

THE UNIVERSITY OF TEXAS  
Bureau of Economic Geology

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THE FOURTH QUARTERLY REPORT  
Covering the Quarter Ending March 31, 1940  
For  
THE STATE-WIDE PALEONTOLOGIC-MINERALOGIC SURVEY  
In Texas

A FEDERAL WORKS AGENCY  
WORK PROJECTS ADMINISTRATION PROJECT  
1940



FOURTH QUARTERLY REPORT FOR THE  
STATE-WIDE PALEONTOLOGIC-MINERALOGIC SURVEY  
COVERING THE MONTHS OF JANUARY, FEBRUARY, AND MARCH

This report covers the activity of the various units of the Paleontologic-Mineralogic Survey of Texas for the first quarter of 1940. The results obtained by the several field units were very satisfactory considering the severity of the winter weather experienced over most of the state. Some working time was lost on all of the units due to rain and extreme cold, but in practically all cases the supervisors were able to make up the lost time. The camp unit engaged in excavating the Odessa Meteorite Crater experienced the greatest difficulties. This camp is on the southern plains, and is exposed to the full force of the north winds. The laboratory unit fared best during the winter.

During this period the two units operating in Lamar and Zavala counties were suspended, and an additional unit was started in Fannin County.



WORK PROJECT NO. 12510

This field unit, which has been operating since the beginning of the Paleontologic-Mineralogic Project, is still active in Bee County, Texas. During the first quarter of 1940 the unit employed an average of 15 certified workers and 1 non-certified worker. The work has been carried on at various sites along the Blanco and Medio creeks in the eastern part of the county.

Site 1, the largest excavation opened to date by the Bee County unit, has been completed. Numerous additional fossils from the Pliocene horizon and from the Pleistocene terrace were obtained. This site has yielded a very large number of vertebrate fossils, particularly from the Pliocene horizon. A total of 15 skulls and 19 lower jaws of the shovel-jawed mastodon have been recovered as well as large numbers of other skeletal parts. In addition to the mastodons, important collections have been made of horse, camel, and deer. When completed, this excavation was 400 feet long and 60 feet wide, with a maximum depth of around 23 or 24 feet.

After the completion of Site 1, intensive reconnaissance was carried on to explore the Pleistocene terrace horizon along the entire course of the Blanco Creek. Downstream from Site 1, some 10 or 12 prospective localities have been located in addition to those sites in which preliminary excavations have already been made. It is considered important that as much work as possible be done on the fauna of this stream terrace since it occupies a geological position about which too little is known. At this time work is being carried on to trace the stratigraphic position of the terrace and to determine its equivalency in the Coastal Plain formations. In connection with this work a complete fauna from the terrace will have great importance in helping to solve the problem. The work that



has already been done has demonstrated that a great number and a considerable variety of animals were living on the Coastal Plain of Texas during the late Pleistocene period, when the stream terrace was deposited. Other units which have been operated by this project, and units which are still operating, are recovering fossils from beds of the same or nearly the same age. If continued recovery from the Bee County unit and the other units collecting from the Pleistocene beds is as good as can be reasonably expected, enough material will be obtained to permit a paleontological correlation of the Pleistocene of the various geographic divisions of the state.



WORK PROJECT NO. 12592

This field unit which began operations in San Patricio County during the last quarter of 1939 continued working at the same site throughout the first quarter of 1940. During the first quarter of 1940 an average of 12 certified and 1 non-certified workers was employed. The headquarters of the project is at Aransas Pass, Texas.

During the 3 month period covering this report the entire working time was spent in excavating in the Tedford caliche pit approximately 1 mile east of Inglesides. During this quarter well over a thousand individual specimens of vertebrate fossils have been recovered. More than 30 species of animals are represented from the large collections that have already been made. Many of these specimens are in excellent state of preservation, and are easily identified as to genus and species.

The turtles which are represented by numerous fragments and a few complete plastrons and carapaces continued to be the most abundant faunal element. Next in abundance are the Proboscidea, including Mastodon americanus and Elephas columbi. As yet no complete proboscidean skull has been found although several hundred bones and teeth of these animals have been recovered in good condition. It is to be hoped that one or more good skulls will be recovered before the work at the Tedford pit is completed. The Carnivora, including Canis, Panthera, Felis, and Smilodon continue to make up a large percentage of the fauna. Some very important fossils of the Perissodactyla, particularly of Equus, have been recovered. Also a few jaws and other bones of Tapirus, a rather rare North American Pleistocene form, have been found.

Many of the fossils that have been recovered from the Tedford pit have not yet been removed from their plaster cast. Consequently, some time



will be required before any complete faunal list can be made. However, enough material has been prepared to demonstrate that the Tedford caliche pit is one of the most important Pleistocene fossil localities in North America. This locality should be worked until a complete fauna is obtained, or until all of the fossils have been recovered. There are very few places where such a large variety of well preserved fossils can be found.



WORK PROJECT NO. 13107

This unit of the State-Wide Paleontological Survey is located at Abilene, Taylor County, Texas. An average of 17 certified workers and 1 non-certified worker was employed during the first quarter.

This project operated during January of this year at Sites 5 and 9 on the John Guitar estate located 1 mile east and  $\frac{1}{2}$  mile south of the Abilene Municipal Airport. Site 5 is in a Pleistocene valley fill. The specimens recovered from this locality were found in very poor condition. A number of fossils were found which were too badly decomposed to be worth preserving. The collected material included a scapula, vertebra, rib, and tusk of elephant.

Site 9 is in the arroya group of the Clear Fork Permian. This site yielded an abundance of fossil leaf impressions, some of which were in an excellent state of preservation. Some 10 or 12 different varieties of plant leaves and fronds were found. Most of the fossil plants came out of a blue shale which has a tendency to crack and crumble when drying. Consequently the plants are difficult to preserve except in small slabs which are treated to prevent the shale from breaking.

During February and March the project operated at Site 7 on the Sid McAdams farm. This site is located 9 miles south and  $\frac{1}{4}$  mile east of the Ovalo school house. This site is also in the Permian rocks at about the same horizon as Site 9. From Site 7, forty-two blocks containing skeletal parts of pelecosaurs and fishes were recovered. One block was collected which appears to contain a nearly complete skeleton of Dimetrodon. If this specimen proves to be as good as it appeared in the field, it will make an interesting and important mounted specimen.



In addition to the collecting at Sites 5, 9, and 7, some reconnaissance work was done in various places along the outcrop of the lower Clear Fork shale beds. Several possible fossil localities were located but only preliminary excavations have been made so far, and the worth of the sites has not yet been determined.



WORK PROJECT NO. 13129

This field unit of the Paleontological Survey has its headquarters at Corsicana, Navarro County, Texas. An average of 10 certified workers and 1 non-certified worker was employed. During the first two months of this period work was carried on at the Valley Farms locality, 20 miles northeast of Corsicana and the third month was spent in excavating at the Crawford gravel pit 25 miles southeast of Corsicana.

The Valley Farms locality is in a Pleistocene terrace of the Trinity River. At this place 5 pits were dug through the sands and gravel to the bedrock level. Most of the fossils found at this site were in fragmentary condition and were so scattered that a proportional large amount of overburden had to be removed for each fossil recovered. The fauna of this pit as represented by the fossils collected includes elephant, horse, bison, camel, deer, and ground sloth. This pit was abandoned on March 8 because of the excessive amount of overburden in proportion to the number and quality of the fossils recovered.

The Crawford gravel pit is located in the same terrace as the Valley Farms site. Like the Valley Farms site, this locality yielded mostly fragmentary fossils which were widely scattered throughout the gravel deposit. From the fossils collected at the Crawford pit, the following have been recognized: mastodon, elephant, horse, and turtle.

In addition to the excavation at the sites mentioned above, reconnaissance was carried on in various parts of the county. Some potential fossil localities were discovered, but none of these places appear very promising. Unless future work develops some site of more importance than any of those previously worked, it is doubtful whether the Corsicana field unit will continue to operate for more than a short period in the next quarter year.



WORK PROJECT NO. 13352

During the quarter covering the months of January, February, and March, there has been an average of 14 certified and 1 non-certified worker employed on this project. The project base is established at Big Spring, Howard County, Texas. This has been by far the most successful quarter in which this unit has operated. Over 1500 specimens have been collected from one quarry which will be discussed in detail in later paragraphs.

The principle quarry is known as Quarry No. 1. It is located 4 miles north and east of Otis Chalk, Howard County, Texas, in the north-east corner of the four-section west pasture of the ranch of Mrs. Robert Hyman. By road it is 30 miles southeast of Big Spring, Texas. The quarry is in the Dockum formation of the upper Triassic, a hard red and brown clay with occasional interfingerings of streaks and lentils of turquoise-colored sandy clay.

Quarry No. 1 has been worked continuously since the first of January. The working length of the quarry is now well over one hundred feet. The potential length or face of the quarry has not yet been determined. The quarry is located on the south side of a large hill which slopes, steeply in places, to the south. The floor of the quarry, which follows a bedding plane, dips at a considerable angle into the hill from the front and sides of the quarry, possibly indicating an ancient local pond. The amount of overhead which must be removed before exposing the bone layer now varies from fifteen feet in the middle of the quarry to three feet on the edges.

Specimens recovered from Quarry No. 1 include the following:

20 jaws, 6 maxillaries, 15 scapulae, 69 pelvi, 41 humeri, 43 femora, 2 radii, 24 ulnae, 17 tibiae, 4 fibulae, 37 leg bones not specifically designated, 77 ribs, mostly partial; 43 distal phalanges, uncounted numbers of toe bones,



731 vertebrae, 1 partial skeleton in plaster cast, and 12 or 15 plaster casts of miscellaneous blocks of bones. To date the fauna has resisted all efforts at identification, and beyond the statement that probably all the fauna is at least rare or mostly undescribed, nothing can be said. The fauna appears to represent at least five distinct forms. It is not determined yet whether this difference is of specific, generic, or possibly of family designation. Some Phytosaur and Amphibian material has been found, but the greater part appears to belong to the peculiar small jaws and maxillaries. A few of the limb elements are clearly referable to a form distinct from those indicated by the jaws.

Extensive work has not yet been started in Quarry No. 2, which is situated about 100 yards east of Quarry No. 1, but is about 20 feet lower stratigraphically, though geologically and lithologically it is the same. The fauna collected here consists of five or six plastered blocks which contain partially articulated legs and vertebrae. Three jaws have been found here which appear to be identical with those from Quarry No. 1, but are about  $1/3$  as large. The skeletal material is correspondingly small, and appears to indicate a distinct species from that found in the other quarry.

A few days have been spent in opening Quarry No. 3, located 1 mile south of Quarry No. 1. This quarry appears to be at the same horizon as Quarry No. 1. The left side of a Phytosaur skull was collected here as well as a number of Phytosaur and Desmotosuchus plates.

The work has been so concentrated on the quarries that no reconnaissance has been done during this quarter. However, there is a large area of unexplored territory both to the north and east of the present work sites and there is no reason to believe that this region will not be as prolific as that area which has been worked.



At present it appears that at least another three or four months will be required to exhaust Quarry No. 1. Two or three months at the least can be spent in working Quarries 2 and 3, unless still more promising sites should be found in the unexplored regions.



WORK PROJECT NO. 13602

An average of 43 certified and 2 non-certified workers was employed during this quarter. The headquarters for this project is located at the crater site, 9 miles west of Odessa, Texas

During the first quarter of 1940 the preliminary work done by the camping unit, which is engaged in excavating the Odessa Meteorite Crater, was to extend the earlier excavations further around the periphery of the crater. About one-half of the total work necessary to expose the rock beds on the crater's rim has been completed at this time. At several places the limestone beds making up the crater rim are standing above the crater fill. These places have been comparatively easy to expose, but at other points around the rim the bedrock is covered by as much as 8 or 10 feet of detritus, which has accumulated within the crater. These low places require a great deal of excavation and consequently a considerable period of time to expose. It has been found that one rock bed can be used as a definite marker because it is composed almost entirely of gryphaeas and other fossil shells. If this bed can be exposed all the way around the crater, it can be used as a definite horizon marker from which to make a structural map to show the extent of displacement in the rock beds caused by the falling meteorite. It is hoped that before the project is completed, test holes can be made some distance away from the crater where the rock beds are still in their original position, in order that the actual depth of the shell bed can be ascertained in the places that were not displaced by the meteorite. If this can be done it will be possible to learn the extent of the uptilting resulting from the meteorite impact.

In addition to the work on the crater rim, some fifteen new test holes have been made within the crater proper. These test holes are sunk



through the detritus which has filled the crater in order to determine the thickness of the fill at all points within the crater. From the data obtained by these test holes it will be possible to make a contour map and a model of the crater which will give a true or nearly true picture of the crater as it originally existed. From trenches dug along the edge of the crater where the fill is shallow, it has been found that in some places boulders and other rock detritus lying along the slopes of the crater walls have been recemented by caliche, and that this recemented material is too hard for the hand drill to penetrate. Since this condition of recementation probably carries to the very bottom of the crater, and since the detritus which was recemented was probably resting at the angle of repose on the crater walls, the subsurface contour map of the crater will not be absolutely accurate but will nevertheless be accurate enough to give a very good picture of the crater as it first appeared.

No detailed search has been made as yet for the meteorite fragments which are distributed in and below the soil level for some distance around the crater. Since the collection of these fragments is not the primary purpose of the work, this phase will be postponed until a satisfactory geophysical machine can be developed for the purpose of locating the fragments buried beneath the soil. If an accurate method of locating the various fragments can be developed, it will be possible to make a distribution chart showing the area affected by the meteorite fall. As stated in the previous Quarterly Report, it has already been demonstrated that fragments of considerable size have been found up to one-half mile from the edge of the crater. How much beyond this point the meteor fragments extend remains to be determined. One problem that may be solved by the location and collection of the scattered fragments is to determine



whether the fragments fell as a shower along with the main mass which created the large crater, or whether they were thrown off the main mass at the instant of impact by a crustal explosion. Since it is known that large meteorite fragments will bury themselves to a greater depth than smaller fragments in earth of uniform consistency, the depth at which the fragments are found and a consideration of their size will give helpful information as to the topography that existed in the area covered by the fall. In the excavations along the crater rim, numerous small fragments of the meteoric iron have been found. However, most of these fragments have decomposed into iron shale, a rusty residue of the original crystalline iron.

Some of the important items of information which are hoped to be revealed by the excavations near Odessa are: (1) What effects are produced upon the earth by the impact of a large meteorite. (2) To determine the size or approximate size of a meteoric mass, and the total depth which it penetrated the earth. (3) To determine the distribution pattern of the various meteorite fragments which were either hurled from the main mass by crustal explosion at the instant of impact with the earth, or which were falling as a shower of fragments accompanying the main body. (4) To ascertain the thickness and kind of rocks penetrated by the main mass and the nature and extent of any distortion, fracturing, or metamorphism that took place as a result of the meteorite impact. (5) To determine the time or the approximate time when the meteorite fell to the earth. (6) To ascertain what changes have taken place in the immediate landscape as a result of the meteorite striking the earth and what changes have taken place by normal erosion since the time of the fall.

Data resulting from the work that has already been done serves to answer in part some of the above problems, but a great deal of work remains to be done before the interesting and important history of the Odessa Meteorite Crater can be completed.



WORK PROJECTS NO. 13721 AND 15348

During the quarter ending March 31, 1940, an average of 10 certified and 1 non-certified workers was employed on the Lamar County unit of the State-Wide Paleontological Survey. The base of operations remained in Paris, Texas, the county seat and approximate geographical center of the county. The project operated smoothly and with general success until completing its work and terminating operations in Lamar County on March 20. Three sites were worked during this period.

The first site is 1.4 miles east of the Chicota post office on the north side of the Chicota-Arthur City highway. Three weeks were spent here, during which time pits were opened at three different levels. No specimens of importance were collected, although it was reported that fossilized fish had previously been found at the locality. Several invertebrate forms were found, a species of *Ostrea* probably being dominant.

The second site was 2.1 miles west and 0.5 mile south of the town of Atlas. This excavation was in a limestone of Lower Taylor age, which is an eastern extension of the Gober Chalk. Considerable *Mosasaur* material had been found in this pit when rock for paving had been quarried at a previous time. After spending two weeks here, and no results were obtained, the pit was abandoned.

The third and last location was 0.6 mile north and 0.5 mile east of the Roxton post office. The formation excavated here was equivalent to the one worked in the second site, being the eastward extension of the Gober Chalk of the lower Taylor into Lamar County. The chalk here is somewhat sandy and contains considerable iron. It is also cross bedded and shows evidence of being deposited on a shallow bar or beach. Six weeks were



spent in working this locality. This time was devoted mainly to collecting fossilized fish and lobsters which occurred in ferruginous concretions. Eight of these concretions were recovered without breaking them. Five were broken, two containing crustaceans of the lobster type and three containing fish of the Order Teleostei.

In addition to excavating at the three sites, some reconnaissance was done in various parts of the county. Also mapping of the outcrop of the fish-bearing bed was completed.

On March 21 the field unit No. 15348 began operations from a project base in Bonham, Texas. Ten certified and 1 non-certified workers were employed on this project.

The first site to be worked in Fannin County is the Savoy rock pit in the southwestern part of the county. This site is in the basal portion of the Austin Chalk and is known to contain fossil fish in some abundance as well as a few bones of the swimming Cretaceous reptiles.

Since only a few days were worked by this unit during the period covered by this report, and since the collection of fossil fish from limestone rock is slow and tedious work, very little material was recovered. However, 2 or 3 fish or partial fish were located and collected. Some time will be required before these specimens can be cleaned and prepared in the Austin Laboratory, so it is not yet definitely known what state of preservation these fossils are in.

It is contemplated that the next quarter year or more will be required to obtain a good collection of the fossil fish from the Savoy rock pit. As yet, no sufficient reconnaissance of Fannin County has been made, so it is not yet known whether other localities in the county are worth excavating.



WORK PROJECT NO. 13815

This field unit which is located at Aspermont, Stonewall County, Texas, employed an average of 11 certified and 1 non-certified workers through the first quarter of 1940. Ten different fossil localities were excavated in an exploratory way. A part of these localities proved unimportant because the fossils were either too scattered or too fragmentary to warrant an extended excavation, but some of the sites proved to contain a valuable Pleistocene vertebrate form.

Site 6, which is located 7.5 miles north of Swenson, is in a high terrace of the Brazos River. In these Pleistocene gravels a number of fossils including elephant, horse, and camel were recovered. The excavation was carried to a depth of approximately 15 feet and to a width along the outcrop of 50 or 60 feet. Sites 7, 8, 9, and 10 were all within one mile of Site 6 and within the same Pleistocene terrace. These pits yielded numerous skeletal elements of elephant, bison, horse, sloth, and camel. Most of the fossils collected were broken but the individual fragments were well preserved and easily collected.

The work done by the Stonewall County field unit during this quarter has produced fossils of considerable value from an area where no good Pleistocene collections have been made, and it has demonstrated that fossil beds of sufficient value to justify many months of work are present within the county. One of the functions of the field units employed on this project is to locate and determine the value of fossil beds. The locating of such places by scouting and exploratory digging sometimes requires as much or more time than does the actual excavation and collection of fossils, once a suitable place is discovered. If the Stonewall



County project continues to operate as successfully as it has in the past, a good Pleistocene fauna will surely be recovered. These fossils will have considerable importance in correlating the Pleistocene of West Texas with the prolific beds of similar age in South and East Texas. It is to be hoped that this unit will be able to operate throughout most of or all of the remainder of this year.



WORK PROJECT NO. 14765

This field unit, which operated until March 27, 1940, had its project base in Crystal City, Zavala County. An average of 14 certified and 1 non-certified workers was employed on the project. This project was sponsored by the Bureau of Economic Geology and co-sponsored by the State Highway Department. The Highway Department had a direct interest in the project since the work done was for the exclusive purpose of locating gravel, caliche, or any other road material in Zavala County.

An area of some 60 square miles in extent along the Nueces River between Crystal City and La Pryor was covered by reconnaissance, and tested for material with an electrical resistivity apparatus and by test holes. Similar work was done along the Leona River between Batesville and the east line of Zavala County. A considerable amount of gravel (an estimated 90 thousand cubic yards) and gravel intermixed with caliche was discovered.

The operating procedure carried on by this project was to explore possible gravel-bearing areas within a workable distance from roads or highways on which road material was needed. The possible areas were first explored with the electrical resistivity machine and where favorable recordings were obtained, actual test holes were dug to ascertain the quality and the quantity of the available material. By this method barren areas were eliminated, thus serving a negative value to the departments needing road material. Also, possible areas were mapped where further searches and excavations would be worthwhile and gravel-bearing areas of known value were located and mapped.

The supervisor of the Zavala County field unit estimated that a total of approximately one-quarter million cubic yards of gravel and other road materials which were previously unknown in the county were located. Not all of this material is of the best quality, but a great deal of it is considered usable, and some of it is very good quality.



WORK PROJECT NO. 15087

During the operation of this project, which began on February 7, and employed an average of 12 certified and 1 non-certified workers, the town of Bandera, Bandera County, served as project base. Its objective was to collect specimens of a new type of dinosaur footprint recently discovered in the area. Two slabs containing such footprints--those of a sauropod dinosaur--were recently delivered to The University of Texas.

Several prospective sites were worked during the quarter in an effort to secure the best possible specimens. As but two of these sites involved more than a few hours preliminary investigation, discussion will first be limited to them accordingly.

The first site was located just .5 mile across the Medina River south of Bandera, on the Mayan Ranch, in the Glen Rose formation. The better part of three days was devoted to cleaning up and uncovering a series of tracks identified as those of a very large sauropod dinosaur. The tracks were in a ledge of rather soft, calcareous limestone, and in order to expose more prints to view, a cut some ten feet wide by twenty deep was made, from which three feet of limestone and shale were quarried. However no specimens were taken, as only forefoot impressions were noted, with exception to one mere trace of a left hind foot. Apparently the animal had been partly supported by water at the time the trail was made. As this was the first occurrence of such a trail, it was, however, of value to have been seen and studied. In all, eleven forefoot impressions were cleaned, exposed, and photographed, along this ledge.

The second site, on the Davenport Ranch 13.6 miles southeast of Bandera by road, also in the Glen Rose formation, proved more in keeping with the main objective of the project, and it was here the major portion of the



work was carried on from February 15 to April 31. A large test area was stripped of rock and overlying gravel, and two prospective sauropod trails exposed to view. With them were numerous other trails of sauropods, which created a problem to find prints not superimposed with other tracks. It was only after the quarrying was continued into the bank that an isolated trail was discovered from which good specimens could be secured. Associated with these sauropod trails--an estimated 17 separate trails in number--were the tracks of seven carnivorous dinosaurs, a most impressive array of material considered as a whole. The area was charted and photographed, and the right fore, and right hind foot impressions of a large sauropod were taken from the quarry in to slabs. The slabs were estimated to weigh between 12 and 15 hundred pounds. The entire area exposed measured over 250 square yards, with the overburden varying from 3 to 12 feet in depth. About 3 to 4 feet of medium bedded, rather soft, light, yellowish-gray calcareous limestone lay above the track zone covered with coarse sand and gravel. The tracks occurred in much the same type of limestone and were separated from the material above by a thin band of soft gray shale, in which evidences of sun cracks were noted. While it has not been determined how far down in the Glen Rose formation the tracks occurred, they did, however, lie 126 feet below the crest of the massive limestone beds adjacent on the east.

Regarding the other sites worked during the quarter, most of them were located in the vicinity of the large quarry on the Davenport Ranch. One was located about a mile downstream on West Verde Creek, another a half-mile above. In all cases only small excavations were made, only enough material being moved to determine the state of unweathered specimens. It is difficult to enumerate all these minor sites, though the time involved would average about three hours each for three men. Perhaps ten in all were



worked. In most cases carnivore prints were seen, sometimes along different but closely associated levels, and sauropod tracks of poor quality occasionally noted with them.

Reconnaissance work was carried out on all other possible areas where the tracks might be expected to occur within Bandera County, on West Verde Creek, Bandera Creek, the Medina River, Middle Verde Creek, Williams Creek, and the Hondo River. No specimens of value were located in any of these localities (except as previously mentioned) and future possibilities would seem to be exhausted accordingly.



WORK PROJECT NO. 13419  
THE LABORATORY UNIT

The laboratory unit of the State-Wide Paleontological Survey is located at the Bureau of Economic Geology on the Little Campus, Austin, Texas. It is the purpose of this unit to prepare and catalogue all fossils collected by the various field units of the Survey, and to mount the better specimens for exhibit in the Texas Memorial Museum. During this quarter, fossils were prepared from the following counties: Taylor, Howard, Lamar, Bee, Navarro, San Patricio, and Stonewall. An average of 35 certified workers and 2 non-certified workers was employed during the period.

Laboratory Technique: The particular kind of bone, its size, and the type of preservation are factors which determine the technique used in preparation. Reptilian bones coming from Permian shales in Taylor County are the oldest fossils being worked. These bones are several million years old and have been subjected to the tremendous pressure of overlying sediments and to the stress and strain of earth movement since their deposition; consequently, the bones are flattened and badly broken. The jointed shales in which these bones are embedded crumbles easily and extreme care must be exercised, both in the field and in the laboratory, to prevent the broken fragments from spilling out and becoming disassociated. Blocks of this shale containing bones are wrapped in plaster of paris jackets for transportation to the laboratory. When the preparator opens these blocks he removes only the top portion of the plaster casing so that no dirt or bone can spill out. Then all of the dirt on the top surface of the bone is removed with small needles and brushes. A complete bone may be present, but it is always broken into many small pieces, and it is necessary to apply a thin layer of glue over the whole surface before the bone can be removed intact.



The age of a fossil, however, has nothing to do with the preservation. The mineral composition of the enclosing sediments and the degree of mineralization which has taken place within the bone determines the preservation. Bones may be very hard due to replacement with pyrite, iron, etc., or they may be very soft and fragile due to the leeching out of the original matter and no mineral replacement. Often fossils are protected by a harder concretionary layer over the surface, or a bone might be the nucleus about which a larger concretion is formed.

Fossils coming from Triassic shales in Howard County are coated with a thin iron concretion which is very hard to remove. Fortunately the bones have been impregnated with the same material and the outside concretion can be chipped away with a chisel, or ground off with an emery wheel.

Bones from the Goliad formation (Pliocene) of Bee County are flattened from the pressure of overlying sediments. This matrix is a bentonitic clay which expands when wet, and the repeated expansion and contraction has caused considerable breakage of the bones. The original mineral matter in the bones has been leached out and there has been little mineral replacement; consequently, the material is chalky and poorly preserved. These bones are so fragile that it is necessary to treat them several times with various hardening solutions before any attempt is made at fitting the broken pieces together. Hardening agents used are shellac, acetone glue, and alvar.

This material from Bee County is more difficult to prepare than that from any other locality being worked.

Well preserved fish and lobsters are found in limestone concretions in a Cretaceous formation in Lamar County. When concretions are split open a longitudinal section of the fossil is exposed. The preparator uses very small chisels and needles to finish cleaning these specimens after the concretion has been split open.



Personnel: At the end of this quarter 30 certified workers were assigned to the laboratory. Workers are classified according to their ability to prepare fossils. If a worker is able to do only very simple preparation, his classification is "UB"; if he is able to do good work on all fossils which are well preserved, his classification is "UA"; if he is able to do fairly good work with all types of fossils, his classification is "I"; to rate the "S" classification a worker must be able to do excellent work with all types of bones and show great interest in the work. At the close of this period the workers were classified as follows: 15 at "UB"; 5 at "UA"; 7 at "I"; and 3 at "S".

Many of the workers will make further progress and be reclassified in the future; only a few have probably reached the peak of their ability.

Cataloguing and Storing the Prepared Fossils: Each specimen is tentatively identified and numbered when it is completed. When all of the material from a locality has been prepared the whole collection is accurately identified and rearranged. This final rearrangement and identification was completed for the locality completed during this period, which was the Boatright Pit in Henderson County. Twelve hundred and fifty specimens were catalogued and stored during this quarter.

Miscellaneous Activity: An additional store room for unprepared bones was obtained during this period and all of the unworked material was rearranged and grouped according to locality. Several truck loads of fossils were unloaded at the store room during the quarter.



During this quarter the laboratory unit prepared and restored a total of 1250 specimens of vertebrate fossils. These fossils have been identified and catalogued, then assigned numbers, and stored in shelves and drawer cases at the Bureau of Economic Geology. A number of specimens have been assembled and mounted for Museum exhibit. These include the skull of a large ground sloth, Myiodon; the skull of a Pleistocene wolf, Aenocyon; skull of Mastodon; two rhinoceros skulls, Aphelops and Teleoceros; a skull of Bison; and a skull of camel.

Scientific description of some of the specimens prepared in the laboratory are being prepared. These reports will be published in scientific journals at some future time.

A List of the Fossils Prepared in the Laboratory During this Quarter

Class Pisces: (Fishes)

Teleostei

- 3 small perch-like fish
- numerous spines and scales

Class Reptilia: (Reptiles)

Cotylosauria: (Primitive forms)

Trilophosaurus (The position of this form is unsatisfactorily known)

- 1 maxillary
- 3 lower jaws

Chelonia: (Turtles)

Testudinidae

- 4 carapaces
- 14 plastrons
- 7 scapulae
- 4 innominates
- 2 ulnae
- 3 humeri
- 2 radii
- 4 femora
- 4 phalanges
- several vertebrae and
- hundreds of shell
- fragments

Class Reptilia (cont.):

Thecondontia:

Phytosauridae (Phytosaurs)

Genus Angistorhinus

- 1 maxillary
- 2 lower jaws
- 50 teeth
- 40 dermal scutes

Crocodylia: (Alligators and crocodiles)

Crocodylidae

Alligator

- 10 teeth
- several dermal scutes
- and skull fragments

Pelycosauria:

Sphenodontidae

Dimetrodon (Sail-backed reptile)

- 1 maxillary
- 2 lower jaws
- 2 teeth
- 3 scapulae
- 16 vertebrae
- numerous neural spine
- fragments



Class Aves: (Birds)

Several unidentified fragments

Class Mammalia: (Mammals)

Insectivora

Talpidae (moles)

Genus Scalops

1 maxillary

2 lower jaws

Edentata (Ground sloths, glyptodonts, armadillos, anteaters, etc.)

Dasypodidae (armadillos)

Genus Holmesina

2 vertebrae

several carapace scutes

Glyptodontidae (glyptodonts)

(These specimens may be Holmesina)

1 tooth

1 pectoral element

2 phalanges

numerous carapace scutes

Mylodontidae (ground sloths)

Genus Mylodon

1 skull

6 lower jaws

22 teeth

2 scapulae

1 clavicle

41 vertebrae

5 neural spines

22 ribs

1 sternabrae

2 humeri

1 ulna

6 femora

2 tibiae

1 metapodial

6 carpals and tarsals

15 phalanges

Rodentia (rodents)

Sciuridae (squirrels, prairie dogs, etc.)

Genus Cynomys (prairie dog)

portions of several skeletons

Class Mammalia (cont.):

Carnivora (flesh-eating animals)

Canidae (wolves, coyotes and foxes)

Genus Aenocyon (dire wolves)

1 skull

2 lower jaws

Genus Canis (coyote)

3 teeth

Felidae (cats)

Genus Smilodon (saber-toothed cat)

2 lower jaws

1 upper canine tooth (the saber)

Proboscidea: (elephants and mastodonts)

Mastodontidae (mastodonts)

1 skull

3 lower jaws

37 teeth

2 tusks

3 vertebrae

3 ribs

1 ulna

2 radii

1 femur

4 carpals and tarsals

7 phalanges

Elephantidae (mammoth)

19 teeth

3 vertebrae

1 humerus

1 ulna

1 radius

2 femora

1 tibia

1 carpal

2 phalanges

Unidentified proboscidean material

1 tusk

34 vertebrae

4 ribs

2 scapulae

1 humerus

1 radius

2 pelvic elements

5 femora

1 tibia

9 carpals and tarsals

4 phalanges

2 metapodials



Mammalia (cont.)

Perissodactyla (Odd-toed ungulates)

Equidae (horses)

270 teeth  
4 lower jaws  
1 skull  
10 vertebrae  
1 radius  
5 femora  
13 metapodials  
24 phalanges  
23 carpals and tarsals

Tapiridae (tapirs)

Genus Tapirus

4 teeth  
1 lower jaw  
1 maxillary  
5 vertebrae

Rhinocerotidae (rhinoceroses)

Genera Teleoceros and

Aphelops

2 skulls  
1 lower jaw  
21 teeth  
10 vertebrae  
2 scapulae  
1 pelvis  
1 humerus  
3 radii  
1 ulna  
1 femur  
3 patellae  
1 rib  
16 carpals and tarsals

Artiodactyla

Tayassuidae (peccaries)

Genus Platygonus

1 premaxillary  
4 vertebrae  
3 teeth  
2 foot bones

Mammalia (cont.)

Artiodactyla (cont.)

Camelidae (camels and llamas)

Genera Camelops and Tanuolama

1 skull  
6 lower jaws  
42 teeth  
9 vertebrae  
1 scapula  
1 femur  
1 tibia  
1 fibula  
5 metapodials  
6 phalanges  
21 carpals and tarsals

Cervidae (deer)

Genus Odocoileus

1 maxillary  
3 lower jaws  
14 teeth  
1 vertebra  
2 tibiae  
2 metapodials  
6 carpals and tarsals  
3 horn-cores

Genus Cervus (elk)

3 teeth  
1 radius  
1 1 calcaneum  
1 foot bone

Bovidae (cattle, sheep and goats)

Genus Bison

1 skull  
5 lower jaws  
25 teeth  
34 vertebrae  
4 scapulae  
1 pelvis  
3 radii  
5 femora  
2 tibiae  
4 metapodials  
15 carpals and tarsals  
13 phalanges



MOBILE UNIT

Early in January a party of five men from the Austin Laboratory visited a site on Flour Bluff near Corpus Christi, where a mastodon tooth had been discovered. Extensive test pits were dug all along the bluff, but three days excavation failed to unearth more than two or three small fragments of bone. The site was therefore pronounced unpromising. On the return trip brief stops were made at the Inglesides pit in San Patricio County and at Beeville, to give the laboratory men some idea of the conditions under which the bones were excavated. Several reported localities in Atascosa County were investigated.

Following this early trip a period of adverse weather prevented further prospecting, and no more trips were made until the middle of February. With two men, a reconnaissance was made of several reported sites in McLennan and Falls counties, none of which were worth excavating. On the return trip the party stopped at the Bengston farm in Williamson County and started to excavate the remaining portion of a mosasaur which had been partly collected several years before. This site was so close to Austin that it was decided to work it from headquarters. Accordingly, four separate one-day trips were made from the laboratory during February and March, with crews of 1 to 10 men, depending on the type of work to be done each day. This proved efficient and the specimen was collected with no great difficulty.