Paleontological Importance of the Cooper Reservoir Basin, Texas Cretaceous and Tertiary

J. D. Powell

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PALEONTOLOGY

COOPER RESERVOIR PROJECTS

THE AREA WITHIN THE NON-MEMBERSHIP REGIONS OF THE
South Sulphur and Lakemont reservoirs, in Bell and Lampasas counties, Texas, and within the vicinity of the Shuler property,
ridge of the Shuler property of the Shuler property,
and the vicinity of the Shuler property, was chosen as the area
Quaternary deposits for the purpose of collecting fossils which
are likely to be found in this area.

The results of this study are presented in the accompanying
addition to the accompaniments.

Various geological and paleontological efforts in Eastern Texas, as well as the
mentioned projects at the South Sulphur and
Delta and Houston reservoirs, lend
this apparent interest in the Quaternary stratigraphic rocks
in the area. The studies of the Trinity River counties of the
rock units in eastern Texas have produced some important results for the Navarro county

* Arlington State University, Department of Geology, State of the Shuler...
PALEONTOLOGICAL IMPORTANCE OF THE
COOPER RESERVOIR BASIN, TEXAS:
CRETACEOUS AND TERTIARY

J. D. POWELL

INTRODUCTION

The area within the proposed Cooper Reservoir lies along the
South Sulphur River in southern Delta and northern Hopkins
counties, Texas. During July, 1965, the writer, under the patron-
age of the Shuler Museum of Paleontology, Southern Methodist
University, conducted a geologic survey of the area. The purpose
of this survey was to examine and identify bedrock (exclusive of
Quaternary deposits) beneath the proposed reservoir and to col-
lect fossils wherever found.

The results of the study are to be used in planning and execut-
ing additional work during the actual building of the reservoir and
the accompanying dam (see map).

PREVIOUS INVESTIGATIONS

Various geologists, mostly those who contributed pioneer
efforts in East Texas—E. T. Dumble, R. T. Hill, L. W. Stephenson
—mentioned the late Cretaceous and early Tertiary bedrock of
Delta and Hopkins counties only by implication. Their reason for
this apparent slighting of the area was lack of exposure of the
stratigraphic units. Hunt County to the west and Lamar and Red
River counties to the north and east contain good outcrops of the
rock units in question. A few localities (Stephenson, 1941, p. 10)
produced some macro-invertebrate fossils from the lower part of
the Navarro clays. No trace of the exposures exists today because

* Arlington State College. The work was done by Dr. Powell as a Research Associ-
 ate of the Shuler Museum of Paleontology, Southern Methodist University.
of colluvium and soil and vegetation cover. Many of these localities (those north of Cooper) are outside the area of investigation; others are now hidden because of changes in stream courses.

Recent investigations of the Cooper area include those by the U.S. Army Corps of Engineers, who have made excellent maps of the proposed reservoir area, damsite, etc. These maps were especially valuable to the writer in his investigation of the extent of excavation of the damsite and the proposed lake level. Bob H. Slaughter (1964) of the Shuler Museum of Paleontology, Southern Methodist University, conducted an appraisal of the paleontological resources of the area with major emphasis on Quaternary river terrace deposits. The present study was conducted after Slaughter's preliminary work revealed the need for it.

METHODS

The accompanying map (pp. 6-7) is an adaptation and modification of the general county highway map of Delta and Hopkins counties prepared by the Texas Highway Department, edition of 1957 (revised to 1964). Air photos of approximately the same scale as that of the map (1" = 1 mile) and photos of a scale 1" = 660' were consulted in prospecting for outcrops of Cretaceous and Tertiary bedrock exposures.

All of the county roads and many others in the proposed reservoir areas were covered by the writer in his prospecting. Many of the streams were walked, a procedure which provided good areal coverage. Significant outcrops, faults, and other localities are shown on map.

Collection of fossils and matrix was done with the aid of a hand soil auger.

STRATIGRAPHY

As was previously reported (Slaughter, 1964, p. 4), the reservoir area is underlain by the following stratigraphic units:

Tertiary System:

Wills Point Fm.
Midway Group
Kincaid Fm.

COOPER REGION

Cretaceous:

Navarro Group

The accompanying map (pp. 9-10) shows the distribution of the above-mentioned localities and areas of outcrops. The map reveals the need for additional mapping and observations.

Exposures of the reservoir area were limited to scattered areas of outcrop. However, the writer was located only three localities of the Navarro Group outcrop.

Clays referred to as Cooper and associated with Cooper and similar rocks were not mapped.

The latter exposures were located on the maps. Those exposures were important from the knowledge and associated activity.

Others mapped were inferred. Some of the spots indicated on the map show the presence of these areas referred to as Cooper clays.

The present study was conducted after Slaughter's preliminary work revealed the need for it. The writer was not able to get access for detailed surveys of the reservoir area along the northing of Hopkins County and south of Delta County and was not able to make detailed surveys of the vicinity or irregular calcarious clays.
COOPER RESERVOIR BASIN: PALEONTOLOGICAL IMPORTANCE

Cretaceous:

Navarro Group

Kemp Clay

Nacatoch Fm.

Neylandville Clay

The accompanying map (pp. 6-7) shows the probable areal distribution of the above rock units in the reservoir area. Certain localities are numbered and given special attention below.

Exposures of all the rock units in the area are poor. Most of the areas of outcrop shown on the map are covered by soil and were located only through the use of high altitude aerial photographs.

Navarro Group. The Navarro Group in this area is known only from scattered exposures in gullies or road ditches. The Corsicana marl of the Navarro Group (Slaughter, 1964, p. 4) was not recognized, probably because of facies change.

Clays referred to the Neylandville are exposed just north of Cooper and southwest of that town in ditches along county roads. The latter exposures are badly weathered and no fossils remain. Those exposures north of Cooper (locality 3) are sufficiently distant from the proposed reservoir not to be disturbed by any associated activity. No other exposures of the Neylandville were seen. Others mapped but not marked by a locality number (see map) were inferred from air photographs, and field checking of those spots indicated no significant exposures. Hand-auger holes in these areas revealed nothing but reworked and extremely weathered clays.

The presence of the Nacatoch Formation is inferred from occurrences of sand in soils and stratigraphic position. The writer was not able to find any exposure of definite Nacatoch. Some concretions of calcareous gray sandstone occurring as float are probably referable to the Nacatoch.

The Kemp Clay is by far the most conspicuously exposed formation of the Navarro Group in the reservoir area. It crops out along the north slope of Hurricane Ridge in northern Hopkins County and south of the South Sulphur River. Here a few gullies and road ditches expose fairly fresh fossiliferous clay containing irregular calcareous septarian concretions. The concretions are
not known to contain fossils. The enclosing clays, however, are richly fossiliferous, containing a few fragments of molluscs and a distinctive microfauna of foraminifers and ostracods, some of which are listed below.

Foraminiferida:
- *Haplophragmoides* sp. aff. *H. excavata* Cushman & Waters
- *Nodosaria affinis* Reuss
- *Vaginulina cretacea* Plummer
- *Anomalina* sp.

Ostracoda:
- *Alatacythere* spp.
- *Cytherea* acutocaudata Alexander
- *Cytherea huntensis* Alexander
- *Cytheridea* sp.

The clays of the Kemp were nowhere found to be glauconitic or phosphatic. Distinctive white nodules up to 1 cm. in diameter (probably, in part, the clay mineral alunite) occur close to the top of the Kemp near the proposed dam site (locality 5).

Laboratory work on rock samples and phosphatic nodules indicates a possible alternative conclusion regarding the Navarro as mapped (Kn) in the vicinity of localities 1, 2, and 6. Here the (Kn), instead of being Kemp clays as expected, may prove to be Neylandville that has been faulted up against the Midway. The writer has not yet found any way to measure the throw on the faults. The possibility that the Nacatoch is faulted out in the dam site excavation is also suggested by the same evidence. These alternatives are expressed here so that they may be checked during the actual excavation of the dam site.

Midway Group. The Midway Group is known only from the southern side of the proposed reservoir, along the crest of Hurricane Ridge in Hopkins County. Exposures are poor and scattered, occurring mostly in the road ditches and gullies.

Faulting drops the Midway rocks into juxtaposition with the upper Navarro clays along Hurricane Ridge. In some cases this faulting may be the cause of Hurricane Ridge through the formation of a reverse fault-line scarp. This faulting will probably be important to further investigation of bedrock in the damsite area.

The lower formation of the Midway Group, the Kincaid, is not

COOPER RIVER

known to be very different from the common NAVARRO. It is commonly occurring gravel clay with scattered silt, but it contains hard, irregular lenses of gray sandstone, often cemented. These small white tracts are often seen in the road cuts. They are found in cavities in the solid sandstone in the Littig Member. They are also found in most places that cemented sandstone, and may be observed only in their true nature in the areas that dam the sandstone. The sandstone is inhabited and activities associated with it are almost always seen in the cover fresh Littig sandstone and debris.

Above the point where this occurs is the Wills Point Member of the Peerless (locality 7) and it is a D1.3 sandstone of a very thin sand and a silty micaceous sandstone. It is a sandstone with some argillaceous concretions. No dikes have been seen in the reservoir area.

**RICHARD H. MILLER**

One of the unique features of this area is the presence of high missionary, macro-invertebrates. The Midway Group is known to be a good reservoir for many of the species found in this area. It is also found to be deformed by faulting throughout its areal extent. Very little information is available on the stratigraphy of the Midway Group, and it is considered significant that many of the exposed beds are considered significant for study.

Another rock unit of interest is the basal Kincaid Member. This member is known to be a source of sand and debris. These materials are important in the reservoir and should be closely studied. It is also possible that any exposed beds are significant for study.

Finally, it is...
known to be well exposed in the Cooper area. Phosphatic nodules commonly occur in other areas at the base of the Kincaid. These are dark, irregular sideritic phosphates of iron, commonly with small white traces of borings and coatings of glauconite pellets. These same nodules occur at localities 2 and 4, where they can be seen in the road ditches. These nodules, along with matrix found in cavities in the nodules, are typical of the rock types found in the Littig Member of the Kincaid Formation to the southwest. In most places the Littig is a highly glauconitic, phosphatic sandstone, and marl containing abundant fish remains. The writer believes that damsite excavations in the vicinity of locality 5 and other activities associated with the construction of the reservoir will uncover fresh Littig phosphates containing abundant fossil fish debris.

Above the Kincaid Formation lies the Wills Point Formation. The Wills Point is best exposed in the west road ditch just north of Peerless (locality 6) in Hopkins County. Here the formation is a silty micaceous shale, containing lignite-bearing calcareous silty concretions. No fossils have been found in the Wills Point in the reservoir area.

RESULTS AND RECOMMENDATIONS

One of the primary purposes of the present study was to collect macro-invertebrates from Stevenson's (1941) localities in the Navarro Group that might be covered by lake water or damaged by construction activities. These localities were visited but were found to be deeply buried by recent fill and soil. Further prospecting throughout the proposed reservoir area produced much of the information set forth earlier in this report. In view of the shortage of good exposures of the Cretaceous and Tertiary bedrock, the collections of microfauna and matrix from these localities is considered significant.

Another result of this study was the possible location of good basal Kincaid phosphatic zones for collection of fossil vertebrate debris. These localities are well marked on the accompanying map and should be observed periodically during the construction so that any exposed fossils can be collected.

Finally, investigations around the proposed damsite exca-
vations reveal that part of the Kincaid Formation (Midway Group), all of the Kemp Clay, and probably the Nacatoch and upper Neylandville formations of the Navarro Group will be exposed during the operations. The Kemp is known from the present work to be highly fossiliferous. The other units mentioned will probably contain good fossils when finally uncovered, especially the Nacatoch, if it is not faulted out.

The absence of good quantities of macrofossils in the reservoir area is due to lack of exposure of the bedrock. This fact reinforces the proposals of Slaughter (1964, p. 10), who suggested that the damsite excavation be observed closely during construction so that no rich deposits of fossils be missed. The present writer feels that fossil occurrences in the damsite area will be locally rich but well scattered and that constant surveillance of the site will not be necessary. Also, the matrix of the formations to be exposed is mostly clay, and therefore less effort will be required in removing any good material.

LITERATURE CITED

STEPHENSON, L. W., 1941, The larger invertebrate fossils of the Navarro Group of Texas: Univ. of Texas Pub. 4101.