GEOLOGICAL SURVEY OF ALABAMA
WALTER BRYAN JONES, STATE GEOLOGIST

## MUSEUM PAPER NO. 9

ALABAMA MUSEUM OF NATURAL HISTORY

# FOOTPRINTS FROM THE COAL MEASURES OF ALABAMA

BY

T. H. ALDRICH, SR., AND WALTER B. JONES

UNIVERSITY, ALABAMA
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BIRMINGHAM PRINTING COMPANY
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# LETTER OF TRANSMITTAL

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To His Excellency,
Bibb Graves,
Governor of Alabama,
Montgomery, Alabama.

Sir: I have the honor to transmit herewith the manuscript of a report on "Footprints from the Coal Measures of Alabama", by T. H. Aldrich, Sr., and Walter B. Jones, with the request that it be printed as Museum Paper Number 9 of the Alabama Museum of Natural History.

Very respectfully,

WALTER B. JONES,
*State Geologist and Director.*

University of Alabama,
April, 1930.

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# TABLE OF CONTENTS

# LIST OF ILLUSTRATIONS

# GENERAL DISCUSSION

*By* WALTER B. JONES

*Introduction.* For several years there have been reports of curious tracks in the shale above the Jagger coal in the Number 11 Mine of the Galloway Coal Company, near Carbon Hill, Walker County. These things were first noticed several years ago by workmen, who called them to the attention of W. F. Cobb, Sr., General Manager, and A. P. MacIntosh, Chief Engineer. The original discovery tracks have been very appropriately named *Cincosaurus Cobbi* Aldrich, (see Plates 6 and 7), and were widely distributed throughout the area of the southwest slope of the mine. A year or so ago, MacIntosh spoke to Arthur Blair, Geologist of the Tennessee Coal, Iron & Railroad Company of Birmingham, about the tracks and Blair, like any good geologist, was rather skeptical. Early in December of last year, Blair and I. W. Miller, of the Land Department of the Tennessee Company, visited Number 11 and went to see the new find. They were somewhat startled to behold the trail of the animal leading for some forty feet along the roof of the slope, until it disappeared into solid rock.

Blair popped down a sample of rock carrying about a dozen of the tracks and took the slab to his Birmingham office. It was the author's good fortune to be in his office when he brought in the find and it was decided that they were entirely new to Alabama geology. David DeJarnette, Assistant Curator of the Museum, visited the mine soon after that, to obtain specimens for our collection and for study. DeJarnette obtained some splendid material, both of the discovery tracks and additional varieties. The author made a trip to the mine on December 12, 1929, and was able to get still other new varieties. The diversity of the fauna was most surprising. Several other trips have been made by members of the staff, resulting in the specimens hereinafter described.

The writers wish to acknowledge, with sincerest thanks and deepest gratitude, the splendid cooperation of the Galloway Coal Company, particularly F. N. Fisher, President, Frank Cobb, Sr., A. P. MacIntosh, H. M. Johnstone, Superintendent of Number 11 Mine, and Charles McKendrick, Mine Foreman. All of the specimens have been taken out by the Galloway Company, and under the supervision of Johnstone. This work has been expensive and was carried out in a very careful, deliberate manner. The Company has fostered a notable contribution to science. Without this cooperation, the discovery could never have received the attention warranted by its importance.

We also wish to thank Dr. G. G. Simpson, of the American Museum of Natural History, for a rather complete bibliography of Carboniferous footprints, which is reproduced at the end of this report.

## GEOLOGY*

The occurrence of these tracks is in the Coal Measures or Pottsville formation, of Pennsylvanian (Upper Carboniferous) age. The Pottsville is the youngest of the Paleozoic formations in Alabama, the Permian not being represented in this area. The Warrior Field, in which these imprints are found, carries coal beds that appear to be Middle Pottsville, while both the Coosa and Cahaba fields have beds which have been placed in the Lower Pottsville. The Jagger bed is in the lower part of the Warrior group.

The general section by McCalley,* is as follows:

*General section of the Coals above the Black Creek Seam, Warrior Basin*

150′ Shales, conglomerates, sandstones
Guide Seam
25′ Shales, sandstones
Brookwood Seam
15′ Shales, sandstones
Milldale Seam
37′ Conglomerates, sandstones, shales
Johnson Seam
27′ Sandstones, conglomerates, shales
Clements Seam
200′ Shales, sandstones
Gwin Seam
40′ Conglomerates, shales, sandstones
Thompson Mill Seam
175′ Shales, sandstones, conglomerates
Cobb Upper Seam
37′ Sandstones, shales
Cobb Lower Seam
83′ Sandstones, conglomerates, shales
Thomas (Frierson) Seam
105′ Shales, sandstones, with some little limestone in places
Pratt Seam
21′ Sandstones, shales
Fire Clay (Cardiff) Seam
30′ Sandstones, shales
American (Double) Seam
52′ Conglomerates, sandstones, shales
Curry Seam

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*For a full discussion of the geology of the Coal Measures of Alabama, reference is made to the various reports of the Survey dealing with this subject.

*McCalley, Henry, The Warrior Coal Basin, Sp. Rpt. 10, Ala. Geol. Surv., 1900, Plate 1.

43′ Shales, sandstones
Gillespy Seam
170′ Shales, sandstones
New Castle Seam
22′ Shales, sandstones
Horse Creek Seam
37′ Shales, sandstones
Blue Creek Seam
10′ Shales, sandstones
Jagger Seam
52′ Conglomerates, shales, sandstones
Ream Seam
56′ Shales, sandstones, with some little limestone in places
Lick Creek Seam
48′ Sandstones, shales
Jefferson Seam
25′ Sandstones, shales
Black Creek Seam

Quite evidently the sediments which compose this group were laid down on a constantly shifting shore-line, ranging from swamp deposits of fresh water and a luxurious vegetation to shallow seas with their sprinkling of marine invertebrates. That these conditions carried also a rather rich vertebrate fauna is no surprise when one considers the ideal surroundings for just such animals as these. The sandy beaches and mud flats between the sea and the swamps must have been a splendid place for these animals to play and rest.

## OCCURRENCE

Fossil plants from the coal beds have been known since mining began, and there have been a few scattering occurrences of marine invertebrate fossils. This discovery of vertebrate tracks is the first in Alabama, and the animals which made them may safely be listed as among the oldest known. Some of the tracks quite evidently belong to reptiles, although there probably was no great difference between reptiles and amphibians at that time.

The tracks are found in the slate some 30 to 42 inches above the top of the Jagger coal, and are limited to slopes and entries which have been driven into the roof for additional clearance, or in caved roof. In many cases the tracks can be followed from the slate on one side over a distance of more than 40 feet, into the slate of the opposite side. Usually, they can be seen for only a few feet. They have been found in several parts of the mine, but the fourth left entry off the southwest slope has been the best place for collecting.

At the time these beds were deposited, the dominant land animals were amphibians, which were usually four-footed, clumsy things. Tracks of amphibians have been found in rocks much older than the Jagger coal, but reptile footprints in older rocks are very rare. The Carbon Hill discovery is replete with interest and is one of the most important of late years.

The earliest known tracks seem to have been found in Canada, but in the United States Dr. A. T. King described some in 1845 in Vol. 49 of the American Journal of Science, p. 216. From the figures given it is probable that these tracks were amphibian. In the impressions he shows that the forefoot only had four toes and the hind foot had five. Some years previously Prof. C. H. Hitchcock described tracks that were possibly bird tracks in the Triassic, but so far as we can find, Dr. A. T. King was the first to describe tracks in the Carboniferous. In 1849 Isaac Lea of Philadelphia discovered some footprints in the Coal Measures of Pennsylvania. His account was probably published in the Transactions of the American Philosophical Society. In 1875 Prof. E. D. Cope described a skull from the Coal Measures from Linton, Ohio. (See Geol. Surv. Ohio, Vol. 2, Part 2, p. 297, plate 34, fig. 2.)

The next writer in the proceedings of the U. S. National Museum, Vol. 39, described some specimens from the Kansas Coal Measures. This writer, R. L. Moodie, subsequently reviewed the subject very carefully and apparently brought it down to 1916. His excellent work is called *The Coal Measures Amphibia of North America,* published by the Carnegie Institute of Washington, 1916. Prof. O. C. Marsh, of Yale, has also written quite a few papers upon the same subject. The tracks of these ancient animals have been of very little benefit to the anatomists and morphologists of the United States. However, the work of Dr. Moodie is more encyclopedic than any other writer. On page 201 in Moodie's work will be found a list of the footprints known and the names attached, October, 1916. This list follows:

| GENUS AND SPECIES | AUTHOR | HORIZON | LOCALITY |
|---|---|---|---|
| *Allopus littoralis* | Marsh | Coal Measures | Osage County, Kansas |
| *Anomaepus? culbertsonii* | King | Do | Pennsylvania |
| *Gallinuloides* | King | Do | Do |
| *Anthracopus ellangowensis* | Leidy | Do | Do |
| *Baropus lentus* | Marsh | Do | Osage County, Kansas |
| *Batrachichnus plainvillensis* | Woodworth | Do | Massachusetts |
| *Cheirotherium? heterodactylum -reiteri* | Moore | Do | Pennsylvania |
| *Collettosaurus indianaensis* | Cox | Coal Measures | Indiana |
| *Crucipes Parvus* | Butts | Do | Missouri |
| *Dromopus agilis* | Marsh | Do | Osage County, Kansas |
| *Hylopus caudifer* | Dawson | Do | Nova Scotia |
| *hardingi* | Dawson | Do | Do |
| *logani* | Dawson | Do | Do |
| *minor* | Dawson | Do | Do |
| *trifidus* | Dawson | Do | Do |
| sp. indet. |  | Do | Do |
| *Limnopus vagus* | Marsh | Do | Osage County, Kansas |
| *Nanopus caudatus* | Marsh | Do | Do |
| *Notalacerta missouriensis* | Butts | Do | Missouri |
| *Notamphibia magna* | Butts | Do | Do |
| *Palaeosauropus antiquior* | Dawson | Subcarboniferous | Nova Scotia |
| *primaevus* | Lea | Coal Measures | Pennsylvania |
| *syndensis* | Dawson | Do | Cape Breton Island |
| *unguifer* | Dawson | Carboniferous (Millstone grit) | Nova Scotia |
| *Thenaropus leptodactylus* | King | Coal Measures | Pennsylvania |
| *ovoidactylus* | King | Do | Do |
| *pachydactylus* | King | Do | Do |
| *sphaerodactylus* | King | Do | Do |

We have also examined the writings of Prof. O. C. Marsh, W. R. Jillson, Messrs. Emerson and Loomis, A. T. Cox and W. D. Moore. We find that it is almost impossible to connect the tracks from Alabama with those from other States, but some have a strong similarity. Most of the animals seem to be rather small. It is hoped that later investigations will reveal more material for better descriptions.

A short account of the occurrence was published* a short time ago.

Most of the animals were four-footed and five-toed, but there appears to have been considerable variation in the proportion of weight carried on fore and hind feet. That some had tails is clearly shown by the trail left behind in the mud (See Plate 8). The greatest variation was in size, although most of them were small. The tracks shown in Plates 1, 2 and

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*Jones, Walter B., Footprints found in Alabama mine, Coal Age, Vol. 35, No. 2, February 1930, p. 92, 3 figs. in text.

4 must have belonged to heavy bodied, clumsy brutes, with legs long enough to bring the feet well under the body. It is possible that all had tails, which were commonly used as a balance while walking.

Descriptions here follow of the Alabama footprints. Accompanying this paper are excellent photographs made by Dr. R. S. Hodges of this Museum.

# DESCRIPTION OF TRACKS

By

T. H. Aldrich, Sr.

## ATTENOSAURUS (NOV. GEN.)

Plates 1, 2, 3, and 4.

*A. indistinctus* n. sp. This slab showed five tracks in the mine, all apparently hind feet, with stride of one foot.

The track is large, with heavy pad, and must have belonged to a heavy animal. No traces of front feet could be seen. The track shows 5 digits. It is evident that this animal was not using his front legs at this time, and that the hind legs were long enough to be brought directly underneath a heavy body. Undoubtedly, this track represents the largest animal yet discovered at Carbon Hill.

Length of track, 10.2 inches; width, 7.2 inches. Length of thumb or lateral digit, 2¼ inches; second digit, 6¼ inches; third digit, 7¼ inches; fourth digit, 6⅞ inches; fifth digit, 5¼ inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, southwest slope, 4th left entry, 527′ from switch point.

Type—Alabama Museum of Natural History.

*A. subulensis* n. sp. These splendid specimens show that this animal had a large foot and was rather heavy. The slab containing these casts is a little over three feet long. There are some slight traces of a tail between the rows of casts.

The hind feet are 3½ inches wide, and have a full length of 10¾ inches. There are five digits, the thumb digit being extended lateral; length of first digit, 3¾ inches; second digit, 6¼ inches; third digit, 6⅝ inches; fourth digit, 5⅝ inches; fifth digit, 3⅜ inches. The pad is about four inches long.

The front feet are smaller than the hind feet and apparently receive only a small amount of weight. The width of the front foot is 2½ inches and the length is 6 inches. Length of first digit, 3½ inches; second digit, 4 3/16 inches; third digit, 3¾ inches. There is no evidence of more than three toes. The length of the stride is 10¼ inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, southwest slope, 4th left entry, 188′ from switch point.

Type—Alabama Museum of Natural History.

PLATE 1
*Attenosaurus indistinctus* Aldrich (reduced one-half size)

PLATE 2
*Attenosaurus subulensis* Aldrich (reduced)

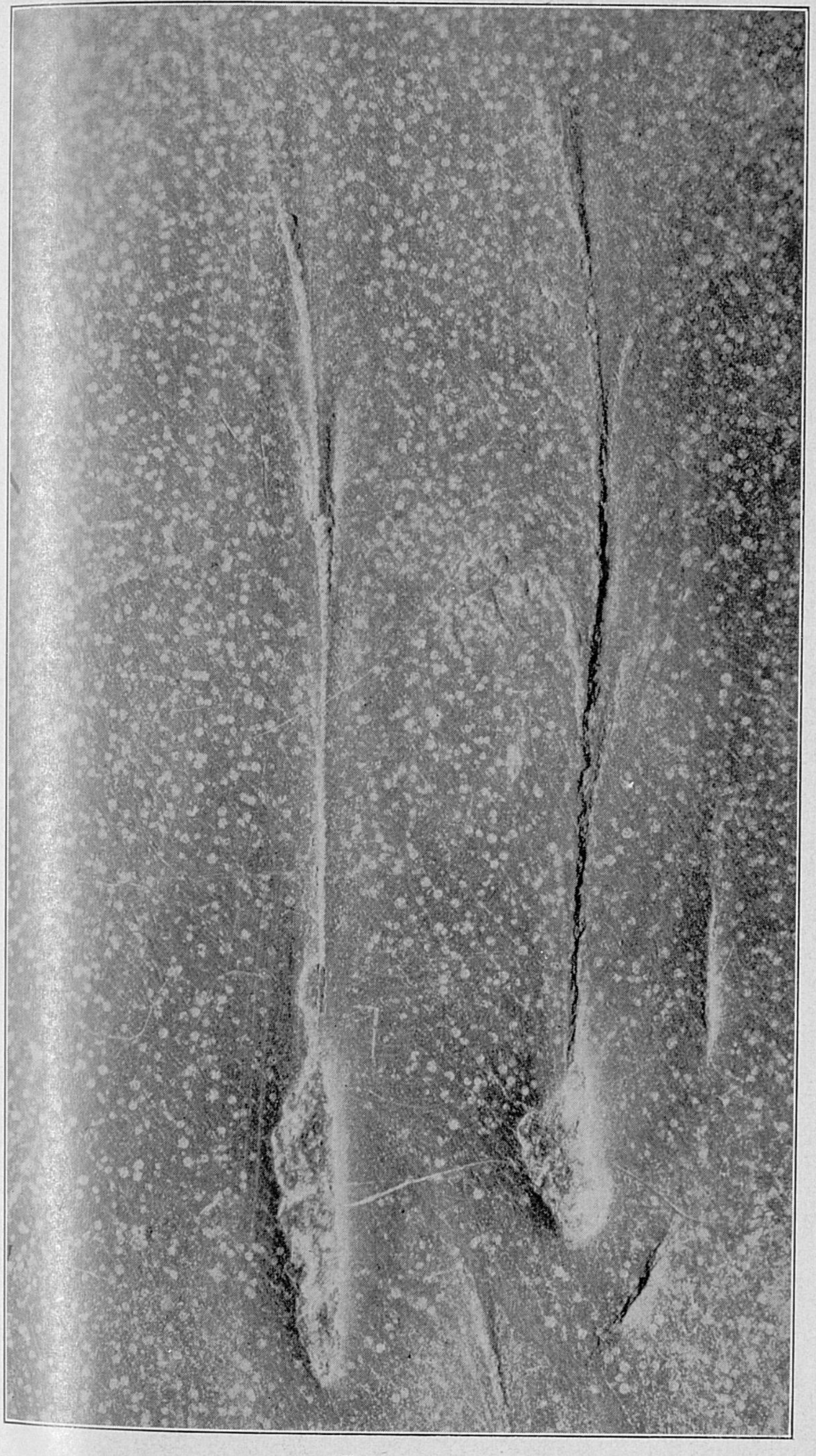

PLATE 3

*Attenosaurus subulensis* Aldrich (natural size), front foot representing a larger animal than shown in Plate 2.

PLATE 4
*Attenosaurus subulensis* Aldrich (natural size), imprint.

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## BIPEDES (NOV. GEN.)

### PLATE 5

*B. aspodon* n. sp. This specimen shows three distinct tracks equidistant and with a depression for the pad. It is evidently an animal with only two toes. There is a single imperfect impression near the bottom of the photograph which is evidently the same animal which also shows only two toes. It is quite likely that this is the track of some amphibian and the corresponding tracks were not secured. The slab itself shows still another cast and the place for another, so that there are probably on the slab four impressions and one place where a fifth should be. These tracks average about 2¼ inches apart.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, 4th left off of 7th right.

Type—Alabama Museum of Natural History.

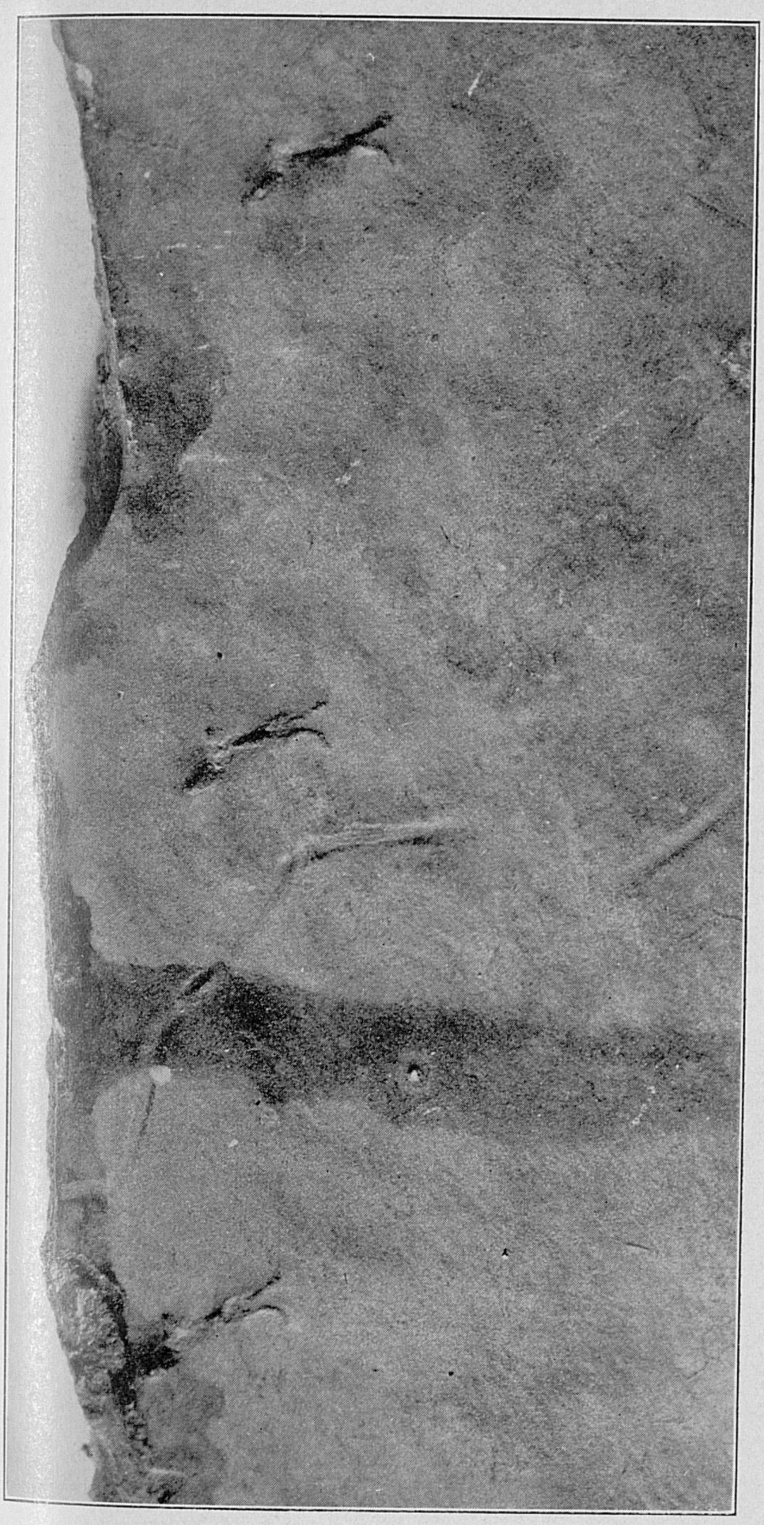

PLATE 5
*Bipedes aspodon* Aldrich (natural size).

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## CINCOSAURUS (NOV. GEN.)

PLATES 6, 7, 8, 9, 10 and 11

*C. Cobbi* n. sp. This was undoubtedly the most abundant of all the reptiles living at that time. These tracks are found throughout the mine. This little animal had five toes with a thumb directed laterally.

Hind foot: length of first digit from articulation of metatarsals, 9/16 inches; total length of phalanges, tarsals and matatarsals, ⅞ inches. Length of phalanges of second digits, ⅞ inches; length of second digit, including tarsals and metatarsals, 1 7/16 inches. Phalanges third digit, 1 inch; length of phalanges, including tarsal and metatarsal, 1⅞ inches. Phalanges fourth digit, 13/16 inches; phalanges, metatarsal and tarsals of fourth digits, 1⅜ inches. Phalanges fifth digit, ½ inch; phalanges, tarsals and metatarsals, 1¼ inches.

Front foot: length of phalanges first digit, 5/16 inches; length of phalanges with carpals and metacarpals, 11/16 inches. Length of phalanges second digit, 7/16 inches; length of second digit, including carpals and metacarpals, ⅞ inches. Phalanges of third digit, 9/16 inches; length of third digit with carpals and metacarpals, 1⅛ inches. Length of fourth phalanges, ½ inch; length of fourth phalanges with carpals and metarcarpals, 1 inch. Fifth digit, length of phalanges, ⅝ inches; length of fifth digit, including carpals and metacarpals, 13/16 inches. Length of stride, 3¼ inches.

These specimens show that the animal was rather small. The distance between the two rows of feet is about 2¼ inches.

We have named this specimen after Mr. W. F. Cobb, General Manager of the Galloway Coal Company, at Carbon Hill, Alabama, who has aided this work in many ways.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, from several places in and near the southwest slope.

Type—Alabama Museum of Natural History.

*C. Fisheri* n. sp. Posterior foot: total length, 5 inches; total width, 3 inches. Thumb digit lateral and directed posterior, 2½ inches long; second digit, 2¾ inches, concave posterior; third digit, 3½ inches; fourth digit, 2 9/16 inches; fifth digit, 2 inches.

Width of anterior foot, 1 15/16 inches; length, 3 inches. First digit (lateral), ¾ inch; second digit, 1½ inches; third digit, 1 13/16 inches; fourth digit, 1⅝ inches; fifth digit, 1 inch. Both feet have a marked posterior bad. Stride is 13 inches.

This animal has been given a name after Mr. F. N. Fisher, President of the Galloway Coal Company, who has very kindly assisted this museum in getting the specimens.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, southwest slope, 4th left entry.

Type—Alabama Museum of Natural History.

*C. jaggerensis* n. sp. Posterior foot: Entire width, ⅞ inch; entire length, ⅞ inch. Thumb digit lateral. First digit length, 9/16 inch; second digit, ¾ inch; third digit is 13/16 inch; fourth digit, ¾ inch; fifth digit, ⅝ inch. Concave surface of the curvature is lateral. Anterior foot shows only four digits; the lateral and medial digits forming practically an angle of 180°. The second digit from the lateral surface being the longest. The lateral digit, 5/16 inch; second digit, ⅝ inch; third digit, 9/16 inch; fourth digit, 7/16 inch. Stride, 2½ inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, 4th left off of 7th right.

Type—Alabama Museum of Natural History.

*C. Jonesii* n. sp. Length of posterior foot, 2 1/16 inches long; thumb digit lateral; length, ½ inch; length of second digit, 1⅛ inches; third digit, 1¼ inches; fourth digit, 1¼ inches; fifth digit, 1 1/16 inches. Anterior limb: entire length is 1¾ inches. Length of first digit, 7/16 inch; second digit, 1 1/16 inches; third digit, 1¼ inches; fourth digit, 1 1/16 inches; fifth digit, 1¾ inches. Total width of anterior foot, ¾ inch.

The slab containing these impressions shows a series of rather faint objects. The heel is much more strongly exhibited than in most specimens.

We have named this species after our State Geologist, Dr. Walter B. Jones, who really obtained these specimens for this museum.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, 7th right hill.

Type—Alabama Museum of Natural History.

PLATE 6
*Cincosaurus Cobbi* Aldrich (natural size).

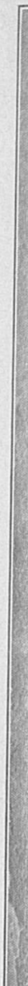
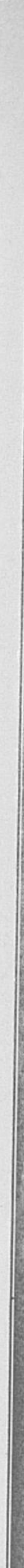


PLATE 7
*Cincosaurus Cobbi* Aldrich (reduced).



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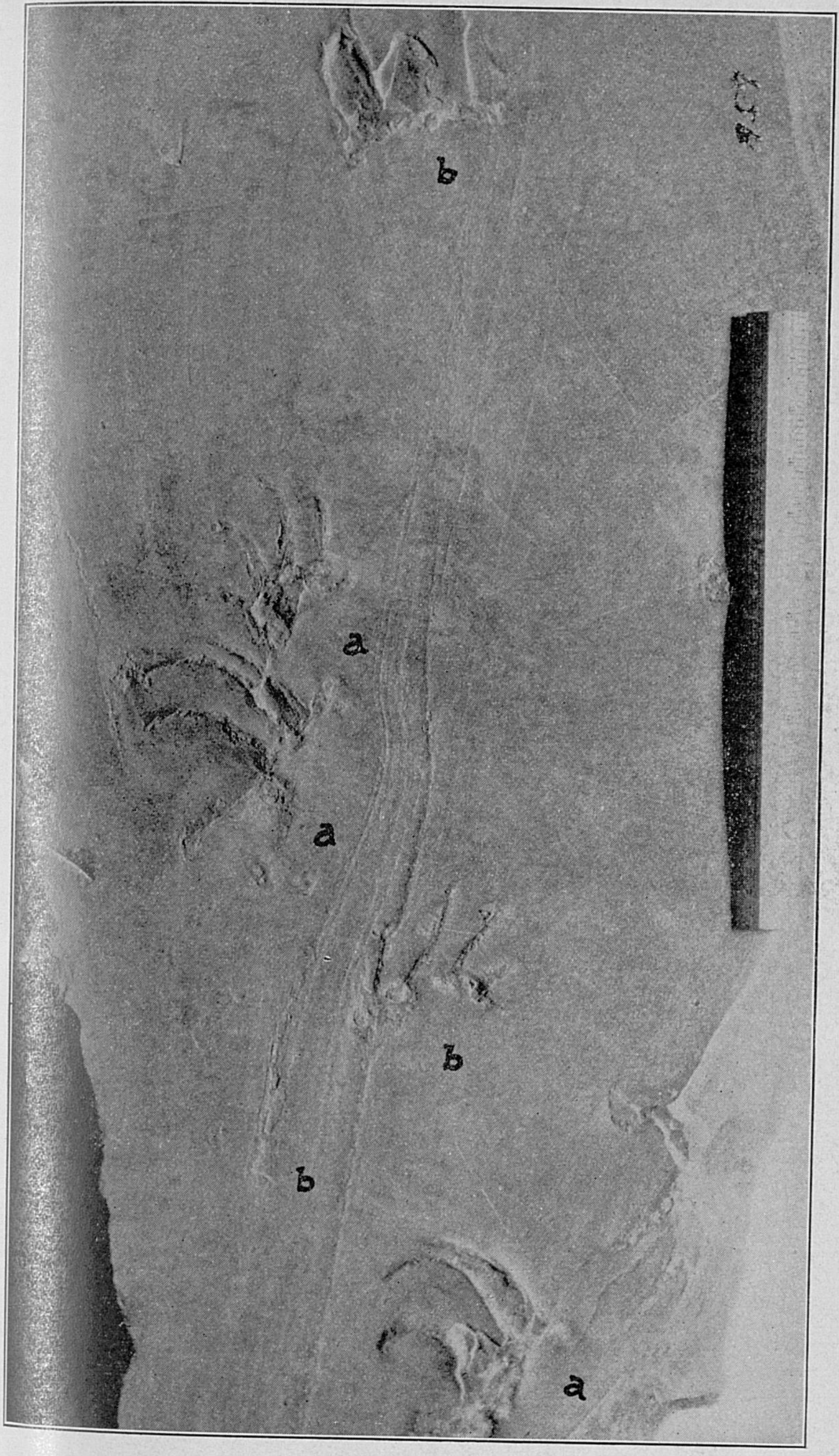

PLATE 8
*Cincosaurus Fisheri* Aldrich (a) and Quadropedia prima Aldrich (b) (reduced).

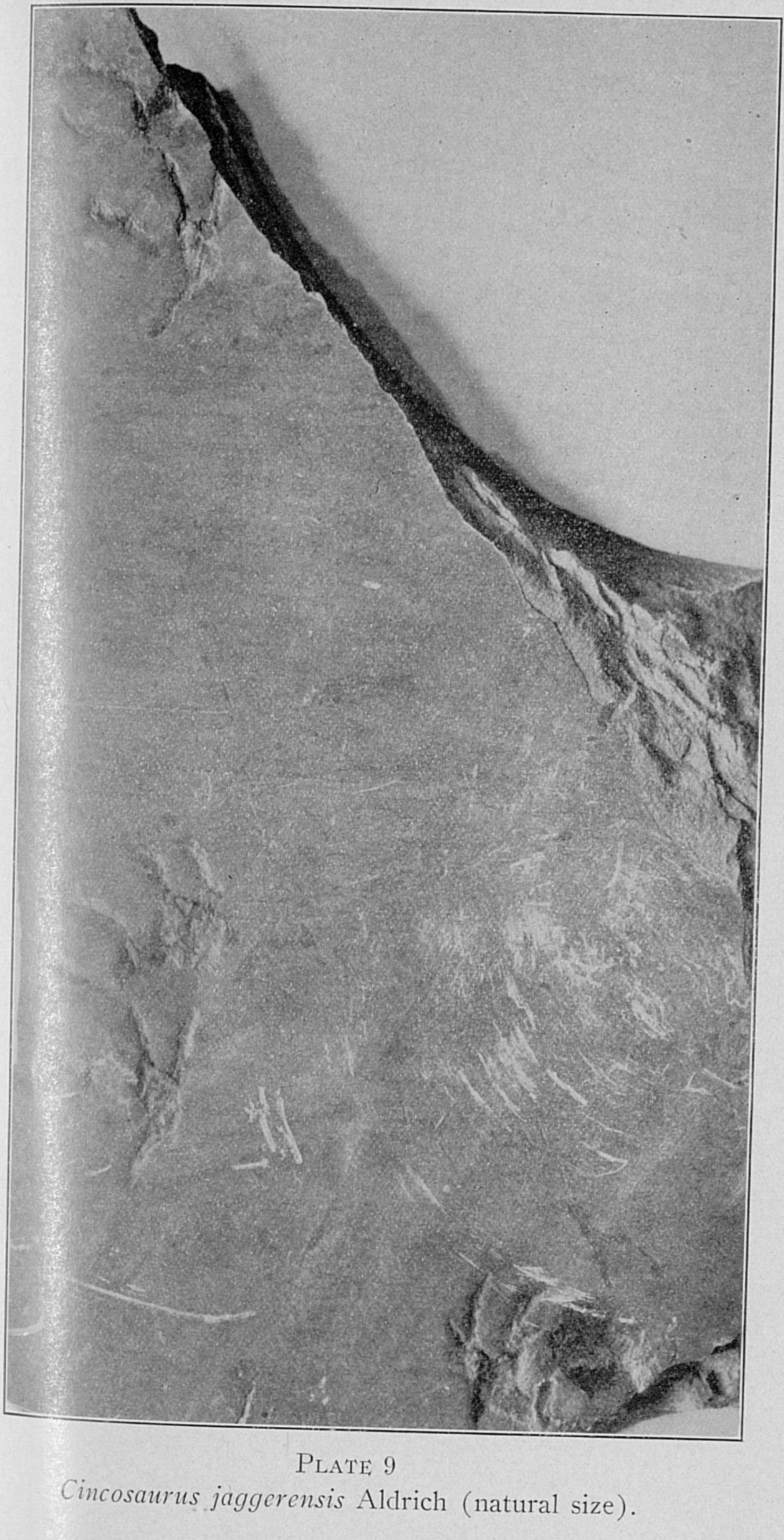

PLATE 9
*Cincosaurus jaggerensis* Aldrich (natural size).

PLATE 10

*Cincosaurus Jonesii* Aldrich (natural size).

PLATE 11

*Cincosaurus Jonesii* Aldrich (natural size).

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## CTENERPETON

### PLATE 12

*C. primum* n. sp. This specimen seems to be a cast of what we consider an impression in the mud of the ancient shore, showing the abdomen of a lizard-like animal. Of course it is impossible to say whether the animal was large or small, but it was probably small. On the lower part of the photograph there are impressions of two feet. One of them showing three toes. We are rather of the opinion that these belong to the species. There seems to be a close resemblance, however, to the ventral portion of *Ctenerpeton alveolatum* Cope, and although Cope's figure shows impressions of the ventral surface and also of the lateral parts on each side of same which this specimen is without. So far as we can tell from the cast this specimen belongs to the genus *Ctenerpeton*. We, therefore, have put it in this genus with a new name. This specimen is evidently a cast and is about 7 inches long and from 1½ to 3 inches wide.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, main south slope, 3rd right entry, and between 1st and 2nd entries.

Type—Alabama Museum of Natural History.

PLATE 12
*Ctenerpeton primum* Aldrich (natural size).

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## HYDROMEDA (NOV. GEN)

### PLATE 13

*H. fimbriata* n. sp. This animal has a very long attenuated foot, the entire length being 1⅞ inches. Entire width, ⅞ inches. Impressions of only four digits are visible on the posterior limb.

Posterior foot: the lateral or first digit is 1⅜ inches; length of second digit, 1 9/16 inches; length of third digit, 1⅜ inches; fourth digit, 1 inch.

The anterior foot shows only three digits, the lateral digit being ⅞ inch; second ¾ inch, and third digit, 9/16 inch. There is a faint impression of a pad. Length of stride, 3¼ inches. Width between rows is 1¾ inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, southwest slope, 4th left entry, 306 feet from the switch point.

Type—Alabama Museum of Natural History.

PLATE 13
*Hydromeda fimbriata* Aldrich (reduced).

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## LIMNOSAURUS (NOV. GEN.)

### PLATE 14

*L. alabamaensis* n. sp. Posterior foot: entire width, 13/16 inch. Entire length, 1⅛ inches. Length of first or lateral digit, 1¼ inches. Length of middle digit, 1 inch. Length of medial digit, ⅞ inch.

Anterior foot shows only 2 digits. Entire width, ⅜ inch. Entire length, 11/16 inch. Length of lateral digit, ½ inch. Length of medial digit, 7/16 inch. Length of stride is 3¼ inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, main south slope, 3rd right entry.

Type—Alabama Museum of Natural History.

PLATE 14
*Limnosaurus alabamaensis* Aldrich (natural size).

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## QUADROPEDIA (NOV. GEN.)

PLATES 8, 15

*Q. prima* n. sp. This animal seems to have been higher in the scale than most of the species represented, as it walked in a manner approaching more nearly later reptiles. It was not webb-footed as the track is very clear. There is a presence of a distinct pad.

Posterior foot: length entire foot, 1⅜ inches; entire width, 1¼ inches. The thumb digit is directed medial. Length of first digit, ⅝ inch; second digit, 1 inch; third digit, ¼ inch; fourth digit, 1¼ inches; fifth digit, 1⅞ inches.

The anterior foot shows only two digits, the lateral one being ½ inch; the medial, ⅝ inch; stride, 5 inches.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, southwest slope, 8th left entry.

Type—Alabama Museum of Natural History.

Plate 15
*Quadropedia prima* Aldrich (natural size).

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## TRISAURUS (NOV. GEN.)

PLATES 16 AND 17

*T. lachrymus* n. sp. These footprints are very faint on the specimen. They show a stride of about 15 inches and a spread of about 14 inches between the rows. The impression of the heel or pad in the large tracks is rather deep showing that there was considerable size to this animal. The slab shows a confused series of ripple marks.

Lateral toe, 2¼ inches; middle, 2½ inches; medial, 1 inch.

A second slab has three impressions of the same foot, and are perhaps the same as the big slab which is cracked across the middle and previously mentioned. The two main impressions are about 13 inches apart. In order to identify it properly, we have given it a name. It shows three curved toes with a strong impression of a pad.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, from southwest slope, 4th left entry, 188′ from switch point.

Type—Alabama Museum of Natural History.

*T. secundus* n. sp. This little animal shows distinctly three toes on his feet. Some of the impressions on the hind foot seem to be larger and show two toes close together, and also a light impression on the left which may be another toe. The pad of the foot was in a manner raised above the toes, and makes a cast, while the toes themselves are impressions. These pads must have been small but are quite distinct and give the impression of the animal walking on its toes. The forefeet show that the phalanges are about ⅝ inch long, the center one being slightly the longest. The central toe of the hind foot is the longest and is from 6/8 to ⅞ inch long. The stride is about 4½ inches long and the rows are about 3 inches apart.

Locality—Galloway No. 11 Mine, near Carbon Hill, Walker County, Alabama, 4th left off 7th right entry.

Type—Alabama Museum of Natural History.

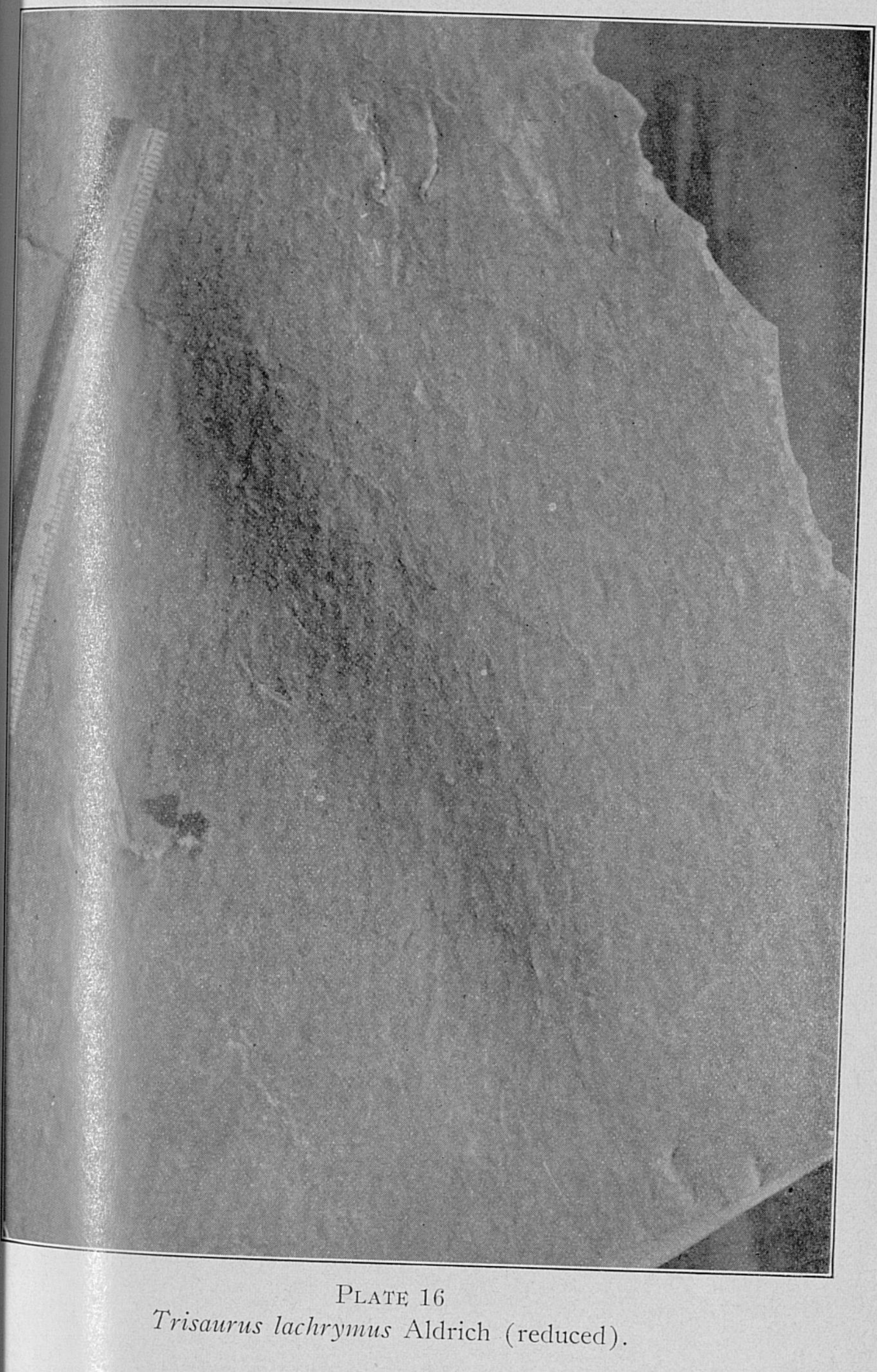

PLATE 16
*Trisaurus lachrymus* Aldrich (reduced).

PLATE 17
*Trisaurus secundus* Aldrich (natural size).

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