

On the fossil remains of reptiles, and on chelonian foot-tracks, from the Devonian strata of Morayshire / by Lambart Brickenden and Gideon Algernon Mantell.

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ON

THE FOSSIL REMAINS OF REPTILES,

AND ON

CHELONIAN FOOT-TRACKS,

FROM THE

DEVONIAN STRATA OF MORAYSHIRE.

BY

CAPT. LAMBART BRICKENDEN, F.G.S.

AND


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PRESIDENT OF THE WEST LONDON MEDICAL SOCIETY.

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The Royal College of Surgeons
from
G. Mantell.

*Notice of the Discovery of REPTILIAN FOOT-TRACKS and REMAINS
in the OLD RED or DEVONIAN STRATA of MORAY. By Capt.
LAMBART BRICKENDEN, F.G.S.*

WITH A

*DESCRIPTION of the TELERPETON ELGINENSE, and OBSERVA-
TIONS on supposed FOSSIL OVA of BATRACHIANS in the LOWER
DEVONIAN STRATA of FORFARSHIRE. By GIDEON ALGERNON
MANTELL, Esq., LL.D., F.R.S., G.S., Pres. West London
Medical Society.*

I BEG to submit to the Geological Society a brief notice of a discovery of considerable interest, which I made during the last year, but was prevented from communicating before the close of the last Session; a delay which I do not now regret, since a recent fact has come to light which invests with additional importance that which it was my object to lay before the Society.

In 1850 I discovered in the quarry of Old Red at Cummington near Elgin, a slab of sandstone bearing a beautiful and distinct series of quadrupedal foot-prints, of which a representation, one-sixth the size of the original, is given in the annexed sketch (Pl. III.).

The slab exhibits on the surface, in a very striking manner, thirty-four foot-prints of a quadruped, traced in an uninterrupted succession across the stone. The impressions of the right feet alternate with those of the left, from which they are separated laterally by an interval of three inches, the length of each stride or pace being about four inches. The imprints of the fore and those of the hind feet are nearly in contact, and bear a precisely similar relation throughout: the size of the foot-marks of the former in proportion to the latter is

as three to four; the hinder being about one inch in diameter. The imprints are slight cavities, and are all characterized by the same rounded and blunt appearance, apparently indicating that the articulations of the feet were closely connected, although, from the crystalline and arenaceous surface of the stone, the form and number of the joints of the toes cannot be positively determined. A slight trailing mark is observable between some of the foot-marks. In some of the marks it appears that the foot, in pressing on the originally yielding sand, had slightly raised the surface at the heel, but this is scarcely perceptible in the drawing. The strata of yellow sandstone, from which the above slab was removed, prevail in great thickness on the sea-coast of Moray, between the villages of Covesea and Burghead, and are regarded as belonging to the upper division of the Devonian Series of Scotland; and this opinion is based on the fact of finding the yellow sandstone in apparently consecutive order of position to, or closely connected with, neighbouring rocks which are unquestionably Old Red.

It unfortunately happens that we have but few organic remains to assist in determining the relation of these strata; for with the exception of the relics of that remarkable Devonian fish, the *Stagonolepis Robertsoni*, of Agassiz, not a fossil of any kind had been found in the Covesea rocks, until the discovery of the foot-tracks in question.

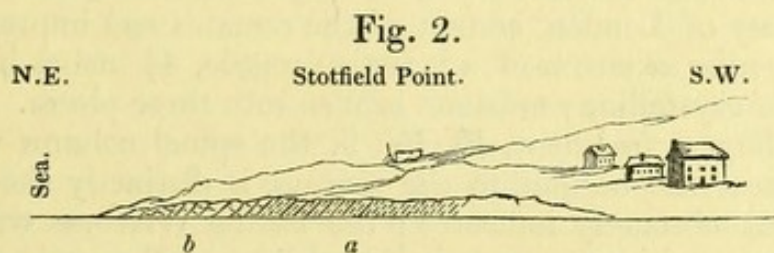
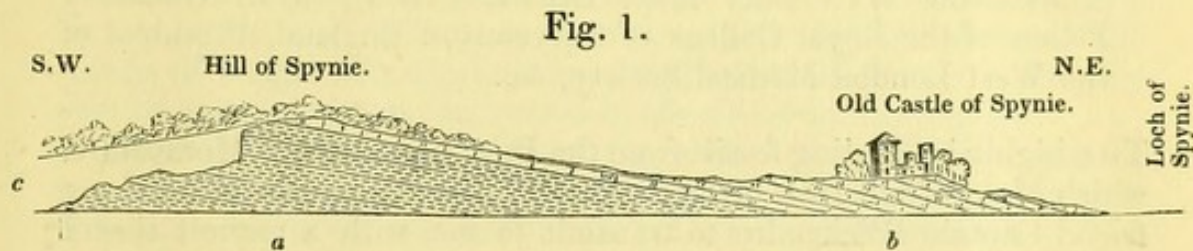
Within the course of the last month, however, a neighbouring hill on the margin of Loch Spynie, hitherto barren of organic remains, but which, like that of Covesea, is held to be Devonian, has yielded from the bottom of its deep quarry a beautiful specimen of a Reptile, which, although its entire length could not have exceeded seven or eight inches, exhibits the vertebral column, ribs, the extremities, and the skull in a compressed state, with some small conical teeth having a smooth enamelled surface.

This peculiarly interesting relic came into possession of Patrick Duff, Esq., of Elgin, who has liberally permitted me to transmit it to London, for the examination of my friend Dr. Mantell, by whom the accompanying description has been drawn up.

I would here mention that at the time of my finding the foot-tracks at Cumingston, a strict investigation took place as to whether the sandstone strata from which the slab was obtained are unquestionably referable to the Devonian formation, to which they had always been considered to belong; the occurrence of foot-prints, apparently of Chelonians, in rocks in which no vestiges of the class *Reptilia* had ever been observed in any part of the world, having led some persons to doubt whether they might not be connected with the Permian Series. The discovery of the Reptile at Spynie, by Mr. Patrick Duff, dispels, however, all doubts on this point, for the sandstones of Cumingston and Spynie are identical, and at Spynie are

overlaid by the cherty limestone peculiar to the upper division of the Devonian in this district.

Figs. 1 and 2.—Sections showing the Relation of the Sandstone and Limestone Rocks in the neighbourhood of Elgin.



a, a. Sandstone } Devonian.
b, b. Limestone }

c. The sandstone quarry from which the fossil reptile was obtained.

The yellow sandstone of Stotfield is a continuation of that of Covesea, from which latter the Foot-prints were obtained.

The relative position of the strata in the two localities above referred to is shown in the accompanying figs. 1 & 2. The quarry from which the reptile was obtained is situated on the Hill of Spynie; the locality whence I extracted the slab with foot-prints is to the north-west, and separated from the former beds by Loch Spynie.

I am reminded, by the accomplished editor of 'The Witness,' Mr. Hugh Miller, "that the Dipterian family, in which M. Agassiz places that unique ichthyolite the *Stagonolepis Robertsoni*, is emphatically an Old Red Sandstone family, represented in the coal-measures only by a *Diplopterus*, and in the Permian series it is without a representative at all."

By the discovery, therefore, of the foot-prints at Cumingston, and of the Reptilian skeleton at Spynie, Morayshire, we have now obtained indisputable evidence in our own country (I believe for the first time) that the class *Reptilia* existed at that very remote period of the world's physical history, which is defined by the deposition of the strata, termed by geologists the Old Red, or Devonian formation.

DESCRIPTION of the TELERPETON ELGINENSE, a FOSSIL REPTILE recently discovered in the OLD RED SANDSTONE of MORAY; with OBSERVATIONS on supposed FOSSIL OVA of BATRACHIANS in the LOWER DEVONIAN STRATA of FORFARSHIRE. By GIDEON ALGERNON MANTELL, Esq., LL.D., F.R.S., G.S., Honorary Fellow of the Royal College of Surgeons of England, President of the West London Medical Society, &c.

THE highly interesting fossils from the Devonian rocks of Morayshire, which Mr. Patrick Duff of Elgin has with great courtesy allowed my friend Captain Brickenden to transmit to me, with a request that I would examine and describe them, and lay the results before the Geological Society of London, consist of the remains and impressions of nearly the entire skeleton of a lacertian reptile, $4\frac{1}{2}$ inches in length, in a block of crystalline sandstone broken into three pieces.

On the largest fragment, Pl. IV. 9, the spinal column with the ribs, from near the occiput to the sacrum, is distinctly shown; the pelvis is but obscurely indicated; the caudal vertebræ with their apophyses, comprising apparently two-thirds of the entire tail, are manifest. There are no traces of the bones of the pectoral arch, nor of those of the feet. Of the left anterior extremity, impressions of the distal half of the humerus, and of the proximal portions of the radius and ulna are the only vestiges; the right arm is indicated solely by a hollow left by the humerus. The forms of the bones of the hinder limbs are demonstrated by the deep imprints of the femora and tibiæ, and less distinct traces of the fibulæ.

The piece of sandstone, Pl. IV. 8, that has been broken from the upper part of the block, Pl. IV. 9, nearly parallel with the plane of the spine, displays the corresponding impressions of the vertebral column and ribs, pelvis, bones of the hinder limbs, and tail.

The third portion of stone, Pl. IV. 4*, 4, has been detached from the anterior part of Pl. IV. 9; it contains the cranium in a very mutilated state, and in a great measure concealed by the investing matrix. The removal of the surrounding sandstone would probably disclose characters that might assist in determining the natural affinities of the original animal, but as this unique and most important relic was entrusted to me for description only, I have not ventured to attempt its more complete development; in fact, the extreme fragility of the specimen would render such an operation very hazardous.

With the exception of the imbedded skull, scarcely any vestige of the osseous substance remains; impressions, more or less distinct, of the spinal column, pelvis, and extremities, and replacements or casts of a considerable number of the vertebræ by the investing rock, are the only indications of the form and structure of the Devonian reptile which the researches of Mr. Duff have brought to light.

In the largest block (Pl. IV. 9) the dorsal aspect, or upper part, of the skeleton is exposed. The vertebral column and ribs are almost in a normal position; the cranium is somewhat displaced, and lies on

one side ; the extremities are partially extended, and the thigh-bones directed forwards ; the tail is curved towards the right.

At the first glance the fossil presents so striking a resemblance to the skeleton of a small lizard, that upon a hasty inspection, I had no doubt that it belonged to a lacertian reptile, and anticipated but little difficulty in determining the form and relations of the original : but a careful examination disclosed anatomical characters, which, if I have rightly interpreted, indicate an approach to the batrachian type : the results of a rigid investigation and comparison of every recognizable part of the skeleton are embodied in the following description.

Cranium.—From the outline of the mutilated skull, which can be traced but imperfectly, the form of the head appears to have been oblong, with a gently rounded muzzle (Pl. IV. 3, 4). The remains of the vomerine and palatine bones are seen between the imprints left by the lower jaw, but are too much crushed to afford any satisfactory information as to the original form and structure of this part of the cranium. The impressions of the distal or articular portion of each ramus of the lower jaw are faintly shown, as sketched in Pl. IV. 3, and 4, *a, a* ; but I have searched in vain for indications of the divisions of the several parts that enter into the composition of the inferior maxillary bone in reptiles ; even the outline of the anterior portion of the dentary piece is not traceable.

Teeth.—Capt. Brickenden informs me that when the fossil was discovered there were several extremely minute conical teeth, having a smooth polished surface ; they were displaced, but distinctly visible. Under a highly magnifying power two or three teeth are still discernible (Pl. IV. 1, 1 *a*, 2), but their original position in the jaw is not obvious. I have been unsuccessful in my attempts to make out the structure of the occipital condyle.

Vertebræ.—I cannot detect the atlas or axis ; the first vertebra seen in Pl. IV. 9, is probably the third or fourth cervical : the spinal column from this point to the sacrum consists of twenty-four vertebræ, as in the Iguana, each bone bearing a pair of ribs. Whether the bodies of the vertebræ were concavo-convex, as in the Lacertians, or the reverse, as in the Salamanders*, or doubly concave, as in the living Axolotl (a Batrachian that inhabits the Lakes of Mexico), I cannot positively determine ; but the sparry replacements of some of the intervertebral spaces appear to indicate the latter modification of structure : and if these casts exhibit the normal form, the vertebræ must have been deeply concave at both extremities : the length of a dorsal vertebra is one-ninth of an inch.

The vertebræ are for the most part exposed dorsally ; that is, the upper part of the neural arch is deeply imprinted on the stone, in Pl. IV. 8 : and sparry casts of the bodies of the bones constitute a portion of the spine in Pl. IV. 9.

A cast from the specimen, Pl. IV. 8, exhibits the form of the upper part of the vertebral column, so far as it can be determined from the

* In the *Salamandridæ* the vertebræ are convex anteriorly and concave posteriorly : the reverse of those of Frogs and Lizards : in the Axolotl they are deeply cupped at both ends.

fossils (see Pl. IV. 5, 6). In this point of view the dorsal aspect of the vertebra is of a subquadrangular form; the articulating planes of the zygapophyses are horizontal; the neural arch rises into a roof or dome, the spinous process forming only a slight ridge, and not a sharp crest, as in Lizards*. The body or centrum of the vertebra is cylindrical, slightly contracted in the middle, and both articular ends are concave: such at least is the inference I have drawn, after a careful consideration of the various appearances presented by the fragmentary remains of the spinal elements. If this view be correct, the characters of the vertebræ are peculiar: the centrum resembles that of the vertebræ in the Axolotl, and in numerous extinct Saurians, while the neural arch approaches the corresponding element in the Salamanders. A comparison of Pl. IV. 6, which is an enlarged view of the dorsal aspect of the neurapophysis of one of the fossil vertebræ, with the vertebra of the large Salamander, *Sieboldtia maxima* (Pl. IV. 7), for which I am indebted to J. E. Gray, Esq., shows this resemblance. Another remarkable feature of the spinal column in the fossil reptile is the great uniformity of character in the vertebræ throughout the spine. The sacral vertebræ are but indistinctly denoted: the caudals have long apophyses, and only ten or twelve vertebræ are disclosed, the terminal series being concealed beneath the stone; probably the entire length of the tail did not exceed an inch and a half.

Ribs.—The ribs, of which there are twenty-four pairs, are remarkably slender, and appear to have been attached by a simple head as in the Lizards; but, as only imprints of these processes remain, the mode of union with the bodies or neural arches of the vertebræ is not distinctly recognizable. Some of the impressions seem to indicate that the ribs were attached to a tubercle on the anterior part of the centrum: others may be traced to the middle, as if occupying the same relative position as in the Salamanders (see Pl. IV. 7); but the evidence on this point is very equivocal.

The length and curvature of the costal processes and the simple mode of attachment are lacertian characters, and strongly contrast with the usual abbreviated and rudimentary condition of the ribs in Batrachians; yet there is no proof that any of these processes extended forward to the sternum, or were united to thoracic or abdominal cartilages; on the contrary, the extremity of each rib appears to be entire, as if none of these bones were originally prolonged beyond the impressions left on the stone (Pl. IV. 9); and should future discoveries confirm the view above enunciated of the structure of the neural arch, it may be well to remind the reader, that in a genus of living batrachians, the *Pleurodeles*†, the ribs are developed almost to as great an extent as in this fossil reptile‡.

Pelvis.—On the specimen, Pl. IV. 9, the form of this part of

* In Lizards, after the twelfth dorsal vertebra the spinous process is a strong, well-marked character.—CUVIER.

† PLEURODELES, *Waltl*, Gray's Catalogue of Amphibia in the British Museum, p. 17.

‡ I am indebted to the eminent zoologist of the British Museum, John Edward Gray, Esq., for this reference; and also for unrestricted access to the important osteological collection which has been formed by his exertions.

the skeleton is indicated by a slight convexity, with an obscure median ridge; apparently produced by coalesced sacral vertebræ: on the stone, Pl. IV. 8, the corresponding impression is better defined, but there are no manifest outlines of the bones composing the pelvic arch. The subquadrangular depression in Pl. IV. 8 closely resembles that which would be left by the dorsal surface of the pelvis of the Salamanders; and under some points of view I thought there were perceptible traces of ilia and ischia resembling those of that family; but no reliance can be placed on this supposition. I have sought in vain for such impressions as the iliac bones of Iguanas or of other Lacertians or Saurians would produce; and I am not aware of any reptilian pelvis, except that of Batrachians, that could give rise to such an outline as is seen in Pl. IV. 5, 8, 9.

It may be proper to remark, that the pelvis is placed after the twenty-fourth vertebra as in the Iguana; in Batrachians the pelvic arch is usually attached from near the fifteenth to the eighteenth vertebra; but in the fossil Salamander of *Œningen*, it is situated near the twenty-first or twenty-second.

Pectoral arch.—Of this important element of the skeleton there are no vestiges exposed.

Anterior extremities.—Impressions of the distal half of the left humerus, and of the corresponding proximal portions of the ulna and radius (Pl. IV. 9) are the only indications of the anterior limbs, and these present no distinctive characters.

Hinder extremities. Femora.—Both femora (Pl. IV. 8, 9) have left distinct imprints, so that the form of the original can be made out. A restored outline is given in Pl. IV. 5. The femur has an oval head, a sharp process or trochanter on the inner side of the neck, and a subcylindrical shaft, the distal end of which is slightly expanded, and compressed in its antero-posterior diameter: the popliteal space and the two small condyles are seen in Pl. IV. 5.

Tibiæ and Fibulæ.—The forms of these bones are not perfectly defined by the imprints on the stone. The tibia has the shaft gently bowed, and expanded at each extremity; the corresponding fibula is a more slender bone: its entire shape is not seen.

Feet.—Unfortunately there are not the slightest traces of the bones of the feet.

The following measurements are added to give more precision to the above description:—

Cranium, length 8 lines.

Vertebral column, from the occiput to the pelvis, 2·4 inches.

Ribs, the longest 6 lines; equal to about the length of five dorsal vertebræ.

Femur, length $5\frac{1}{2}$ lines.

Tibia, length 4 lines.

Pelvis, transverse diameter 4 lines.

—, antero-posterior diameter 3 lines.

As the drawings are of the size of the original, further particulars are unnecessary.

The above statement comprises every osteological character of this

Devonian Reptile, which a patient investigation of the specimens has enabled me to detect; the details have been worked out by the aid of models of those bones that have left distinct imprints, and by this method the form of the dorsal aspect of the neurapophyses, and of the bodies of the vertebræ, the femora, &c., as represented in Pl. IV. 5, were determined.

On the accuracy of the descriptions the palæontologist may rely, for they have been drawn up with due caution and are faithfully recorded; but the following observations on the probable affinities of the original animal are offered with much deference, and as mere approximative inferences, the true value of which the discovery of a skeleton, or even of detached bones, will sooner or later determine.

The structure of the skeleton, so far as it is disclosed by the specimens submitted to my examination, indicates a peculiar type of reptilian organization, in which, as in numerous other extinct forms of this Class, osteological characters are associated, which in existing oviparous quadrupeds are restricted to distinct orders or genera. Such anomalies (as our preconceived archetypal notions lead us to regard them) are continually presented to the palæontologist, and often embarrass his attempts to interpret the relics of beings whose races have long since been swept from the face of the earth.

The skeleton from Elgin exhibits lacertian characters with batrachian modifications. From the mutilated condition of the imperfectly exposed cranium, the feeble imprint of the lower jaw, and the uncertainty as to the mode of implantation of the teeth, no conclusive opinion can be formed as to the construction of the skull; the oval or oblong form of the head may belong either to a Lizard, or an aquatic Salamander. In the length and characters of the ribs, the situation of the pelvis, and the well-developed limbs, the fossil exhibits lacertian or varanian affinities; but the apparent structure of the neural arch with its small spinous process, and the horizontality of the articular surfaces of the zygapophyses, and the shape of the impression left by the pelvic arch, are suggestive of batrachian characters; and in regard to the extent of the ribs, the fact that in the *Pleurodeles* the costal processes are not rudimentary, as in other batrachians, renders that feature less decisive.

In the absence of any certain knowledge of the essential characters of the cranium, jaws, and mode of dentition, and with no traces of the bones composing the pectoral arch and feet, and with but faint indications of the structure of the pelvis, I cannot presume to refer the fossil reptile to any existing order. The difficulties which beset the determination of the natural relations of extinct reptilians, of which even the skull, teeth, and jaws, and many other parts of the skeleton, are known, are strikingly exemplified by the fact, that at the present time the Labyrinthodonts, which in England are generally considered to be true batrachians, are regarded as saurians by many eminent foreign palæontologists (Von Meyer, Plieninger*, Pictet, &c.); and the

* The Labyrinthodonts are divided by these authors into three genera, viz. *Mastodonsaurus* (of Jäger); *Capitosaurus*, and *Metopias*. See 'Beiträge zur Palæontologie Württembergs.' Stutgard, 1844.

original name of *Mastodonsaurus* is actually restored to the great Wirtemberg reptile, discovered by my friend Dr. Jäger of Stutgard. In fact, the characters of the batrachian order are chiefly derived from the soft parts, of which no traces occur in a fossil state; and it is consequently impossible to determine with precision whether remains of reptiles of extinct types, and of whose early condition we are in utter ignorance, are referable to saurians or to batrachians.

From what has been advanced, I am led to conclude that if future discoveries should prove the batrachian character of the reptile of the Old Red of Scotland, the original must have nearly resembled in general form, and doubtless also in its habits, the Tritons or aquatic Salamanders; but that it had a longer and broader dorsal region, a wide tail, and well-developed limbs, equally adapted for progression on the land or through the water: on the other hand, should its lacertian relations be established, it probably differed but little in its physiognomy and economy from the small existing terrestrial Lizards, its length not exceeding six or seven inches.

In the uncertainty as to the natural relations of this most ancient skeleton of an oviparous quadruped hitherto discovered, I propose to distinguish the Devonian reptile of Scotland by a term simply denoting its remote antiquity, viz. TELERPETON (*τῆλε*, *afar off*; *ἑρπετόν*, *a reptile*), with the specific designation of *Elginense*, to record the locality whence it was obtained.

DESCRIPTION OF PLATE IV.

Illustrative of the TELERPETON ELGINENSE (Mantell), a fossil Reptile from the Old Red Sandstone of Morayshire. The original is in the collection of Peter Duff, Esq., of Elgin.

- Figs. 1a, 2. Enlarged views of very minute conical teeth seen in the portion of cranium represented in figs. 3 and 4.
- Fig. 1. Enlarged view of a fractured tooth showing a relatively large internal cavity.
- Fig. 3. Imprints of the posterior part of the two rami of the lower jaw, with vestiges of minute teeth, and the palatal arch of the skull, seen from beneath, as exposed in the piece of stone, fig. 4. The form of the anterior part of the head and lower jaw is not obvious. *a, a*. The impressions of the posterior angles of the lower jaw.
- Fig. 4. The remains of the cranium, imbedded in the fragment of stone, fig. 4*, as seen when separated from the block, fig. 9.
- Fig. 5. Restored outlines of part of the vertebral column, pelvis, bones of the hinder extremities, &c.
- Fig. 6. Enlarged view of a dorsal vertebra of the TELERPETON, with the anterior and posterior zygapophyses of the contiguous vertebræ.
- Fig. 7. Dorsal vertebra of the large Salamander (*Sieboldtia maxima*), to show the general resemblance of the neural arch and the zygapophyses to those of the *Telerpeton*.
- Fig. 8. A portion of sandstone struck off from the larger block (fig. 9), in the direction of the plane of the spinal column. It exhibits the imprint of the dorsal aspect of the skeleton.
- Fig. 9. Impression of the skeleton of TELERPETON ELGINENSE, natural size, showing the outline of the vertebral column, ribs, pelvis, femora, tibiæ and fibulæ, part of the caudal series of vertebræ, the left humerus, radius and ulna, imperfect traces of the right anterior extremity, and obscure indications of part of the cranium.

On supposed Fossil Eggs of Reptiles, from the Devonian Rocks of Forfarshire.

In connection with the announcement of the discovery of fossil reptiles in the Old Red of Morayshire, I would offer a few remarks on certain organic remains that occur in the more ancient Devonian strata of Forfarshire, and which are popularly termed "petrified blackberries," and have been considered by some naturalists to be seeds, by others the ova of gasteropodous Mollusca.

These fossils are small, carbonaceous, oval bodies, more or less depressed, and are figured by Sir Charles Lyell with the following observations* :—

"In the same grey paving-stones and coarse roofing-slates in which the *Cephalaspis* occurs, in Forfarshire and in Kincardineshire, the remains of marine plants or fucoids abound. They are frequently accompanied by groups of hexagonal, or nearly hexagonal, markings, which consist of small carbonaceous bodies placed in a slight depression of the sandstone or shale. These much resemble in form the spawn of the recent *Natica*, in which the eggs are arranged in a thin layer of sand, and seem to have acquired a polygonal form by pressing against each other. The substance of the egg, if fossilized, might give rise to small pellicles of carbonaceous matter. These fossils I have met with both at the foot of the Grampians, north of the valley of Strathmore, and in the vertical shale beneath the conglomerate, and in corresponding beds in the Sidlaw Hills; always occupying the same situation, and without any intermixture of shells, whether marine or freshwater."

Several years ago my attention was directed to this subject from having obtained, from some indurated mud thrown up from the bottom of a long dried-up pond on Clapham Common, a carbonized mass of the ova of a Frog (*Rana temporaria*), which so closely resembled the petrified eggs of Forfarshire, that I suggested to Sir Charles Lyell the much greater probability that the latter were referable to batrachians than to gasteropodous mollusks; but, although the analogy was admitted, the fact that no traces of reptiles had at that time been discovered in any formation more ancient than the Trias, was regarded as fatal to such an interpretation.

On receiving the fossil reptile from Elgin, the idea of the batrachian origin of the "petrified blackberries" again recurred to my mind, and from a careful examination of all the specimens within my reach, and a comparison of the fossil ova with those of the Frog in a carbonized state, I have no hesitation in expressing my conviction, that if the *animal origin* of the carbonaceous bodies found in the shales of Forfarshire be proved, there is no doubt that they are the ova of batrachians closely allied to the *Ranidæ* or Frog tribe.

The fossil eggs occur in clusters blended with the foliage of apparently fluviatile plants. Their forms are in many instances well defined, and the polygonal depressions, apparently produced by the

* Manual of Elementary Geology, 3rd edition, p. 344.

removal of the ova, are distinctly shown; and they entirely correspond with those in the recent carbonized mass from Clapham.

Fig. 1.

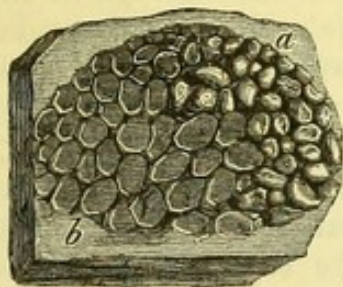


Fig. 2.

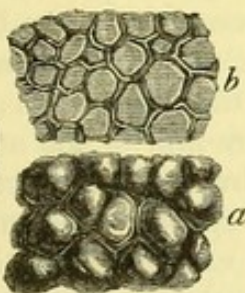


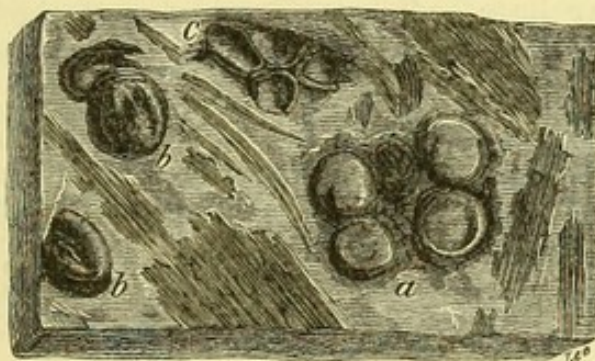
Fig. 1. *Slab of Old Red Sandstone, Forfarshire, with eggs of Batrachians?*

a. Ova in a carbonized state.
b. Egg cells; the ova having been shed.

Fig. 2. *Eggs of the common Frog, Rana temporaria, from a dried-up pond in Clapham Common.*

a. Portion of the ovary.
b. A transverse section of the mass exhibiting the form of the egg-cells.

Fig. 3.—*Devonian Shale, Forfarshire, with impression of Plants and Eggs of Batrachians?.*



a. Two pair of ova resembling those of large Salamanders or Tritons on the same leaf.
b, b. Detached ova. c. Egg-cells of Frogs?

[The use of the above woodcuts has been kindly granted by Sir C. Lyell.]

Associated with these remains are small, oval, roundish bodies, disposed singly or in pairs among, and sometimes adherent to, the foliage with which they are collocated; these fossils so strikingly resemble the eggs of aquatic Salamanders, that, admitting the batrachian character of the specimens previously described, there is every reason to conclude they are the mineralized ova of reptiles, which, like the recent Tritons, deposited their eggs on the leaves of aquatic plants.

Aware how startling such a statement might appear to those who had not examined the evidence on which it is founded, I requested my friend Mr. Newport, our eminent physiologist, whose profound investigations of the development of the ova in the *Amphibia* have recently received the award of a Royal Medal, to allow me to place before him the facts which bear on this question; and I am permitted to state that, after a careful investigation of the fossil and recent ova, Mr. Newport concurs with me in the opinion that the carbonized eggs in the Devonian shales of Forfarshire are referable to Batrachians; those which are in clusters, and in size, form, and arrangement, resemble the spawn of the Frog, belong to *Ranidæ*; while the larger ova that occur singly or in pairs, and are attached to leaves, are probably those of large aquatic Salamanders. It may be observed that

Sir Charles Lyell remarks, that from the *entire absence of shells* in the grey shales and slates that underlie the conglomerate of the Old Red of Forfarshire, he found no fossils so useful in identifying the beds as these ova. The *Cephalaspis* occasionally occurs in the same strata; but, assuming these eggs to be batrachian, the remains of fishes are absolutely as nothing in comparison with the myriads of vestiges of aquatic reptiles that are scattered through the Lower Devonian deposits of Forfarshire and to the north of Fife.

Thus, for the first time, we have obtained certain proofs of the existence during the Devonian epoch of several orders of the class *Reptilia*, of which (with the exception of the supposed chelonian foot-prints in the Lower Silurian) no indications were known in any formation more ancient than the Carboniferous.

In the *Telerpeton Elginense* (and whether the original were a lacertian or a batrachian is of no importance whatever in a geological point of view) we have indisputable evidence of the presence of air-breathing oviparous quadrupeds, bearing a general resemblance to the Lacertians or Salamanders of modern times.

The quadrupedal foot-tracks discovered by Capt. L. Brickenden—according to the accepted interpretation of similar imprints by palæontologists—denote the existence of terrestrial Chelonians or Tortoises contemporaneously with the *Telerpeton*. The ova in the shales of Forfarshire carry back the reptilian fauna to a yet remoter period, and afford presumptive proof that the rivers and streams of the Devonian ages swarmed with Frogs and Tritons; and the occurrence of these remains with those of fluviatile plants, and of ganoid fishes (which, for aught we know to the contrary, may, like the *Lepidostei* of the American rivers, and the *Polypteri* of the Nile, have been inhabitants or frequenters of fresh water), together with the absence of shells and casts of shells, suggests the probability that the strata in which these fossils are distributed may be of lacustrine or freshwater origin.

I refrain from indulging in any comments on the bearing of these discoveries on the problems relating to the successive appearance of distinct types of organic life on the surface of our planet, as indicated by the fossil remains discovered in the respective formations; yet I cannot conclude without reminding the Society, that but a few months have elapsed since our late President, Sir Charles Lyell, in his last Anniversary Address, with the view of restraining the rash and hasty generalizations of those who would fix the first creation of each tribe of plants or animals, or even of animate beings in general, at the precise point where our retrospective knowledge happens to stop, emphatically remarked that “our acquaintance with the living creation of given periods of the past must depend in a great measure on what we commonly term chance; and that the casual discovery of new localities rich in peculiar fossils, may modify or entirely overthrow all our generalizations which are based on the supposed non-existence at former epochs, of the fossil representatives of large families or classes of plants and animals*.”

* Quart. Journ. Geol. Soc. 1851, vol. vii. p. lxxviii.

And now, ere another Anniversary has arrived, the casual researches of two gentlemen in the Old Red Sandstone of a remote part of Scotland, have brought to light memorials of the past which establish the existence, during the Devonian epoch, of several orders of a higher class of *Vertebrata* than had previously been discovered; and this evidence is so complete and incontrovertible, and affords such an unexpected and striking confirmation of the truth and sagacity of the salutary caution enunciated by our late President, that his warning assumes the character of a prediction, the fulfilment of which may possibly be not very distant.

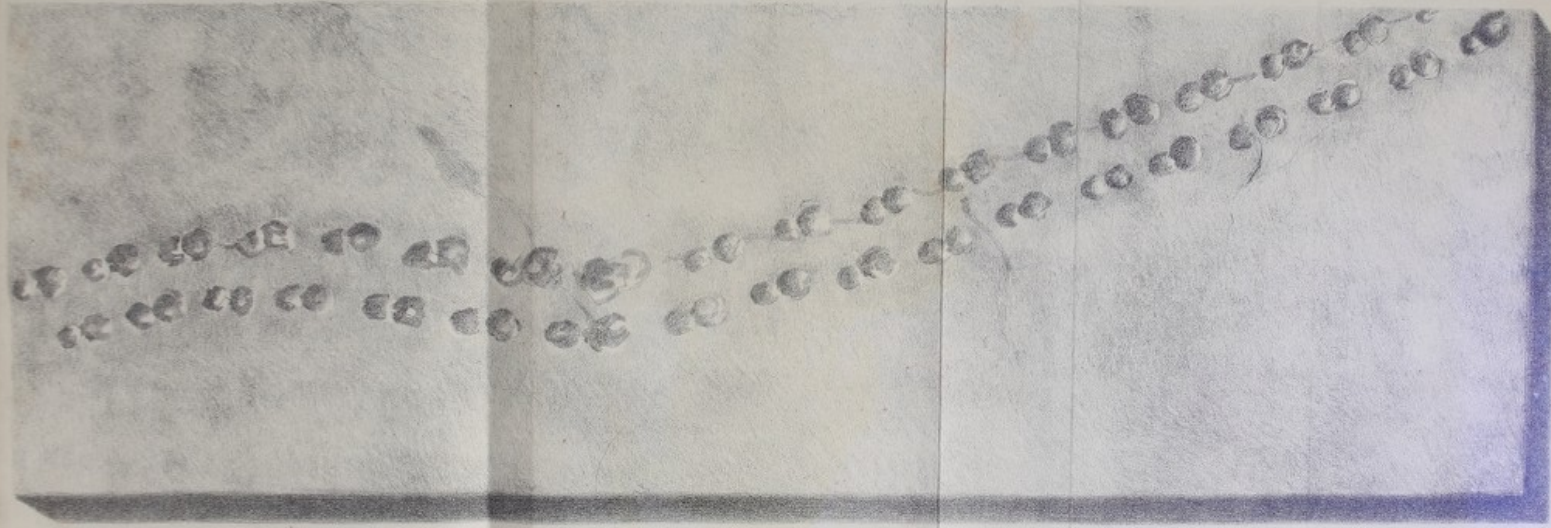
It only remains for me to express my warmest thanks to my friend Capt. L. Brickenden, and to Mr. Patrick Duff, for enabling me to have the pleasure and privilege of communicating to the Geological Society an account of one of the most interesting and important discoveries in British Palæontology which it has ever been my good fortune to record.

Chester Square, November, 1851.

And now the reader will observe that the two
of two examples in that the first part of a sentence
that have been in this manner of the particular
analysis during the process of the mind of a
man of letters that has been the subject of
reference to the first and the second part of
a sentence and the mind of the reader will
find that the first part of a sentence is
often the subject of a sentence, and the
second part is the object of a sentence.

In the first part of a sentence the subject
is the person or thing that is doing the
action, and in the second part the object
is the person or thing that is receiving the
action. For example, in the sentence "The
king died," the king is the subject and
died is the action, and in the sentence "The
king died of a fever," the king is the
subject, died is the action, and of a fever
is the object.

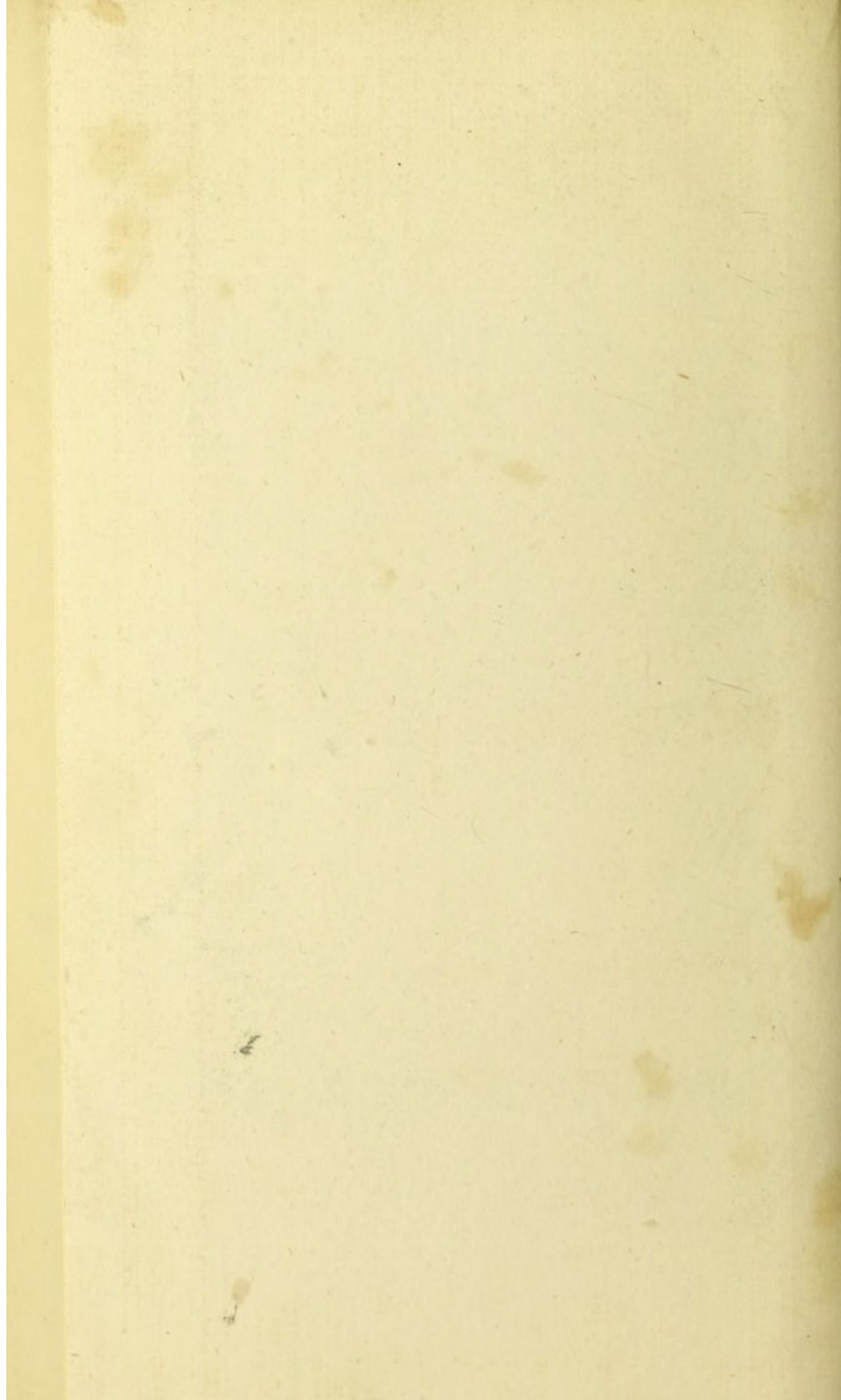
Copy and analyze it.

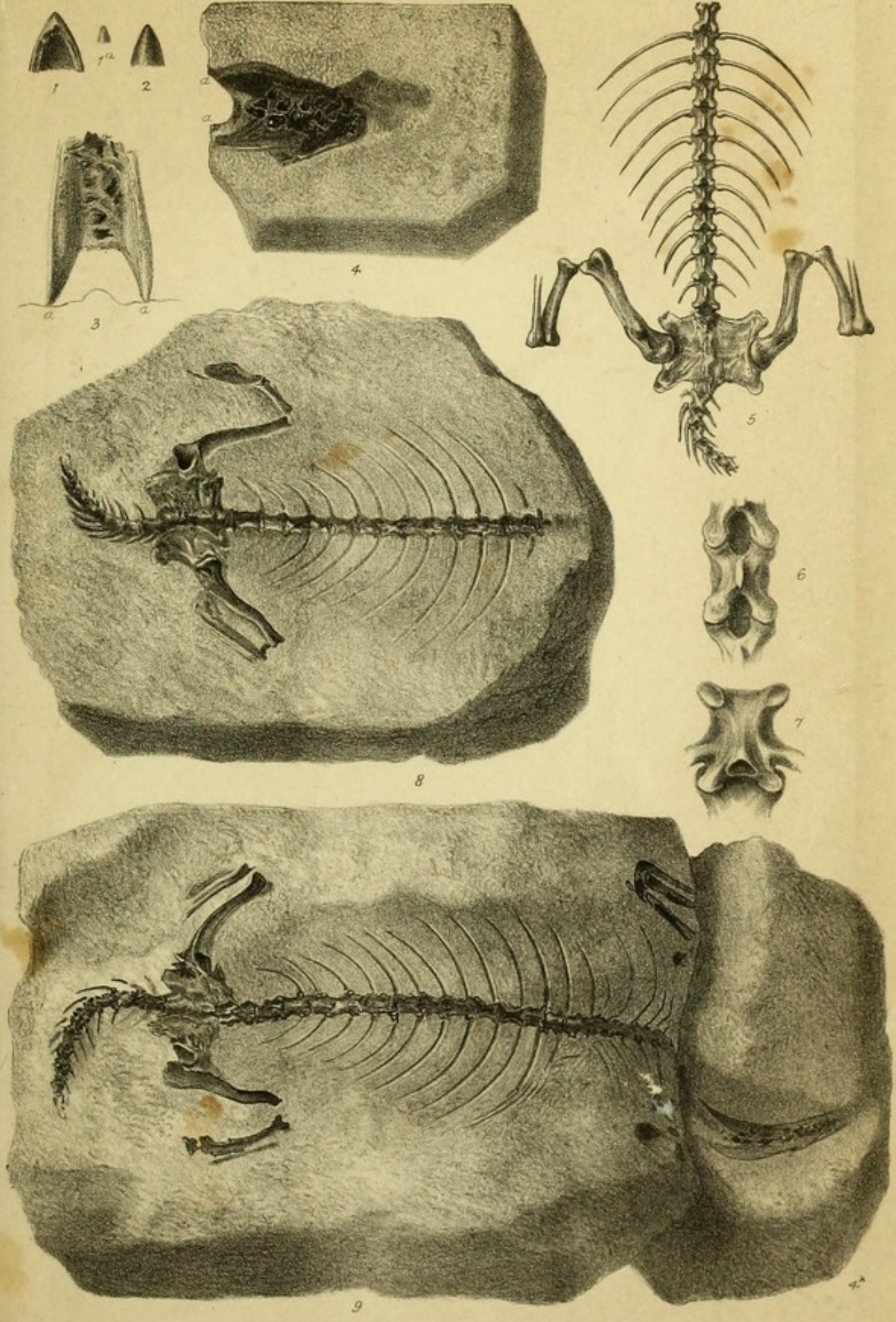


Drawn by Capt. L. Anderson.

FOOT-TRACKS ON THE DEVONIAN SANDSTONE OF CUMMINGSTONE, NEAR ELGIN.
One Sixth the natural size.

Ed. & West Lithographers, 34, Hatton Garden.





See Dial. of Geol. p. 103.

Fig. 1. West. Lithographic. Edin. Geol.

TELERPETON ELGINENSE (Mantell)
From the Old Red Sandstone of Morayshire discovered by P. L. ff. Esq. 1851.

Richard

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