       |
|                               | Myids               |
|                               | Corbulids           |
|                               | Vertebrates         |
| <i>Myliobatus</i> (Eagle Ray) |                     |

Other localities produce more and better-preserved material of the Jackson fauna.

Numerous plant remains were found in the Jackson at locality 20 near the juncture of White Rock and Caney creeks. One lens in particular contains perfectly preserved leaves. Samples were collected and sent to H. S. MacGinitie of the University of California. Dr. MacGinitie plans a visit to the site during the fall of 1965, and every effort will be made to recover more of this material.

## MIOCENE

The Catahoula Formation is exposed at localities 3, 4, and 15. The first two, which are bluffs of the river, produced no identifiable fossils. The third exposure is in a clay pit near the town of Riverside. This exposure (locality 15) produced specimens of Miocene wood, which have been sent to R. A. Scott of the U.S. Geological Survey for identification.

To date, we have been unable to locate a site near the town of Sebastopol where a surveyor is said to have found well-preserved leaves in the Catahoula.

A number of exposures of the Flemming Formation were found along the river, but thus far only three have produced identifiable fossils. Ganoid scales, probably belonging to garfish, were collected at locality 5, but because this site is accessible only by boat, no large samples have been processed. Locality 6 produced rhinoceros tooth and unidentifiable bone scrap of smaller mammals. Most of this material was in float, but a test trench should make it possible to locate the bed and thus provide a better evaluation of the quarry's possibilities.

Twenty feet of the Flemming is exposed at locality 14, which contains vertebrate microfossils. Two tons of the sediments have been collected and processed from this locality. The herpetological specimens recovered are being studied by J. Alan Holman of Illinois State University. Among the animals represented in this collection are crocodiles, a hylid frog, *Rana* (the second known occurrence of this frog genus in the American Miocene), and an extinct genus of salamander. Andreas Poulumpus, also of Illinois State University, is studying the fish remains from this site and reports garfish (*Lepisosteus*), drumfish (*Aplodinotus*), and a new species of ictalurid catfish. Additional material is needed for identification of a most interesting rodent which occurs infrequently in the collection.

## QUATERNARY DEPOSITS

Two Pleistocene alluvial terraces are recognized by topographic position, although their lithologies are so similar that they cannot be distinguished from one another on this basis. These are provisionally referred to as the T-2 terrace (highest) and T-1 terrace (lowest above the floodplain).

### SECOND TERRACE ABOVE THE FLOODPLAIN (T-2)

The T-2 terrace typically stands some seventy feet above normal stream grade and fifty feet above the present floodplain. The deposit varies in thickness because of the irregular surfaces

of the subjacent bedrock. Fifteen feet of this terrace are exposed at Alfred's Bluff (locality 1) where it overlays the Eocene (Jackson). It is predominantly of limonitic-stained cross-bedded sands capped by a four-foot soil mantle (A and B zones inclusive). A first phalanx of a horse of the size of *Equus fraternus* was collected from the base of the bluff. Presumably, it was weathered from the T-2 deposits of the bluff.

Although Jones Bluff at locality 6 is largely covered with colluvium, one slumped area produced a tooth and jaw fragments of a Columbian Mammoth. If future floods should clean the bank of its colluvial mask, it is probable that additional and perhaps more important specimens will be available.

The best section of the T-2 terrace is exposed at Red Bluff (locality 14). Here there are fifty feet of T-2 deposits capping twenty feet of Flemming. There is one foot of iron-stained gravel, the remainder being cross-bedded sands with occasional pebble lenses. The soil mantle is similar to that of locality 1. A portion of a mammoth humerus was found at the base of the bluff, and a broken vertebra of a small horse was found in place. Of primary importance, however, is the dark clay filling of a small feeder creek that crossed the Pleistocene floodplain. This contains tests of freshwater and terrestrial mollusks and a few fragments of vertebrate animals. Specimens in the following list were identified by Dr. E. P. Cheatum.

PRELIMINARY LIST OF T-2 MOLLUSKS

|                              |                             |
|------------------------------|-----------------------------|
| <i>Pupoides albilabris</i>   | <i>Strobalops texasiana</i> |
| <i>Vertigo ovata</i>         | <i>Hawaiiia miniscula</i>   |
| <i>Gastrocopta pellucida</i> | <i>Menetus dilatatus</i>    |
| <i>Gastrocopta contracta</i> | <i>Hordeacella</i> sp.      |

FIRST TERRACE ABOVE THE FLOODPLAIN (T-1)

Eroded remnants of the T-1 terrace covered by Recent floodplain deposits are exposed at localities 7, 8, 9, 10, and 13. No fossils were found at any of these localities. The T-1 terrace, when in full section, stands about fifty feet above normal stream grade and thirty feet above the floodplain. By far the best exposure of this terrace is at locality 21, where there are four feet of basal gravel,

the upper two feet of which are heavily indurated with iron compounds. Above this there are fifteen feet of coarse-bedded sands containing pebble lenses. This, like the T-2 deposits, is capped by a thick A and B soils zone of gray and brick-red color respectively. There is an oak stump rooted into the Flemming bedrock and covered with the basal gravel. Several logs within the gravel were also sampled. These specimens are being studied by Arthur Beyer of Midwestern University, and a report on their ecological and climatological inferences will be forthcoming. We are indebted to Mr. Owen Baker of Shell Development Company, Houston, Texas, for a radiocarbon analysis on a portion of this wood. This analysis indicated an age of 21,000 years before the present. We are fortunate to have the radiocarbon date and the additional information provided by the fossil trees from this locality, for it promises to be a major Pleistocene bone site. Already, two beautifully preserved skulls have been recovered: one tapir (*Tapirus*) and one ground sloth (*Megalonyx*). In addition, elephant, horse, and the giant tortoise, *Geochelone*, have been identified. These are not described here in detail, as they await a more comprehensive faunal report after additional work is done at the locality.

There are several gravel bars in the river which probably represent secondary deposits. On these, especially at locality 11, fossil bones and teeth of Pleistocene animals were found, but these doubtless are mixed from both the T-2 and T-1 terraces and therefore of little value.

#### FLOODPLAIN (T-0)

The present floodplain is mostly of cross-bedded, buff-sandy loam. There is no limonite staining as occurs in the cross-bedded sands of the Pleistocene terraces. Numerous mud banks and channel fills demonstrate that the river has changed course many times, even since alluviation of the valley has been essentially stable. No bones or artifacts were observed, and only in a few places were lenses of Recent mollusks seen. It is doubtful whether much of the alluvium is older than a few hundred years in deposition.

## CONCLUSIONS AND RECOMMENDATIONS

Of the three fossil-producing localities found in the Jackson Formation (Eocene), further work is recommended at only one—locality 20. Here, we propose to furnish Dr. MacGinitie a helper for approximately two weeks to recover more fossil plant material, both for Dr. MacGinitie's studies and for display material to be donated to area museums.

No future work is scheduled for the recovery of fossil wood from locality 15 in the Catahoula Formation of Miocene age, but occasional visits may be made in the course of other work in the basin.

Further efforts to locate the rumored Miocene-leaf locality in the Catahoula Formation should be made, since the fact that the flora of the Texas Gulf Coast Miocene is virtually unknown gives this potential locality unusual significance.

At least one additional ton from the Miocene Flemming at locality 5 should be quarried and processed for the possible recovery of vertebrate microfossils. Also, additional exploration at locality 6 where the rhinoceros tooth was collected would be desirable, since it might be hoped that a worthwhile quarry of large Miocene mammals would be found there.

Two additional weeks' work at locality 14 should expand the collections of Miocene microvertebrates sufficiently to allow completion of three separate papers on that fauna. Another week should also be spent collecting matrix from the T-2 channel fill in the hope not only of expanding the molluscan fauna, but also of recovering vertebrate microfossils for paleoclimatic interpretations and enough shell material for a radiocarbon age determination.

Plans are being made for a retired local resident, who is knowledgeable in the recognition and recovery of fossil bone material, to make daily reconnaissance of the dam excavation in order that the Shuler Museum may be alerted when the excavation encounters the T-1 bone deposit. Such arrangements should be continued for the duration of construction and possibly a short while thereafter, as the flume tube will direct spillway water onto the exposure of the bone bed.

Locality 22 is a rather large peat bed filling an old oxbow of

the Trinity River. It is about the level of the floodplain but very likely represents a channel of T-1 age. The peat deposit is estimated at 15 feet in thickness and could provide considerable information in the form of plant remains and radiocarbon dates. The Shuler Museum has arranged for corings of this bed, which are to be stored for future study in connection with the planned study of the history of the Trinity River. Peat beds of Pleistocene age are rare at this latitude and could add considerably to our knowledge of the climatic and botanical history of the area.

Examination of the dam construction plans shows that fresh sections up to 120 feet in thickness and over 4 miles in width of Miocene and possibly Pliocene clays and sands will be exposed in the course of the work. Since the damsite is adjacent to areas where a few more or less complete skeletons of Miocene mammals have been recovered in the past, the probability is great that good display-quality skeletons for the Houston and Dallas museums can be recovered. In addition, fresh sections of such thickness in an area with such high rainfall are unknown, and the description of these will be of extreme importance to the eventual working out in detail of the local stratigraphy necessary for proper evaluation of the faunas in continent-wide terms.

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#### LOCALITIES OF INTEREST

1. Good exposure of Jackson Formation capped by fifteen feet of T-2 terrace deposit.
2. Exposure of Jackson marine facies.
3. Exposure of Catahoula Formation (Miocene age).
4. Exposure of Catahoula Formation.
5. Exposure of Flemming Miocene and T-2 terrace.
6. Exposure of T-2 terrace and Flemming.



7. Eroded T-1 terrace capped by Recent deposits.
8. Flemming Miocene and T-1 terrace deposit.
9. T-1 terrace remnant capped by Recent sediments.
10. T-1 terrace and Recent sediments.
11. Gravel bar—probably secondary.
12. Flemming exposure.
13. Flemming with T-1 capping.
14. Red Bluff; Flemming Miocene and T-2 terrace deposits.
15. Catahoula Formation.
16. T-1 terrace and Recent.
17. T-1 terrace remnant.
18. Flemming.
19. Flemming and T-2 terrace deposits.
20. Jackson Eocene.
21. Good exposure of T-1 terrace.
22. Pleistocene or sub-Recent peat bog.