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EVIDENCE OF TRIASSIC INSECTS IN THE PETRIFIED FOREST NATIONAL MONUMENT, ARIZONA

By M. V. Walker

In my nature notes for May 1935, I described for the first time some peculiar markings that occur on many of the petrified logs in the Petrified Forest National Monument, Ariz. It was thought that these were made by some form of insect (larvae) that had attacked the trees, and for purposes of identification they were described and named. Some time later Dr. Junius Henderson visited the Petrified Forest National Monument Museum, and his attention was called to these markings. He at once suggested that the material be assembled for publication, and accordingly I prepared the present descriptive article.

At first I was unable to find descriptive literature concerning such occurrences, but in October 1936 an article appeared in the Journal of Paleontology by Dr. Charles T. Brues, of Harvard University, entitled "Evidence of Insect Activity Preserved in Fossil Wood." I was greatly interested in this descriptive material and am now more convinced than ever that several types of "borings" may eventually be described from the petrified wood of the Petrified Forest National Monument. Dr. Brues had only a few specimens available for study, but we have, in the logs of the Petrified Forest region, literally thousands of specimens of this nature. Surely a trained observer would not lack for study material for a research problem in the Petrified Forest National Monument. It is hoped that this

paper will serve its purpose by calling attention to the existence of such phenomena and that future research workers will recognize that this area is worth a careful investigation. Plate 1 shows a map of the region and the localities where types were taken.

LARVAL TRAILS IN THE PETRIFIED WOOD

On many of the fossil trees in the Petrified Forest National Monument there are peculiar ridges and shallow channels, some of which completely encircle the massive trunks. To the average observer these are just "funny" marks on the trees, but when examined carefully they seem to indicate that they were made by some form of animal life. The more they are studied the more I am convinced that they were made by some insect (larvae) that had attacked the forest. These ridges, channels, and tunnels apparently represent the burrows and cuttings of the larvae of wood borers or bark beetles.

Two different groups are recognized; one is represented by channels that were apparently just under the bark; the other by tunnels or burrows cut through the heart-wood, some around the outside of the tree but sometimes penetrating 40 or 50 cm from the outside, while others bored through and through the wood in all directions.

Several "species" of each group seem to be present. In order to distinguish these different forms, the following method of classification and description has been adopted:

GROUP 1

This group consists of channels, not tunnels, that for the most part occur apparently just under the bark. The cuttings evidently are coming partly from the heart-wood. In some cases the cuttings were silicified and now form raised bands around the tree trunks. In some others the cuttings dropped out, leaving shallow channels. In this group there are three species, as follows:

PALEOBUPRESTIS MAXIMA, new genus and species

PLATE 2

Type specimen.—U.S.N.M. no. 95870.

Referred specimen.—Petrified Forest Nat. Mon. Mus. no. 101.

Type locality.—Petrified Forest National Monument, Holbrook, Ariz.

Formation.—Triassic (Chinle).

Description.—These channels seem to occur just under the bark. They measure about 10 mm across and may be followed completely around the tree; in some instances channels measure from 1 to 2 meters in length. The cuttings made by the larva as it worked along show exceptionally well. Where the cuttings were silicified in

place they now appear as raised bands 3 to 6 mm in thickness. The structure of the castings in the channels is in striking contrast to the normal texture and grain of the wood, which is in nearly all instances at right angles to the channel.

PALEOBUPRESTIS MINIMA, new species

PLATE 3, B

Type specimen.—U.S.N.M. no. 95871.

Referred specimen.—Petrified Forest Nat. Mon. Mus. no. 183.

Type locality.—Petrified Forest National Monument, Holbrook, Ariz.

Formation.—Triassic (Chinle).

Description.—These small channels measure only about 2 mm in diameter. None of them can be traced more than a few centimeters. It appears, however, as if some of them had completely encircled the small trunk. Some of the castings were silicified and appear as raised bands, while others dropped out and the work is preserved only as shallow channels. The castings in the channels are in striking contrast to the normal texture of the wood.

PALEOSCOLYTUS DIVERGUS, new genus and species

PLATE 3, A

Type specimen.—U.S.N.M. no. 95872.

Referred specimen.—Petrified Forest Nat. Mon. Mus. no. 184.

Type locality.—Petrified Forest National Monument, Holbrook, Ariz.

Formation.—Triassic (Chinle).

Description.—These channels occur just under the bark. They measure only about 5 mm across but are not filled with the castings. The cuttings apparently fell out before being silicified. These channels do not as a rule go around the tree but run in all directions, and consequently they appear very much like the workings of our modern bark beetles or engraver beetles of the family Scolytidae. The best channels of this species are found on some of the trees in the Black Forest of the Painted Desert section.

GROUP 2

This group includes tunnels and burrows, not channels, that penetrate the heart-wood. Some occur near the bark and seem to go around the log, while others seem to have bored through and through the wood. The cuttings in the tunnels have been completely silicified and agatized, but the tunnels are in striking contrast to the natural texture of the silicified and agatized wood. In this group there are two species, named as follows:

PALEOIPIDUS PERFORATUS, new genus and species

PLATE 4, B

Type specimen.—U.S.N.M. no. 95873.

Referred specimen.—Petrified Forest Nat. Mon. Mus. no. 185.

Type locality.—Petrified Forest National Monument, Holbrook Ariz.

Formation.—Triassic (Chinle).

Description.—These tunnels seem to go through and through the wood. They measure about 5 mm in diameter but appear to be angular rather than round. In some cases they are exposed by decay or weathering of the wood, and they appear square to rectangular in outline. Cross sections viewed in the solid matrix appear oval in outline but with a flattened surface on one side; the silicified cuttings are in striking contrast to the normal texture of the wood.

PALEOIPIDUS MARGINATUS, new species

PLATE 4, A

Type specimen.—U.S.N.M. no. 95874.

Referred specimen.—Petrified Forest Nat. Mon. Mus. no. 102.

Type locality.—Petrified Forest National Monument, Holbrook, Ariz.

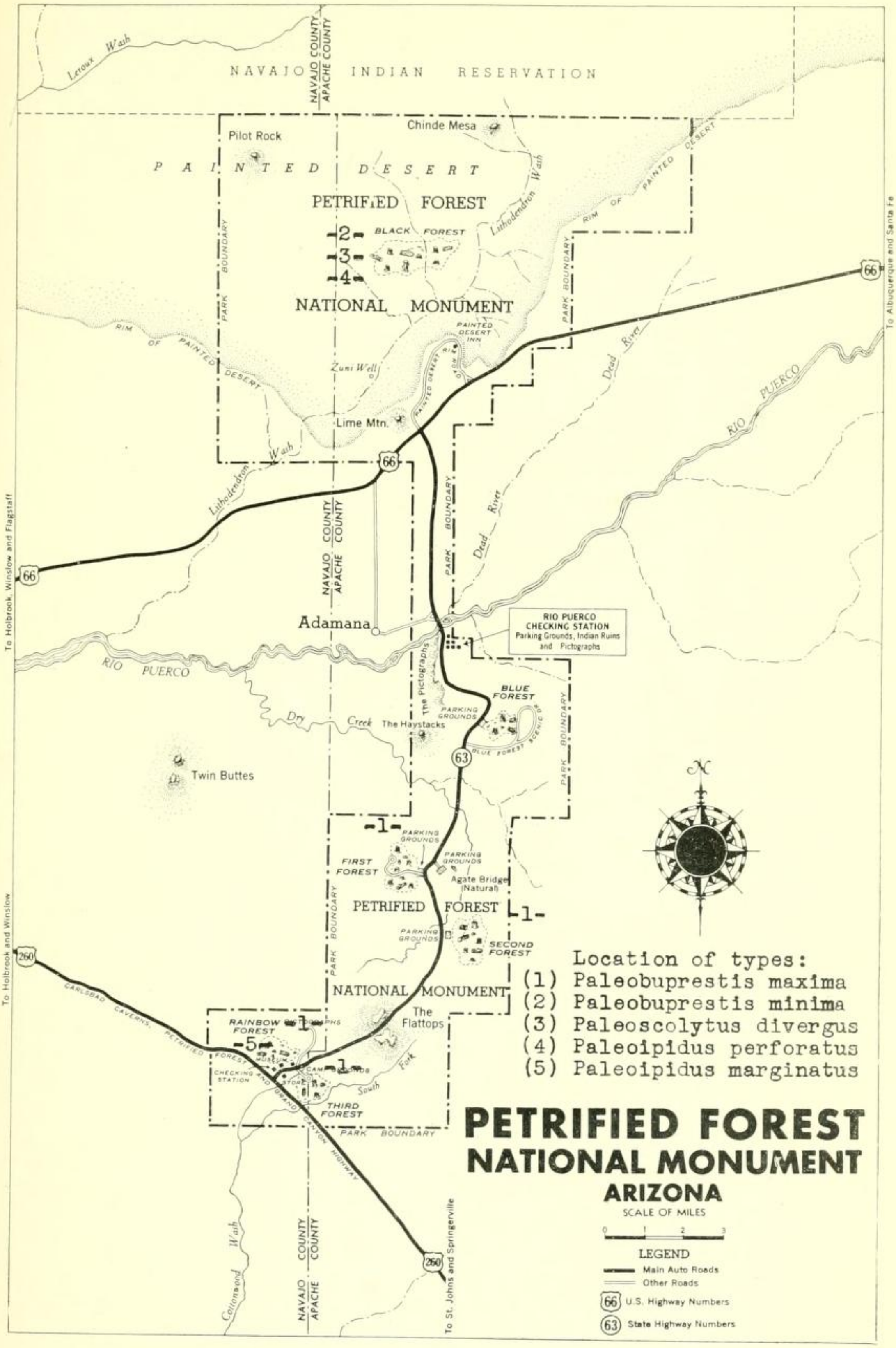
Formation.—Triassic (Chinle).

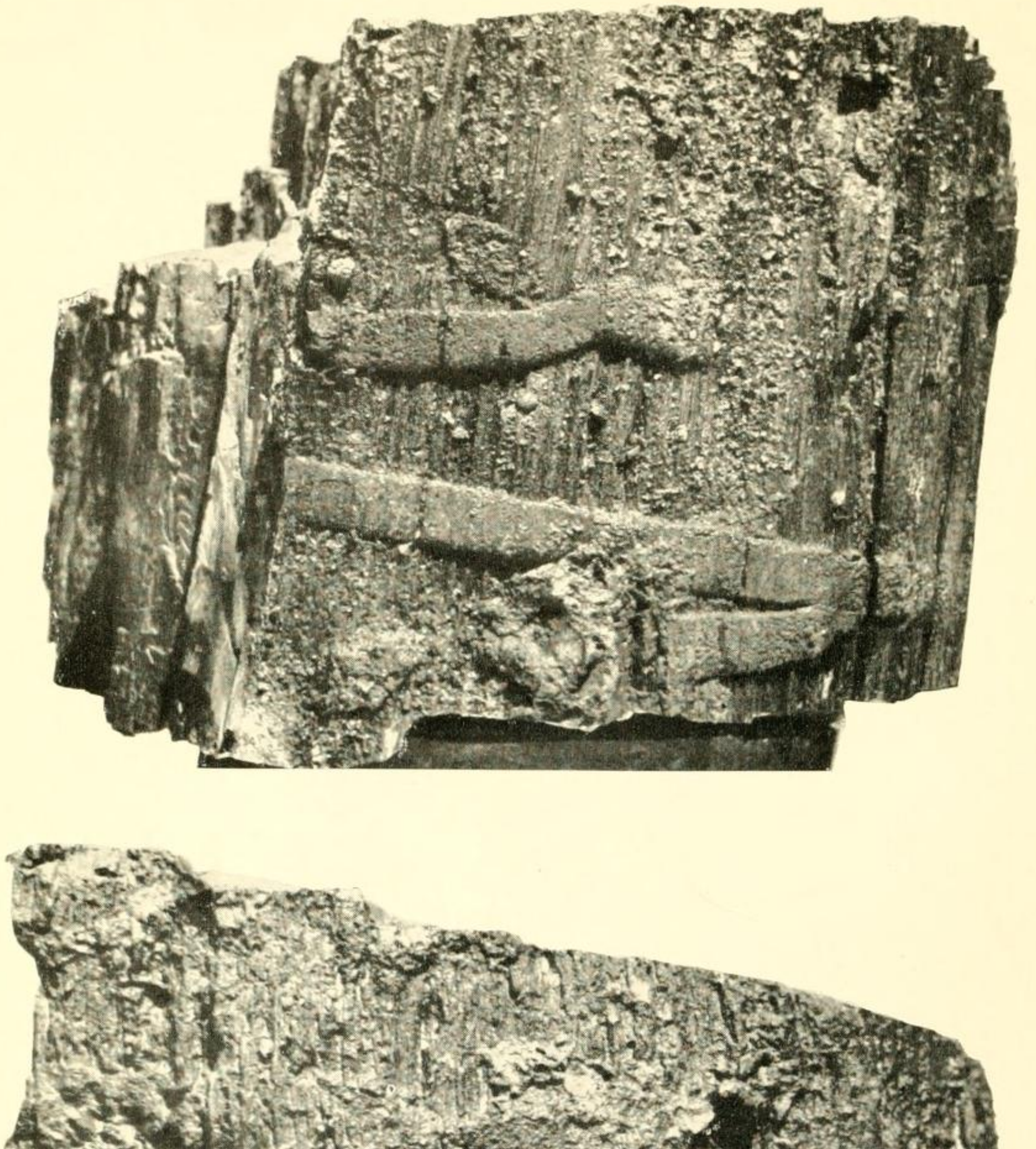
Description.—These tunnels that occur in the heart-wood may be observed only in a few polished sections on exhibit in the museum. Tunnels of two sizes are recognized, one measuring about 2 mm, the other 3 mm, in diameter. In the few complete log sections where these tunnels have been observed, they never penetrate more than 10 or 20 cm from the margin or probable bark layer. The castings have been completely agatized but may be easily traced across a polished surface.

SUMMARY

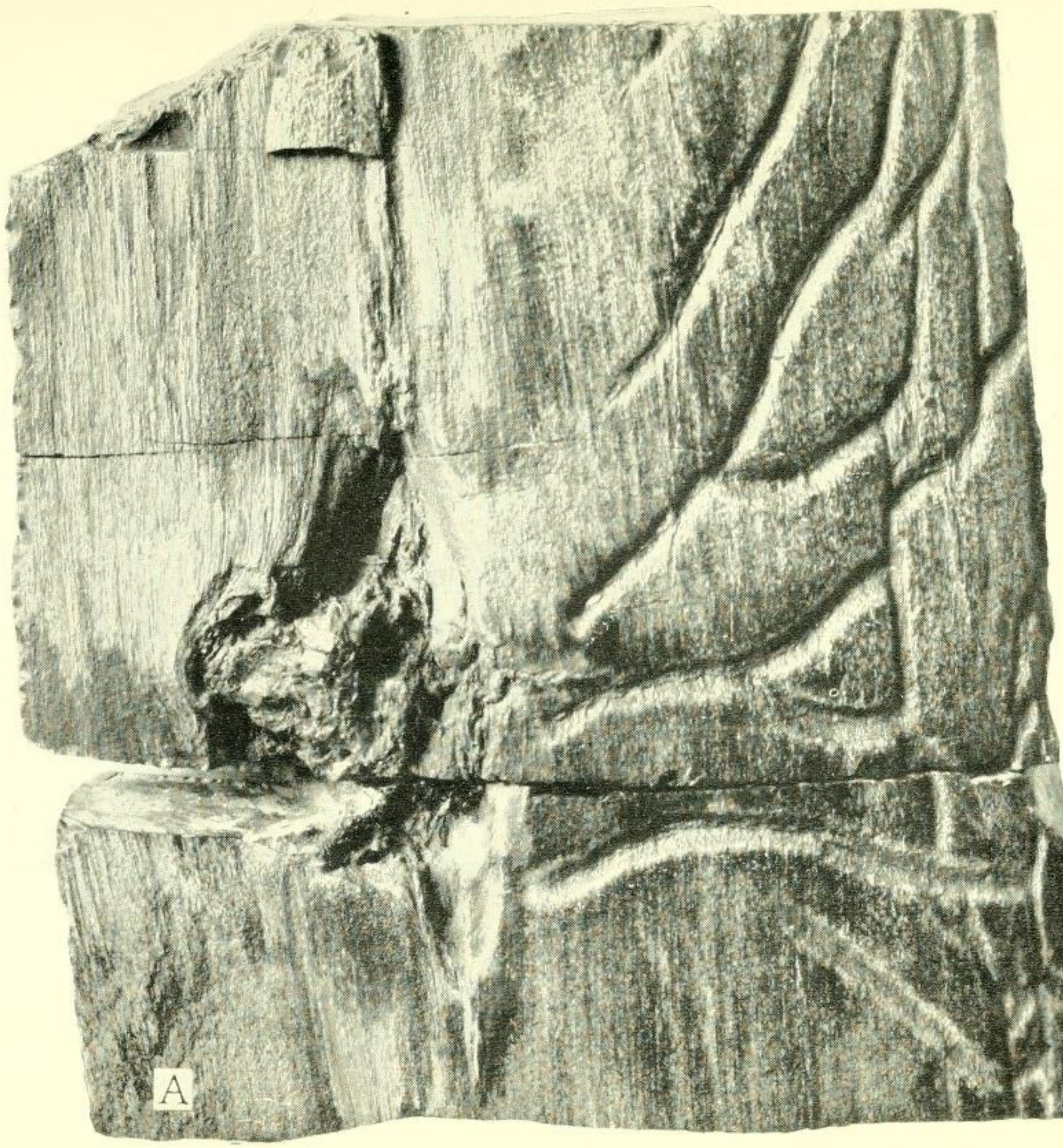
As far as I have been able to observe, the only species of tree attacked by the borers is *Araucarioxylon arizonicum*. In no instance has there been found evidence of insect activity in either *Woodworthia* or *Schilderia*, the other two known genera of fossil trees from the Petrified Forest National Monument area.

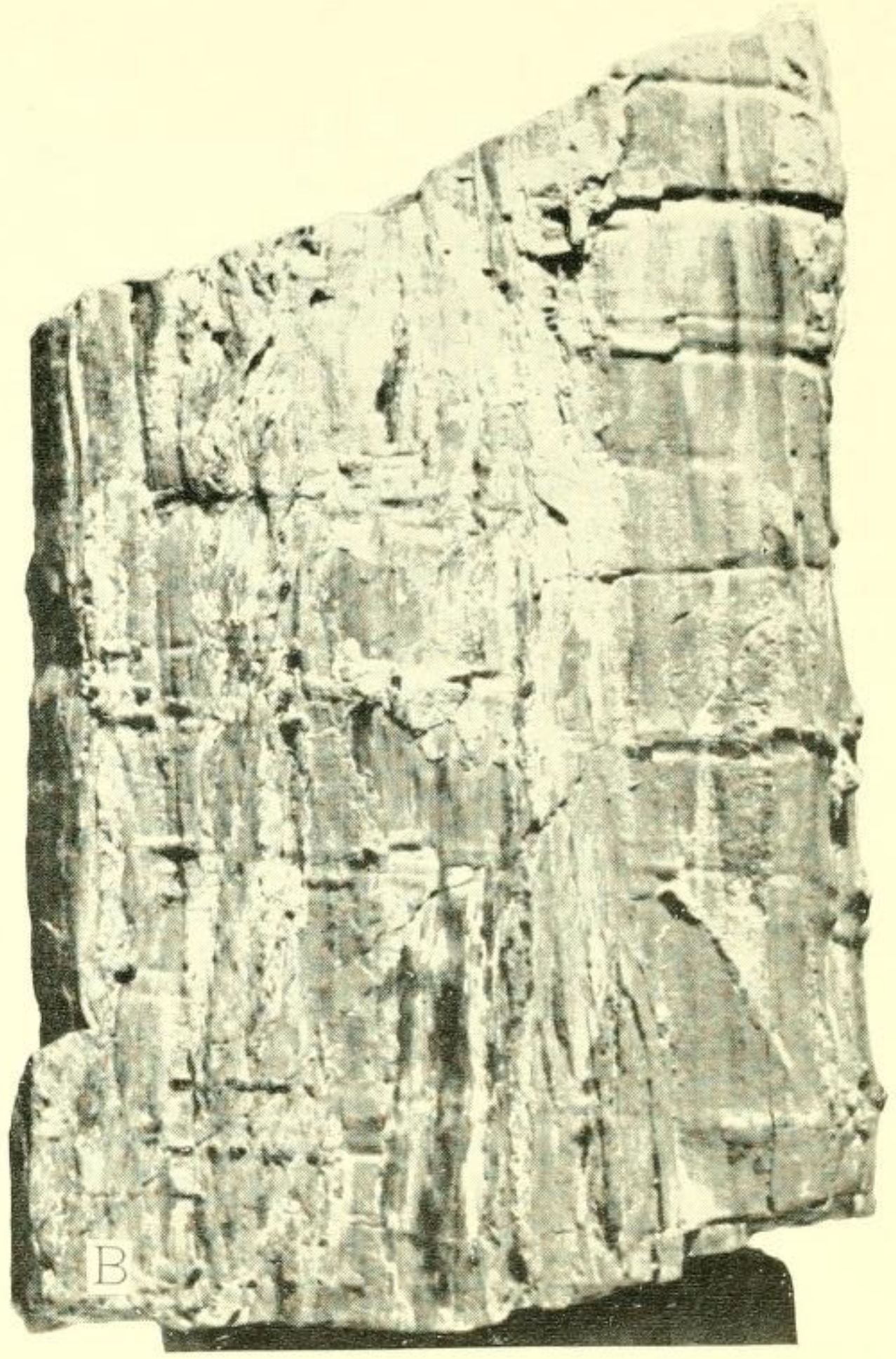
The large channels of Group 1 resemble somewhat the work of some modern buprestids, and it seems logical to believe that many of the trees were girdled and killed. In that way one might account for such a concentration of logs as occurs at about the 300-foot level in the Chinle of this region, where it is estimated that approximately 50 percent of the log sections show evidence of being attacked by these borers.


NAVAJO INDIAN RESERVATION
NAVAJO COUNTY
APACHE COUNTY
Leroux Wash
Chinde Mesa
Pilot Rock
PAINTED DESERT
PETRIFIED FOREST
BLACK FOREST
NATIONAL MONUMENT
PARK BOUNDARY
RIM OF PAINTED DESERT
PAINTED DESERT INN
Zuni Well
Lithodendron Wash
Dead River
RIO PUERCO
Lime Mtn.
66
To Albuquerque and Santa Fe
To Holbrook, Winslow and Flagstaff
Adamana
RIO PUERCO CHECKING STATION
Parking Grounds, Indian Ruins and Pictographs
BLUE FOREST
PARKING GROUNDS
BLUE FOREST SCENIC DR.
The Pictographs
Dry Creek
The Haystacks
63
Twin Buttes
FIRST FOREST
SECOND FOREST
THIRD FOREST
Agate Bridge (Natural)
RAINBOW FOREST
CHECKING STATION
CARLSBAD CAVERNS, PETRIFIED FOREST AND GRAND CANYON HIGHWAY
260
To Holbrook and Winslow
The Flattops
South Fork
Cottonwood Wash
To St. Johns and Springerville
N
Location of types:
(1) Paleobuprestis maxima
(2) Paleobuprestis minima
(3) Paleoscolytus divergus
(4) Paleoipidus perforatus
(5) Paleoipidus marginatus
PETRIFIED FOREST
NATIONAL MONUMENT
ARIZONA
SCALE OF MILES
0 1 2 3
LEGEND
Main Auto Roads
Other Roads
66 U.S. Highway Numbers
63 State Highway Numbers

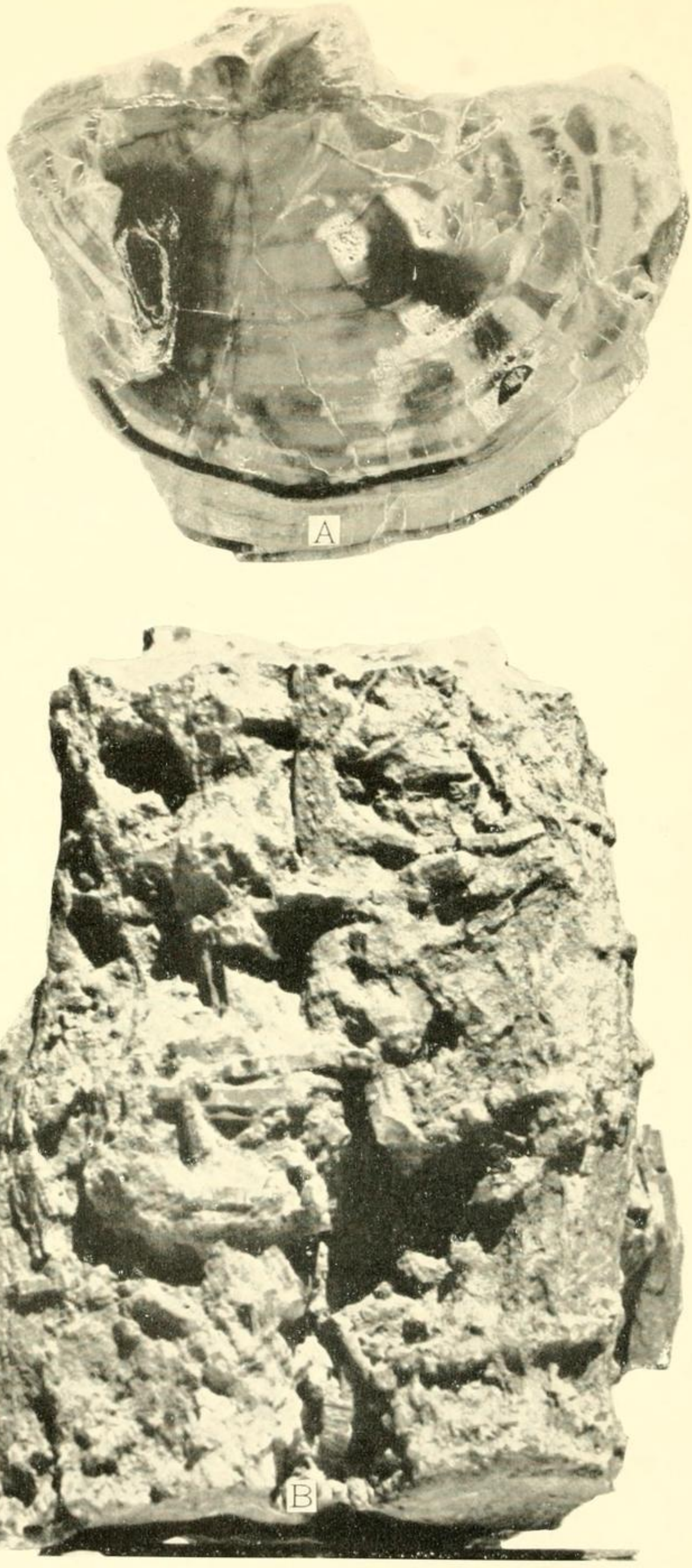


EVIDENCE OF TRIASSIC INSECTS: PALEOBUPRESTIS MAXIMA, NEW GENUS AND SPECIES.





EVIDENCE OF TRIASSIC INSECTS: (A) PALEOSCOLYTUS DIVERGUS, NEW GENUS AND SPECIES; (B) PALEOBUPRESTIS MINIMA, NEW GENUS AND SPECIES.



EVIDENCE OF TRIASSIC INSECTS: (A) PALEOIPIDUS MARGINATUS, NEW GENUS AND SPECIES; (B) PALEOIPIDUS PERFORATUS, NEW SPECIES.

Whether the heart-wood borers of Group 2 attacked only the dead trees cannot be determined, since no specimens have been found showing the workings of both groups on the same log section.

Recent discoveries of beautifully preserved leaves of ferns and cycads lead one to believe that there is a possibility of someday finding fossil insect remains in these remarkable, fine-grained, paper shales of the Chinle.

Numerous questions will undoubtedly arise in the minds of many regarding these very brief generalizations. It may be mentioned, however, that the Coleoptera are recorded as far back as the Triassic, and they were numerous in the Jurassic formation. Since we know that the buprestids date back many geological periods, it seems logical to believe that some form of larva or borer could have infested the trees of the great Triassic forests.

There are numerous trails on the thin, fine-grained sandstones and flagstones of the Petrified Forest area that appear to have been made by some arthropod, but there is no reason for assuming that these trails were made by the adult beetles whose larvae worked the burrows in the trees.

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