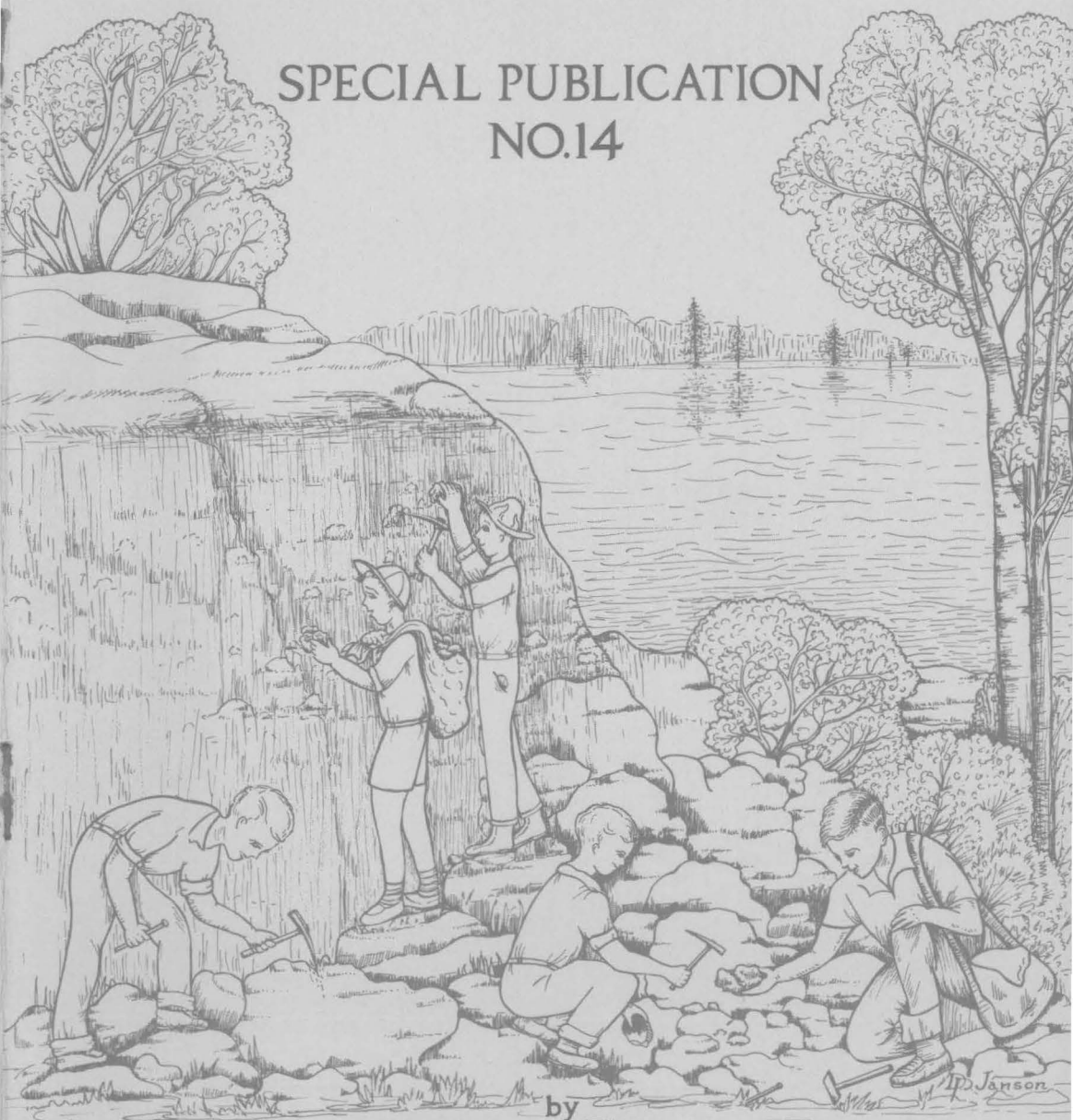


ADVENTURES in GEOLOGY at JACKSON BLUFF

SPECIAL PUBLICATION
NO.14



by
J. William Yon, Jr.

**STATE OF FLORIDA
STATE BOARD OF CONSERVATION
DIVISION OF GEOLOGY**

**FLORIDA GEOLOGICAL SURVEY
Robert O. Vernon, Director**

SPECIAL PUBLICATION NO. 14

ADVENTURES IN GEOLOGY AT JACKSON BLUFF

**By
J. William Yon, Jr.**

**Tallahassee
1965**

Completed manuscript received
October 19, 1965
Printed by the Florida Geological Survey (114)
Tallahassee
1965

CONTENTS

Introduction	1
The age of the rocks at Jackson Bluff	2
Rocks and kinds of rocks	2
Igneous rocks	3
Metamorphic rocks	3
Sedimentary rocks	3
Marls	4
Clays	5
Sands	5
Fossils	5
Class Gastropoda	5
Class Pelecypoda	7
Rock formations	7
Rock layers	7
Geologic history of deposition	9
Rock uses	10
Suggested advanced exploration for boy scouts	11
Additional references	13
Books or booklets of general interest	13
Rocks and fossils	13

ILLUSTRATIONS

Figure

1	Map showing location and suggested routes to Jackson Bluff	1
2	Shell marl exposed near top of section at Jackson Bluff	4
3	Gastropods from the Jackson Bluff formation	6
4	Pelecypods from the Jackson Bluff formation	8
5	Diagrammatic section of rocks exposed at Jackson Bluff, Leon County, Florida	9
6	Unconformity between the Miccosukee and Jackson Bluff formations	11
7	West bank of Ochlockonee River as seen from Jackson Bluff	12

ADVENTURES IN GEOLOGY AT JACKSON BLUFF

By
J. William Yon, Jr.

INTRODUCTION

The rocks exposed at Jackson Bluff on the Leon County side of the Ochlockonee River just below Lake Talquin Dam, figure 1*, provide a fascinating chapter in the story of Florida's geologic history and can be of great interest to anyone interested in earth science.

The rocks you see exposed at Jackson Bluff are sediments that were laid down in ancient seas and by river deltas that once

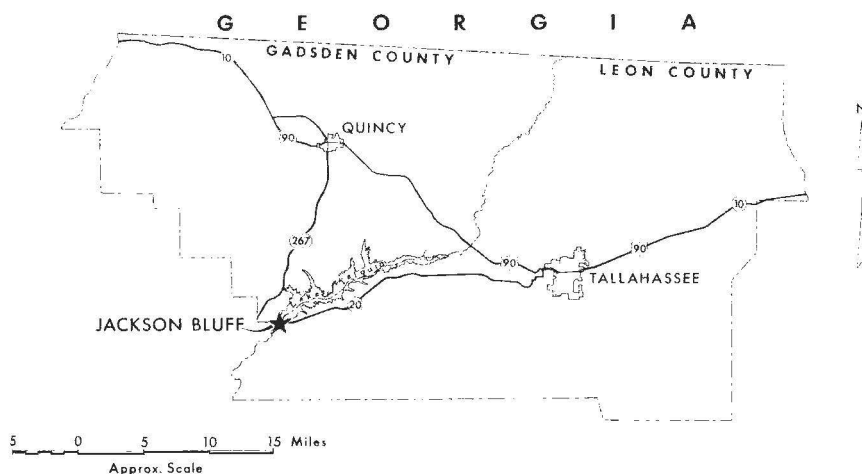


Figure 1. Map showing location and suggested routes to Jackson Bluff.

*Note: Jackson Bluff is located on property owned by the Florida Power Corporation and is not accessible to the public except by special permission from the Florida Power Corporation.

covered this area. The many remains of former life (called fossils) which you see at Jackson Bluff indicate that marine animals lived in abundance in the ancient sea that covered the area.

The intent of this booklet is to help beginning students of rocks investigate the geology of one of Florida's more famous outcrops. It will also provide an opportunity for Boy Scouts to work on the Geology Merit Badge.

THE AGE OF THE ROCKS AT JACKSON BLUFF

The rocks exposed at Jackson Bluff range in age from one to twenty million years and these rocks were deposited during the Miocene Epoch of the Tertiary Period and the Pleistocene Epoch of the Quaternary Period. The rocks exposed at the base of the bluff at river level are the oldest, and as you climb the bluff, you pass across millions of years in the geologic time scale. The table below shows how the section at Jackson Bluff fits into the geologic time scale.

Principal subdivisions of geologic time represented by the rocks at Jackson Bluff			Time in millions of years
Era	Period	Epoch	
Cenozoic	Quaternary	Recent Pleistocene	1
	Tertiary	Unconformity Pliocene rocks missing	10
		Miocene	10

ROCKS AND KINDS OF ROCKS

The crust of the earth or the earth's surface is composed of many kinds of rock-forming minerals. Rocks occur everywhere, and almost any plot of ground will yield them. They can occur as rocky outcrops in soils of plowed fields, or as sands and gravels in a river bottom.

By studying rocks, geologists have come to know a great deal about the composition, forces that shape the earth's surface, and the history of the earth.

Geologists have divided all rocks into three main types: igneous, sedimentary, and metamorphic.

Igneous Rocks

Igneous rocks are formed from molten material that originated deep within the earth. As the molten rock material rose to shallower depths, or to the earth's surface during volcanic eruptions, it cooled and became solid. Because of the difference in cooling rates and chemical composition, there are many varieties of igneous rocks. Some of these varieties are granite, obsidian, and basalt.

Metamorphic Rocks

Metamorphic rocks are sedimentary or igneous rocks that have been acted upon and changed by intense heat and pressures.

This change takes place while the sedimentary and igneous rocks are buried deep beneath the earth's surface. Some examples of metamorphic rocks are gneisses, schists, and slate.

Sedimentary Rocks

Sedimentary rocks can be composed of material derived from the weathering and eroding of older sedimentary, metamorphic and igneous rocks. They are also derived from the precipitation of chemical material and from the accumulation of organic matter. Sedimentary rocks are deposited in layers that are generally parallel to the earth's surface.

The rocks exposed at Jackson Bluff are sedimentary. Consequently, they will be the only one of the three previously mentioned rock types discussed in more detail. Quite likely the marls, clays, and sands (sedimentary rocks) we see at the bluff were derived from igneous, metamorphic and sedimentary rocks in Alabama and Georgia.

MARLS

Marls are exposed in most of the section at Jackson Bluff. Marl is the term geologists apply to rocks that are composed of essentially equal parts of clay and calcium carbonate (limestone). At the bluff there are many shells present in the Jackson Bluff formation. These shells, composed of calcite limestone particles and associated with a clay, make this a special type of marl called shell marl, shown in figure 2. The marls at Jackson Bluff vary in color from very pale orange to bluish gray, and they contain abundant fossil shells.



Figure 2. Shell marl exposed near top of section at Jackson Bluff.

CLAYS

Clay is a generally plastic, natural material composed of clay minerals that are too small to be seen without the aid of a very high powered microscope or x-ray equipment. There are several clay beds in the Jackson Bluff section and the color of these clays varies from gray, yellow-orange to dark blue-green.

When clay is wet, it is often very soft and gummy. If clay is present in a rock, it will generally have an "earthy" smell when the rock is slightly moistened.

SANDS

Sands are composed of the mineral quartz and in Florida they are generally unconsolidated. Sand can range in size from 2 millimeters (size of lead in pencil) to 0.05 millimeters (smaller than a pin point). Sands that are cemented together are called sandstones. The quartz, making up sands in the section at Jackson Bluff is crystalline silica (SiO_2) and is a stained, greenish gray to light gray color.

FOSSILS

Fossils (evidence of past life) are important to geologists because they help determine the time in the earth's history when a rock was deposited. The presence of fossils in the rocks at Jackson Bluff (fig. 2) show that during the time these animals lived, ocean conditions were favorable for marine-animal growth. The most common fossils in the rocks at Jackson Bluff come under the zoological classification of Phylum Mollusca. The Molluscan group can be further subdivided into the Classes Gastropoda and Pelecypoda.

Class Gastropoda

Gastropods, such as snails, conchs, and whelks live today in lakes, on land, and in the oceans. Fossil Gastropods are common in the rocks at Jackson Bluff and can be identified. Pictures of the fossils with their names are included for reference in figure 3.

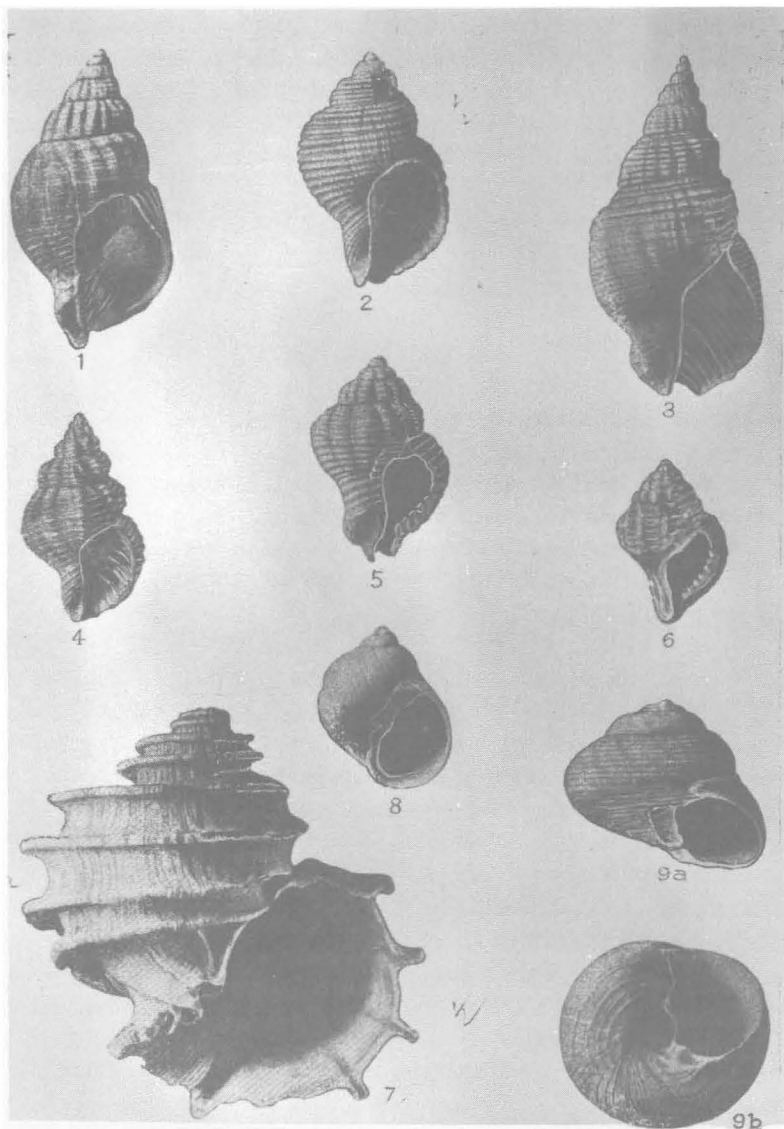


Figure 3. Gastropods from the Jackson Bluff formation. 1. *Ptychosalpinx laqueata* (Conrad); 2. *Cancellaria propevenusta* Mansfield; 3. *Dorsanum? plicatilum* (Bose); 4. *Peristernia filicata* (Conrad); 5. *Solenosteira vaughani* Dall; 6. *Eupleura miocenica* Dall; 7. *Ecphora quadricosta umbilicata* Wagner; 8. *Polinices coensis* Dall; 9. *Tegula exoleta* (Conrad). After Cooke and Mossom, 1929, pl. 16.

Class Pelecypoda

The group Pelecypoda includes what are commonly known as oysters, clams, mussels and scallops. Pelecypods, like Gastropods, live today in fresh and salt water. Fossil Pelecypods are common at Jackson Bluff, and the pictures in figure 4 include some of the Pelecypods that can be observed in the rocks at Jackson Bluff.

ROCK FORMATIONS

Sedimentary rocks are generally deposited as layers. If these layers or units are distinctive and extend over a large geographical area, geologists call them formations. Formations quite often are given names so that geologists can refer to them without a long description each time the rock unit is mentioned.

There are four rock units or formations exposed at Jackson Bluff. Beginning at the top of the Bluff and going from youngest to oldest, these units are Pleistocene deposits, Miccosukee formation, Jackson Bluff formation and the Hawthorn Formation.

The Pleistocene deposits are primarily light gray sands. The Miccosukee formation consists of yellow-orange, clayey sands. The Jackson Bluff formation is a vari-colored, sandy marl containing many fossils. The Hawthorn Formation contains layers of vari-colored, sandy clays, marls and clayey quartz sands.

Rock Layers

The diagram shown in figure 5 indicates how the rock layers occur in the section at Jackson Bluff. As shown in the illustration, the oldest (bottom) unit is the Hawthorn Formation, and overlying the Hawthorn are progressively younger formations. The geologic time span covered, from the basal Hawthorn Formation to the Pleistocene sands at the top of the exposed section, is approximately 20 million years. Detailed study of this section by geologists has enabled them to gain knowledge about the geologic history of the rocks exposed at Jackson Bluff.

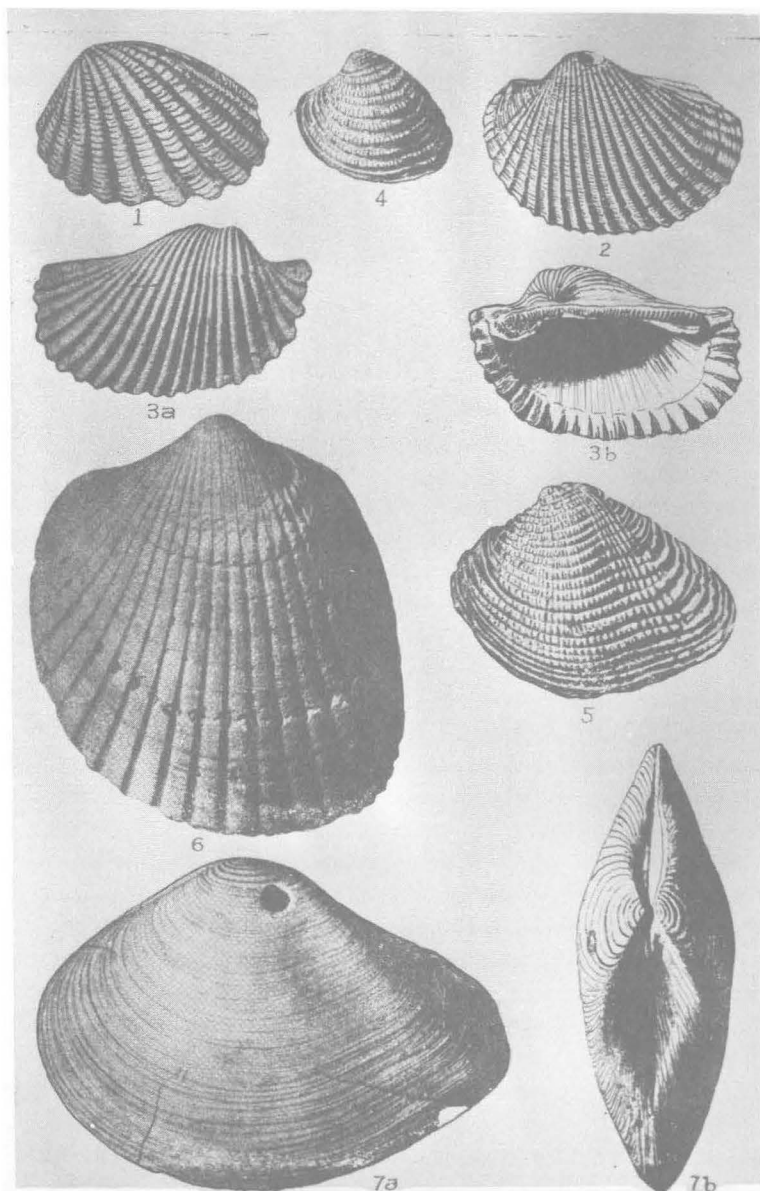


Figure 4. Pelecypods from the Jackson Bluff formation. 1. *Cardita (Carditamera) vauhani* Dall; 2. *Anadara aresta* Dall; 3. *Anadara campsa* Dall; 4. *Chione xesta* Dall; 5. *Chione ulocyma* Dall; 6. *Cardium virginianum* Conrad; 7. *Crassatellites meridionalis* Dall. After Cooke and Mosson, 1929, pl. 17.

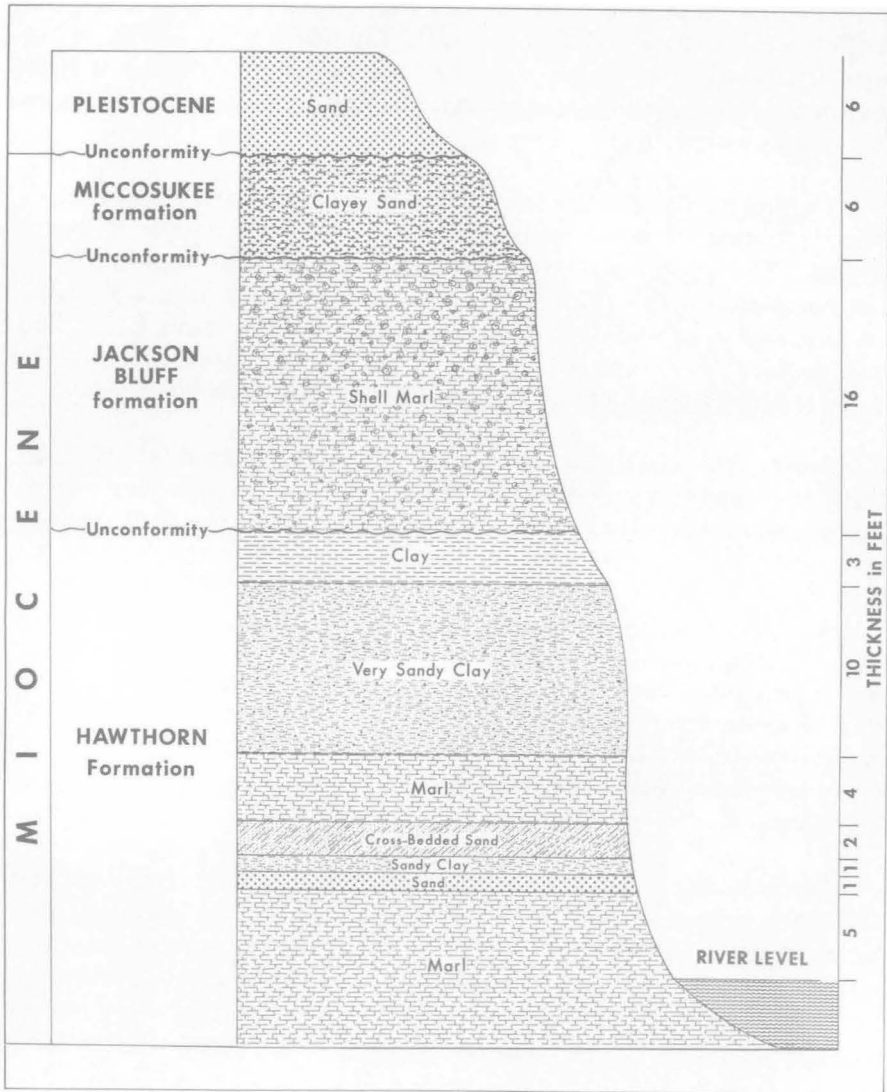


Figure 5. Diagrammatic section of rocks exposed at Jackson Bluff, Leon County, Florida.

Geologic History Of Deposition

Geologists believe that the Hawthorn Formation at Jackson Bluff was laid down in a shallow sea that received abundant sands and clays from the land that was to the north of Jackson Bluff. The cross-bedded sand in the Hawthorn Formation, exposed at the bluff, indicates that the shore line was at or near Jackson Bluff during the period of geologic time in which the Hawthorn Formation was being deposited.

The Jackson Bluff formation was probably deposited in a shallow sea that received sands and clays from a land area to the north and northeast. These shallow, warm waters provided a good environment in which abundant marine animal life such as clams and conchs could live.

The rocks of the Miccosukee formation are believed to have been deposited as a large delta that covered many square miles of Florida. The Miccosukee formation, exposed at Jackson Bluff, is thin compared to the thickness of the unit in other areas. Following deposition of the Miccosukee formation at Jackson Bluff, the land surface was exposed for many thousands of years and quite likely a large amount of the Miccosukee rocks was eroded away.

During the time the last seas covered the land at Jackson Bluff, the sands exposed at the top of the section were deposited. These sands were laid down during the Pleistocene or Great Ice Age.

As shown in the diagrammatic section (fig. 5), several lines called unconformities separate the formations. These unconformities represent a break in the geological record. That is, they represent an interruption in the sequence of rocks that resulted from an interval of erosion or non-deposition. Figure 6 shows an example of an unconformity between the Miccosukee and Jackson Bluff formations.

Jackson Bluff was formed through erosion by the Ochlockonee River over a period of thousands of years, or during the time geologists call the Recent. Looking toward the west side of the Ochlockonee River, figure 7, from Jackson Bluff, you will notice the bank of the river is much lower in height than where you are standing. During times of flooding, the water of the river spills out over the west bank and deposits sand along the channel bank. The sand forms small ridges along the bank and these are called natural levees. Lying behind the natural levees is a plain approximately one mile wide, which forms the flood plain of the Ochlockonee River.

ROCK USES

Many geologists earn their livelihood looking for rock deposits that may be useful to man. This phase of geology is called economic geology.



Figure 6. Unconformity between the Miccosukee and Jackson Bluff formations.

The Jackson Bluff formation is an economic deposit. The formation has been mined by the Florida Power Corporation for use as a road material. Observation of the embankments of the dam at Lake Talquin show that the Jackson Bluff formation was used as a construction material when the dam was built.

SUGGESTED ADVANCED EXPLORATION FOR BOY SCOUTS

1. Measure at Jackson Bluff the thickness of the sands, clays, and marls as shown in the diagrammatic section on page 9.
2. Observe and describe how the beds at the river level are being eroded.



Figure 7. West bank of Ochlockonee River as seen from Jackson Bluff.

3. How many different kinds of fossils are recognized in the rocks at Jackson Bluff? List all identified fossils. Draw some of the common fossils.

4. Discuss how the Jackson Bluff section fits into the overall scheme of geologic events as described in your Geologic Merit Badge Pamphlet.

ADDITIONAL REFERENCES

The publications listed below should be available at local libraries.

Books Or Booklets Of General Interest

Cooke, C. Wythe

- 1939 Scenery of Florida interpreted by a geologist: Florida Geological Survey Bulletin 17, 120 p., 58 figs.

Puri, Harbans S.

- 1964 (and Vernon, Robert O.) Summary of the Geology of Florida and a guidebook to the classic exposures: Florida Geological Survey Special Publication No. 5 (Revised). 312 p.

Rocks And Fossils

Bishop, Ernest W.

- 1961 (and Dee, Lawrence L.) Rocks and Minerals of Florida and a guide to identification, occurrence, production and use: Florida Geological Survey Special Publication, No. 8, 41 p.

Calver, James L.

- 1957 Mining and Mineral resources: Florida Geological Survey Bulletin 39, 132 p., 35 figs., 12 tables.

Cooke, C. Wythe

- 1945 Geology of Florida: Florida Geological Survey Bulletin 29, 342 p., 1 pl., 47 figs.

Cooper, C.L.

- 1953 (and others) Geology: Merit Badge Series, Boy Scouts of America, New Brunswick, New Jersey, 83 p.

Mansfield, W. C.

- 1930 Miocene Gastropods and Scaphopods of the Choctawhatchee Formation of Florida: Florida Geological Survey Bulletin 3, 189 p., 21 pl.
- 1932 Miocene Pelecypods of the Choctawhatchee Formation of Florida: Florida Geological Survey Bulletin 8, 240 p., 34 pl., 3 fig.
- 1935 New Miocene Gastropods and Scaphopods from Alaquá Creek Valley, Florida: Florida Geological Survey Bulletin 12, 50 p., 5 pl.

Namowitz, S. N.

- 1960 (and Stone, D. B.) *Earth Science: The World We Live In*:
D. Van Nostrand Co., Princeton, N.J., 614 p., (High School
Text).

Olsen, Stanley J.

- 1959 *Fossil Mammals of Florida*: Florida Geological Survey
Special Publication No. 6, 74 p., 14 pl., 13 fig.

Rhodes, F. H.

- 1962 (and others) *Fossils: A Guide to Prehistoric Life*: Golden
Nature Guide, Golden Press, New York, N.Y., 160 p.,
(Paperback).

Zim, H. S.

- 1957 (and Shaffer, P. R.) *Rocks and Minerals: A Guide to Fami-
liar Minerals, Gems, Ores and Rocks*: Golden Nature Guide,
Golden Press, New York, N.Y., 160 p., (Paperback).

