

FOSSIL FOOTPRINTS FROM THE MIDDLE TRIASSIC OF
NOTTINGHAMSHIRE AND DERBYSHIRE

by

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Summary

Vertebrate tracks collected by the late Professor H. H. Swinnerton from the Keuper Waterstones at Mapperley Park, Nottingham, and Dale Abbey, Derbyshire, are described. Six types are recognised, of which one accords with tracks known hitherto only from Germany; the others are of undescribed types. Two new ichnospecies are proposed: Swinnertonichnus mapperleyensis ichnogen. et sp. nov. and Deuterotrapous planus ichnosp. nov. In addition, the diagnosis of an existing ichnogenus, Coelurosaurichnus, is emended. Four of the types of tracks are considered to be those of small dinosaurs: the remaining two types may both be the tracks of small amphibians.

INTRODUCTION

Tracks and footprints of vertebrates have been found widely in Triassic rocks in many parts of the world, but records from the Nottingham region are extremely meagre. The earliest record is of the finding by the Rev. A. Irving of a Cheirotherid print in the railway cutting at Colwick (see Swinnerton, 1910, p. 229). In 1910, H. H. Swinnerton found a series of footprints in a temporary exposure in Nottingham, at a locality never stated with any precision, but described variously as "the Sherwood suburb" and "Mapperley Park". The published photograph of this temporary outcrop (Swinnerton, 1912, pl. III fig. 1) does not give sufficient information for precise localisation. Swinnerton's specimens are now in the collections of the Department of Geology, University of Nottingham: they are consistently labelled "Mapperley Park". The exposure was of Keuper Waterstones, seen as between 8 and 15 feet (no measurements are quoted) of sandstones and marls. Towards the top, a layer of enigmatical sedimentary structures, called "fucoidal markings", was present: immediately below this was a 2 inch bed yielding fish remains. The sandstone below the fish bed contained the footprints, consistently found as casts in sandstones of footprints originally impressed into an underlying marl. Ripple marks were also noted.

A brief note recording preliminary observations was published by Swinnerton in 1910: and a fuller account of the exposure, with descriptions of two types of tracks (distinguished as "A" and "B"), was published in 1912. The surviving collections contain a number of further footprint types, never described by Swinnerton.

There have been no subsequent published accounts of Triassic footprints from the Nottingham region. However, Swinnerton's collections also contain footprints, obtained at some unascertained date, from a temporary exposure of the Keuper Waterstones at Dale Abbey, Stanton-by-Dale, Derbyshire.



Text-fig. 1. Sketch of the slab illustrated in Plate 13 showing the distribution of vertebrate footprints and indications of tail-drag. Inset figures (at $1\frac{1}{2}X$ general scale): A. Varanopus aff. curvidactylus. B. Microsauropus aff. acutipes.

In view of the paucity of records of vertebrate footprints from this region and the interest of these tracks in particular, the author undertook a restudy of Swinnerton's collections, the results of which are presented in this paper. The footprints of type A were unfortunately not found; and only one example of type B, fortunately an excellent specimen, was located. An account and discussion of the footprints is given below, and a discussion of the results follows. (The principles of footprint classification are outlined in Sarjeant, 1966).

The Keuper Waterstones were placed into his "Waterstones Formation" by Elliott, 1961. Correlation with the type Triassic of Germany has presented considerable problems in the past; and an Upper Triassic age has frequently been assigned to these beds. However, a recent palynological study by Warrington (1967) suggests that they are equivalent to the lower Ladinian Stage of Continental Europe (Middle Triassic).

Systematic Descriptions

Ichnogenus Microsauropus Moodie, 1929

Diagnosis. Quadrupedal, with four digits in the manus and five in the pes. Digitigrade: no impression of palm or sole. Digits thick and sharply acuminate, or slender and clawed: lateral digits short. Feet rectigrade, hindfoot placed in front of forefoot impressions. Tail short in all species recorded to date: hind limb apparently longer than fore limb.

Type Species. Microsauropus clarki Moodie, 1929, Permian (Upper Clear Fork Formation), Texas.

Microsauropus aff. acutipes Moodie, 1929

Plate 13 Text-figs 1B, 2C.

- aff. 1929 Microsauropus acutipes Moodie, pp. 362-4, Figs. 2, 6, 7.
- aff. 1930 M. acutipes, Moodie, p. 551, Fig. 2.
- aff. 1958 M. acutipes. Kuhn, Pl. 6. Fig. 19.
- aff. 1963 M. acutipes, Kuhn, p. 37.

Description.

Represented by a number of imprints, only one of which is clear enough for study and description: a right pes - and in this instance the fourth digit has shifted, producing two impressions. (The second is shaded in Text-figs 1B and 2C.) Right pes with five digits, the first short and faintly impressed, the second proportionately very long, the third moderately long, the fourth and fifth short. All digits sharply clawed and slender. Stride and trackway not determinable: prints in part associated with faint indications of tail drag.

Figured Specimen.

P.C. 3365, collections of the Geology Department, University of Nottingham.

Horizon and Locality

Keuper Waterstones (L. Ladinian: Middle Triassic), Mapperley Park, Nottingham.

Dimensions

Right pes; length overall 1.8 mm., maximum breadth (from tip of digit I to tip of digit IV) 9.5 mm. Length of digits: I, 5 mm.; II, 1.2 mm.; III, 7.5 mm.; IV, 6 mm.; V, 4 mm. Other prints insufficiently clear to merit measurement.

Divarication of Digits.

Right pes; I-II, 19°; II-III, 18°; III-IV, 23°; IV-V, 36°. Based on a single imprint, but examination of other, less perfect imprints suggests that those angles are relatively constant.

Remarks.

The Triassic specimens closely resemble Moodie's material from the Permian of Texas, but differ in a number of details. They are considerably larger, the longest digit measuring 12 mm. as against 6 mm. in the holotype; the digits are less broad; and the digits are directed forward, whereas the outer end of the digits of M. acutipes form an angle to the inner end. The other species of the ichnogenus Microsauropus are even more markedly dissimilar from the Nottingham forms in proportions.

It is certain that these represent an undescribed ichnospecies : but the inadequacy of the material renders the giving of a new name inadvisable.

Moodie considered his Texan footprints to have been made by microsaur, a group of amphibians known only from the Carboniferous and Permian. The footprints from the Nottingham Triassic cannot, it seems, have been made by microsaur; and the history of the smaller amphibians in the Triassic is obscure. The salamanders, the only comparable group of present day amphibians, are not known earlier than the Cretaceous. It seems, therefore, that, if these footprints are indeed amphibian, they were produced by an amphibian "missing link" between microsaur and salamanders. Confirmation of an amphibian affinity depends on the nature of the manus: a four-toed manus would support such an affinity, whereas a five-toed manus would render an affinity to the lizards or rhynchocephalians (both present in the Triassic) more feasible. The rock slab shows a number of apparently four-toed impressions, some of which appear to be associated with the prints of the pes here described: unfortunately, the pattern is so random and the prints so poor that this cannot be confirmed. It can only, therefore, be said that these are probably - not certainly - the footprints of a small amphibian.

Ichnogenus Varanopus Moodie, 1929.

Diagnosis.

Quadrupedal, with four digits in the manus and five in the pes. Digitigrade; impressions of palm and sole present or absent. Digits all curved and sharply clawed. Hindfoot placed inside of forefoot impression.

Type Species. Varanopus curvidactylus Moodie, 1929. Permian (Upper Clear Fork Formation), Texas.

Varanopus aff. curvidactylus Moodie, 1929

Plate 13 Text-figs. 1A, 2D.

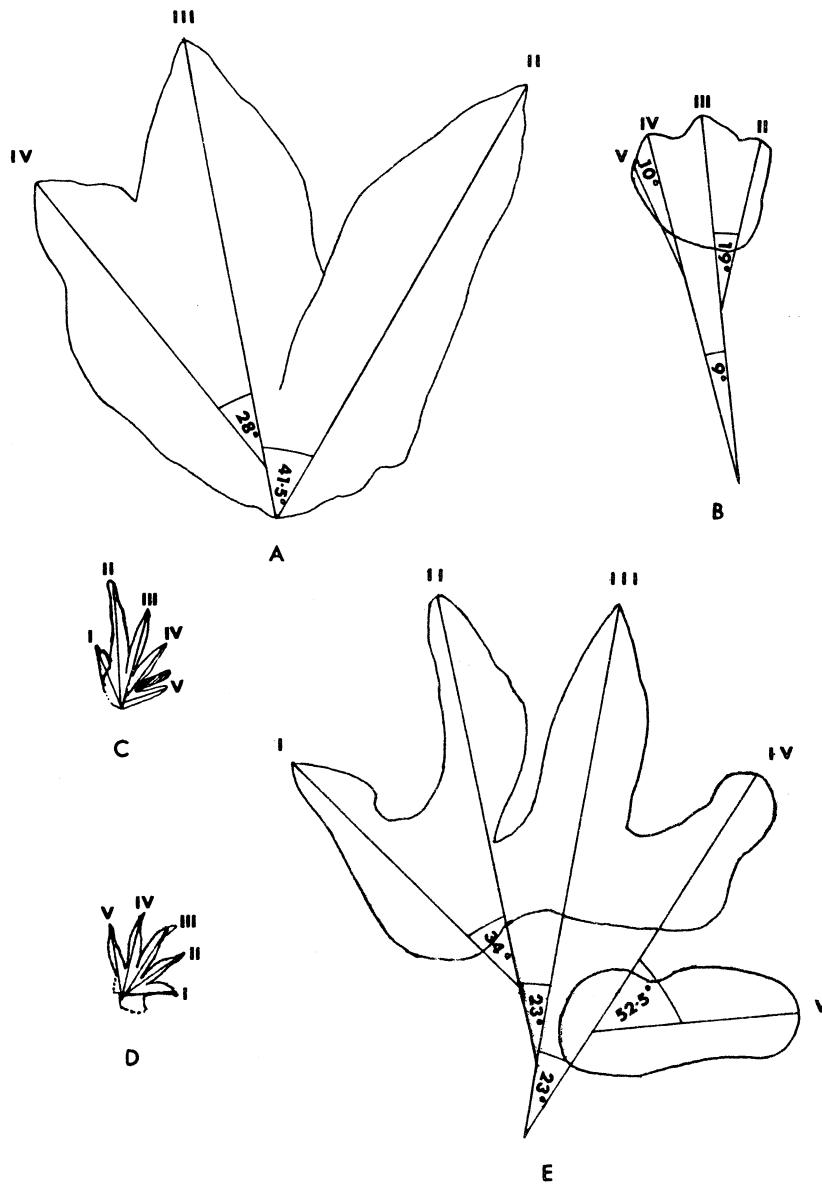
aff. 1929. Varanopus curvidactylus Moodie, p. 365, Fig. 8.

aff. 1958. V. curvidactylus Kuhn, pl. 6 fig. 17.

aff. 1963. V. curvidactylus Kuhn, p. 47.

Description.

Represented by a number of impressions, only one of which is clear enough for study and discussion - a pes, partly obscured by tail drag, considered to be the left pes. (The imperfect impressions of the manus suggest that this bears four digits and is smaller than the pes; they are, however, too poor to merit full description). Left pes with five digits, four of comparable length, the first somewhat shorter: impression of palm also present. All digits slightly curved inward and with sharp claws. Prints associated with tail-drag, suggesting a moderately short tail sometimes carried clear of the ground. Stride and trackway not determinable.



Text-fig. 2. Sketches of footprints, showing the angles of divarication of the digits. A. Coelurosaurichnus sp. B. Deuterotetrapous plancus ichnosp. nov. C. Microsauropus aff. acutipes. D. Varanopus aff. curvidactylus. E. Brachychirotherium coburgense.

Figured Specimen.

P. C. 3365, collections of the Geology Department, University of Nottingham.

Horizon and locality.

Keuper Waterstones (L. Ladinian: Middle Triassic), Mapperley Park, Nottingham.

Dimensions.

Left pes: length overall 15 mm, maximum breadth (from tip of digit I to tip of digit V) 14 mm. Length of digits: I, c. 4.5 mm.; II, 8 mm.; III 9 mm.; IV 8 mm.; V, 7 mm. Manus smaller: prints not capable of accurate measurement.

Divarication of Digits.

Left pes; I-II, 31°; II - III, 23°; III - IV, 21°; IV - V, 22°. Based on a single imprint: but other, less clear imprints suggest comparable angles.

Remarks

The Triassic specimens resemble Moodie's material from the Permian of Texas in general form, but the constantly inward curvature of the digits; the presence of palm and sole impressions; and the somewhat different proportions (15 x 14 mm. as against 18 x 11 mm.) afford significant differences.

Once again, it is certain that these forms represent an undescribed ichnospecies; the inadequacy of the material rendering inadvisable the giving of a new name.

Moodie considered his Permian footprints to have been made by a synapsid reptile comparable to Varanosaurus (a pelycosaur). Such an explanation is unacceptable for the prints here described; the pelycosaur became extinct in the Permian and the synapsids were in decline by the Middle Triassic. (The known Middle Triassic synapsids appear unlikely candidates, in view of their size and gait). In view of the possession of four digits in the manus, it would seem that an affinity to the contemporary lizards and rhynchocephalians can be ruled out. It is therefore suggested that these too may be the footprints of a small amphibian; the inevitable corollary is the suggestion that the Permian prints, also, may be those of amphibians rather than of synapsids.

Ichnogenus Swinertonichnus ichnogen. nov.

Diagnosis.

Probably a biped. Imprint of pes three-toed semidigitigrade, with webbing present between the digits. Digits jointed and possibly clawed. Size large.

Derivation of Name.

Named after the late Professor Henry Hurd Swinerton, who collected the material here described.

Type Species. Swinertonichnus mapperleyensis sp. nov. Middle Triassic (Keuper Waterstones), Nottingham, England.

Remarks.

This new ichnogenus differs from the existing ichnogenus Coelurosaurichnus in the presence of webbing between the digits; the morphology is, in other respects, closely similar. The ichnogenus Ruecklinichnium comprises three-toed prints with webbing; but these are the prints of a very small quadruped and exhibit neither jointing nor the suggestion of claws.

If the presumed bipedal nature of the animal forming these prints is accepted for purposes of discussion, then an affinity to the coelosaurs (a group of small, bipedal carnivorous dinosaurs) is immediately suggested. There are no known instances of bipedal carnivorous dinosaurs with webbed feet; but a skeleton

would not, in any case, indicate this feature, and "mummified" dinosaurs retaining skins are not known from the Triassic. The recent discovery of remains of ornithischians (bipedal herbivorous dinosaurs), in the Upper Triassic of South Africa, should be noted: but the more primitive ornithischians typically have a functionally four-digitated pes and, in the later forms with three functional digits, these digits are usually rather hoof-like. A web-footed coelurosaur is thus strongly suggested.

Swinertonichnus mapperleyensis sp. nov.

Plate 14 Text-fig. 3.

1912. Footprint B. Swinerton, p. 67, pl. 4 fig. 4.

Diagnosis.

Semidigitigrade and probably bipedal: imprints of three digits (II-IV), all with short, blunt terminations, and the front part of the sole. Digits forwardly directed, divaricating at a low angle: digit III somewhat longer than digit II and markedly longer than IV. Webbing indicated between the digits.

Derivation of Name.

Based on the type locality.

Horizon and Locality.

Keuper Waterstones (L. Ladinian: Middle Triassic), Mapperley Park, Nottingham.

Type Specimen.

Specimen P. C. 3315, collections of the Geology Department, University of Nottingham.

Dimensions.

Left pes; length overall 168 mm., maximum breadth (from tip of digit II to tip of digit IV) 100 mm. Length of digits: II, c. 78 mm; III, c. 98.5 mm.; IV, 56 mm. Other prints not available for measurement.

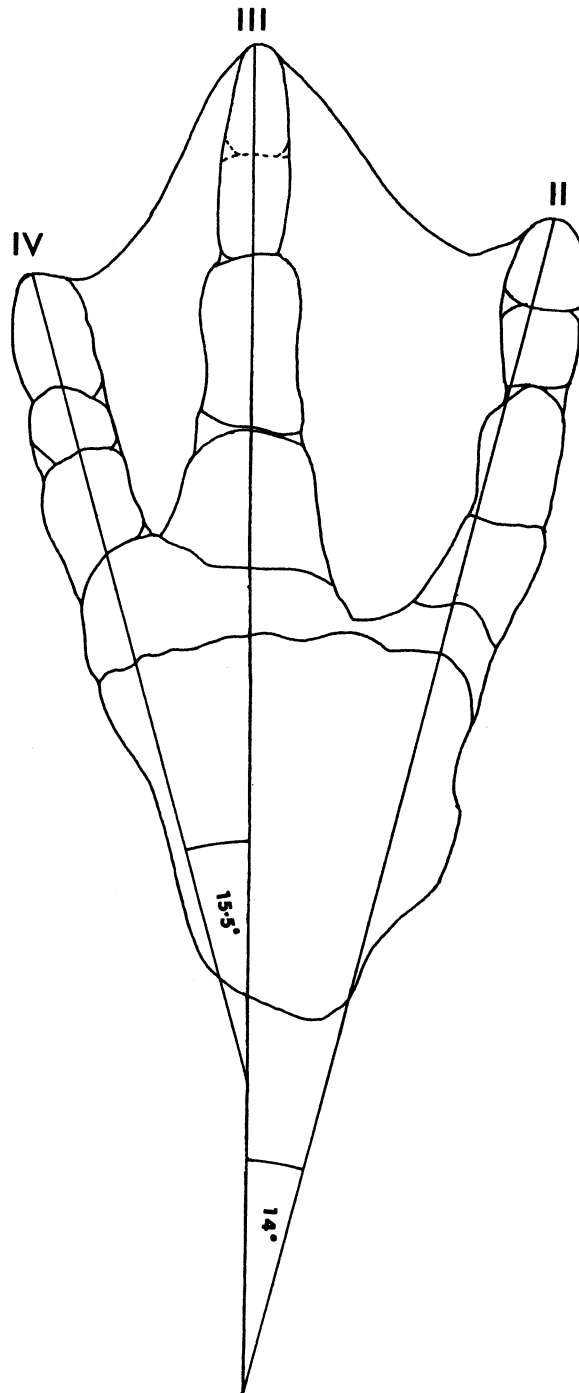
Divarication of Digits.

Left pes: II-III, 14° ; III-IV, 15.5° .

Remarks

The footprints here described were found at the exposure figured by Swinerton, 1912 (Plate III fig. 1), apparently a temporary exposure in road-building operations, variously cited as "Sherwood" or "Mapperley Park" in textual references (Swinerton, 1910, p. 229; 1912, p. 66) but labelled as "Mapperley Park" on the single specimen examined. The original material was a fallen block which apparently exhibited several prints. Swinerton states (p. 67) that: "The fore and hind feet of this creature being of the same size it progressed on all fours with its weight evenly distributed on all the limbs". However, there were certainly only three functional toes: since there are no known instances of functionally three-toed Triassic quadrupeds having all four feet of equal size, this must be considered a misinterpretation. It is considered that these are the tracks of a bipedal reptile whose weight was taken on the three functional toes and the front part of the sole. Unfortunately, only one specimen survives; the cast illustrated by Swinerton (1912, pl. 4 fig. 4), now lost, was probably made from this specimen. No information can be given, therefore, regarding stride or trackway: there appear to have been no evidences of tail drag.

The diagram here given (Text-fig. 3) is based on examination of the type specimen and of several photographs taken in different directions of illumination, including that included here (Plate 14). An attempt is made to interpret the probable positions of the joints in the digits. The terminal phalange (or claw) is blunt; the webbing extends between the terminal joints in two smooth curves. Four phalanges appear to have been present in the second and third digit: three only in the fourth, giving a possible phalangeal formula of 4-4-3. The first and fifth digits must have been either rudimentary or absent.



Text-fig. 3. Swinertonichnus mapperleyensis ichnogen. et. sp. nov. Sketch showing morphology and the angles of divarication of the digits.

Only one other type of three-toed print with indications of webbing between the digits has hitherto been described from the Triassic: this is Ruecklinichinium tridactylum Kuhn 1958, from the Lower Triassic (Oberen Voltziensandstein) of the Saargebiet, Germany. This latter form is a quadruped, the fore and hind feet differing in proportions: the prints are very small (maximum breadth 9 mm). Kuhn suggests (1958, p.17) that the animal forming these prints was about 150 mm. in body length: despite the three-toed nature of the prints (immediately suggestive of a diapsid reptile), he visualises a salamander-like amphibian as having produced them.

As stated earlier, the weight of the animal forming the prints here described was placed on the metatarsals and phalanges, indicating a semidigitigrade to digitigrade gait. The stress distribution strongly suggests that the print is that of a biped, as does Swinnerton's mention of a number of prints, all of constant dimensions; it is unfortunate that more of the original material was not preserved. An amphibious way of life would certainly accord with the lagoonal conditions in which the sediments are considered to have been accumulating.

Ichnogenus Deuterotetrapous Nopcsa 1923

Diagnosis.

Footprints with four toes, the toes very short and thickening markedly towards their base: fifth digit consistently lacking. Plantigrade to partially digitigrade. No recognisable boundary between the broader front part and narrow back part of the sole or heel.

Type Species. Deuterotetrapous triassicus Nopcsa, 1923. (Type P of Beasley 1910), Upper Triassic, Cheshire, England.

Deuterotetrapous plancus sp. nov.

Plate 15 Text-figs 2B, 4A.

Diagnosis.

Footprints of a quadruped, plantigrade reptile. Manus smaller than pes, slightly broader than long, with three well-marked toes, short and bluntly triangular (prob. II-IV), and a fourth poorly marked (prob. V). Pes almost ovoid in outline, with three short, rounded toes (prob. II-IV) and the suggestion of a fourth (prob. V). Trackway narrow, the feet being set down almost in a line: stride about four times the footprint length.

Derivation of Name.

Latin, planus, flat-footed.

Horizon and Locality.

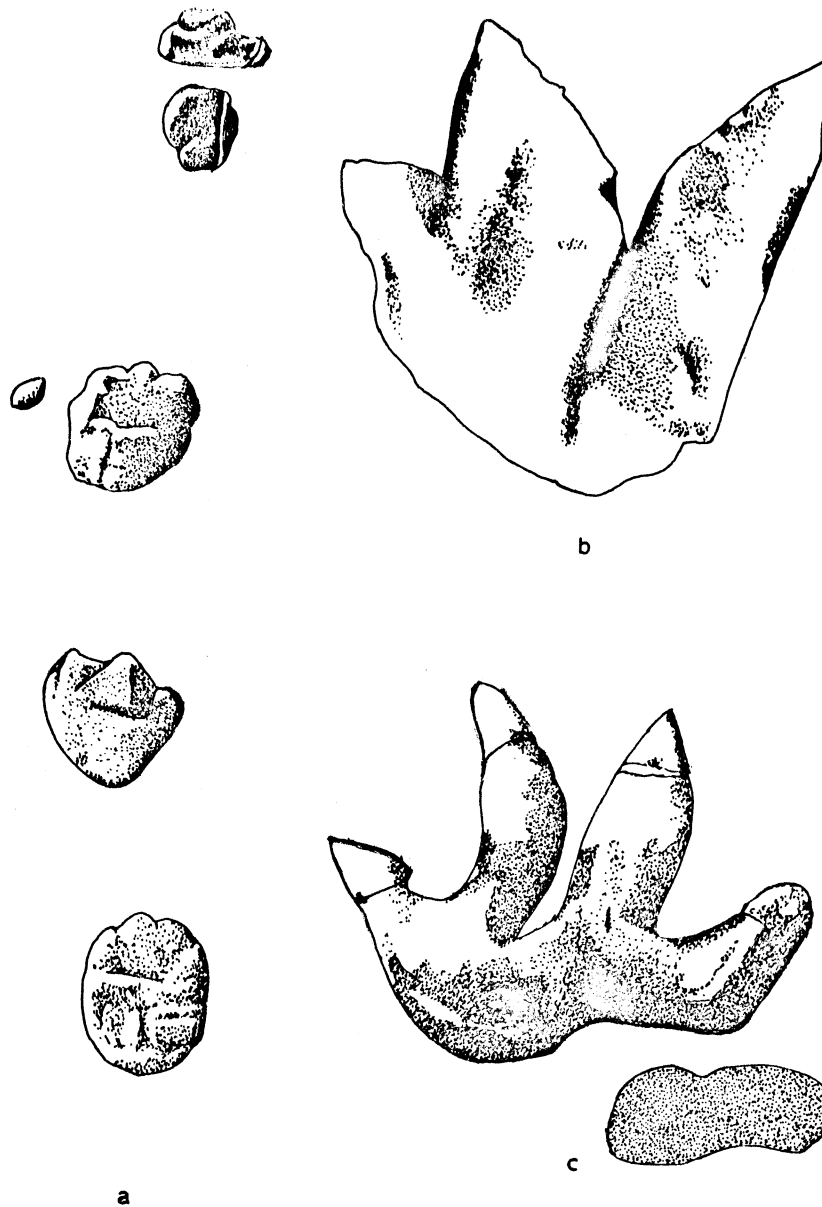
Keuper Waterstones (L. Ladinian: Middle Triassic), Dale Abbey, Stanton-by-Dale, Derbyshire.

Type Specimen.

Specimen P. C. 3307, collections of the Geology Department, University of Nottingham.

Dimensions.

Left manus: length overall 27 mm: maximum breadth 30 mm. Length of toes - II, c.3 mm; III, c.5.5 mm.; IV, c.3.5 mm.; V, c.2 mm. Right manus not capable of precise measurement. Left pes: length overall 33 mm., breadth 28 mm.; toes too poorly marked for accurate measurement. Right pes: length overall 34.5 mm., maximum breadth 28 mm.: length of toes II, c.2 mm.; III, c.3.5 mm.; IV, c.2.5 mm. V too poorly marked for measurement. Breadth of trackway c.43 mm., length of stride (from centre of right to centre of left pes) c.135 mm.



Text-fig. 4a. Deuterotetrapous plancus sp. nov.; interpretative drawing of the trackway illustrated in Plate 15.
 b. Coelurosaurichnus sp.; interpretative drawing of the footprint illustrated in Plate 16, fig. 2.
 c. Brachychirotherium coburgense Aumann; interpretative drawing of the footprint illustrated in Plate 16, fig. 1.

Divarication of Digits.

Left manus: II-III, 19°; III-IV, 9°; IV-V, 10°. Right pes: apparently almost parallel. Right manus and left pes similar.

Remarks.

The footprints here described were collected from a temporary exposure at Dale Abbey, near Stanton-by-Dale, Derbyshire, by Professor H.H. Swinerton: no details of this exposure are available. The slab collected is illustrated in Plate 15 and Text-fig. 2b; prints of all four feet are displayed, though that of the right manus is very imperfect. The feet are short: the digits reduced to toes, apparently not clawed. The first digits are not represented, the fifth very reduced; the stress is taken on the sole and heel and on the three central digits.

The tracks are certainly those of a habitual quadruped, their alignment suggesting a running form. The reduction in the number of functional toes suggests a diapsid reptile; the gait rules out the crocodiles and phytosaurs, suggesting instead a quadrupedal Thecodont related to Aetosaurus.

Deuterotetrapous plancus differs from the type species, D. triassicus, in the presence of clear sole and heel marks, without posterior narrowing, and in the proportionate reduction of digit V (Beasley's print is considered to be probably a manus). The size is considerably larger (breadth about 300 mm.)

Another comparable form was described by F. & P. Ellenberger from the Stormberg Series (Triassic) of Basutoland. The tracks they illustrate as "quadruped tracks" (1958: pistes quadrupèdes; Text-fig. H) appear certainly attributable to the ichnogenus Deuterotetrapous but differ from D. plancus in the squarer toes and the proportionately much smaller manus. No measurements are quoted.

A third comparable footprint type was illustrated by Rehnelt, 1959, from the Triassic of Germany as "short-toed print, gen. indet". The prints are similar to D. plancus but larger (length 55 mm): their imperfection makes it impossible to say whether they are conspecific with D. plancus but, once again, they appear attributable to the genus Deuterotetrapous.

Ichnogenus Brachychirotherium Beurlen, 1950

Diagnosis.

Quadruped with an inclination to bipedal gait, semidigitigrade, with short, clumsily spread digits. Five digits, digit V being directed forwards; the others are inclined to it at varying angles. The metatarsals are deeply impressed, suggesting that they took most of the weight. Breadth of the foot about double the hand breadth.

Type Species. Brachychirotherium thuringiacum (Rühle von Lilienstern, 1939) Beurlen, 1950, Middle Keuper (Upper Triassic), Germany.

Brachychirotherium coburgense Aumann, 1957.

Plate 16 Fig. 1. Text-figs 2E, 4C.

1957. Brachychirotherium coburgense Aumann, pp. 183-5, Figs 38-40.

1960. B. coburgense Aumann, pp. 58-65, figs. 1-4, Pl. 2.

1963. B. coburgense Kuhn, p. 75, pl. 9, figs. 18-21.

Description of Nottinghamshire Specimen.

Imprint of left hind foot only: the impression of the forwardly directed fifth digit, which is separate from the others (see Aumann, 1960, Fig 1) is poorly marked as a result of damage. Digits I-IV bear claws: their order of size is III-II-IV-I. The relative depth of impression indicates that the stress of weight was taken by the metatarsals: the back of the sole is not impressed, indicating a

semidigitigrade gait.

Horizon and Locality.

Keuper Waterstones (L. Ladinian: Middle Triassic), Mapperley Park, Nottingham.

Figured Specimen.

Specimen P. C. 3317, collections of the Geology Department, University of Nottingham.

Dimensions.

Left pes: length overall c. 90 mm.; maximum breadth (tip of digit I to tip of digit V) c. 115 mm.; length of digits - I, c. 23. mm.; II, c. 35 mm.; III, c. 38 mm.; IV, c. 18 mm.; V c. 40 mm. (measurement difficult).

Divarication of Digits.

I-II, 34° ; II-III, 23° ; III-IV, 23° ; IV-V, 52.5° .

Remarks.

The ichnospecies *Brachychirotherium coburgense* has not previously been recorded from the British Isles; its presence in Nottingham is therefore of considerable interest. The footprints are considered by Kuhn (1963, p. 22) to be those of reptiles, quadrupedal, attributable to the diapsid Order Thecodontia. The form of footprints suggests a clumsy gait: it may be, therefore, that these are rather the tracks of an amphibious reptile, perhaps a phytosaur, than of a habitual pedestrian, like the aetosaurs. In the absence of information regarding stride and trackway, however, the prints cannot be more precisely assigned.

Genus Coelurosaurichnus von Huene 1941, emend.

Emended Diagnosis.

Biped, digitigrade to semidigitigrade, with three digits (II-IV); the prints lack any indication of webbing between the digits.

Type Species. Coelurosaurichnus toscanus von Huene, 1941, Keuper (U. Triassic), Italy.

Remarks.

The generic diagnosis is emended to clarify the distinction between Coelurosaurichnus and the new ichnogenus Swinertonichnus.

Coelurosaurichnus sp.

Plate 16 Fig. 2. Text-fig. 2A, 4b.

- ? 1952. Dinosauripus sp. Rehnelt, p. 39, Fig. 1.
- ? 1958. Dinosauripus sp., Kuhn, pl. 9 fig. 6.
- ? 1963. Coelurosaurichnus sp. indet. Kuhn, p. 87.

Description.

Impression of right pes with three digits: no indication of heel. Digit II is the longest and is separate from the others digits. III and IV are closely appressed, digit IV being very reduced. No suggestion of claws of joints. There is a faint suggestion of a rudimentary digit I, at right in the photograph (Plate 16 or fig. 2).

Horizon and Locality.

Keuper Waterstones (L. Ladinian: Middle Triassic), Mapperley Park, Nottingham.

Figured Specimen

Specimen P. C. 3316, collections of the Geology Department, University of Nottingham.

Dimensions.

Right pes: length overall 85 mm.; breadth (tip of digit II to tip of digit IV) 87 mm.; length of digits - II, c. 48 mm; III, c. 45 mm.; IV, c. 12 mm.

Divarication of Digits.

II-III, 41.5°: III-IV, 28°.

Remarks.

The single footprint here described corresponds in morphology to the ichnogenus Coelurosaurichnus, but differs significantly from all species hitherto described. In size and proportions, it resembles a form from the Middle Keuper of Bayreuth, Germany, originally described by Rehnelt (1952) as Dinosauripus sp. and subsequently transferred to the ichnogenus Coelurosaurichnus by Kuhn (1963). However, the digits of this German form are somewhat longer and are clawed, and the print suggests a semidigitigrade, rather than a digitigrade, gait. It therefore seems that an undescribed ichnospecies is represented: but, since digits III and IV may not be constantly appressed and in view of the suggestion of a digit I, further material must be awaited before a new name is proposed.

The morphology of the print strongly suggests that it was made by a coelurosaur, a small, bipedal carnivorous dinosaur; the prints are not definitely clawed, but they are markedly pointed, so that claws may well have been present. As discussed earlier, the primitive ornithischians appear to have consistently had a four-toed pes, so that an affinity to this latter group is improbable.

Conclusions.

The footprints here described indicate that, despite the paucity of vertebrate remains in the Triassic of Nottinghamshire and Derbyshire, a varied fauna of terrestrial vertebrates inhabited the area at certain times during that period. From an examination of the character of the sediments, the environment of the tracks from Mapperley Park appears to have been a lagoon with desert or semi-desert shores, possibly much like the lagoons on the shores of the Persian Gulf today. The presence of what may well be amphibian footprints, at a period when the remains of small amphibians are virtually unknown, and the apparent presence of a bipedal dinosaur with webbed feet, most probably a coelurosaur, are of special interest. Further coelurosaur prints and the footprints of a quadrupedal reptile complete the representation of a Middle Triassic terrestrial fauna. In view of the abundant fish remains at a slightly higher horizon, it is possible that these animals may have been, at least in part, beachcombers or fisheaters.

In addition, footprints from Dale Abbey, Derbyshire, are recorded; the prints appear to be those of a small quadrupedal reptile, possibly an Aetosaur. The environmental circumstances at this locality are less clear.

Acknowledgement

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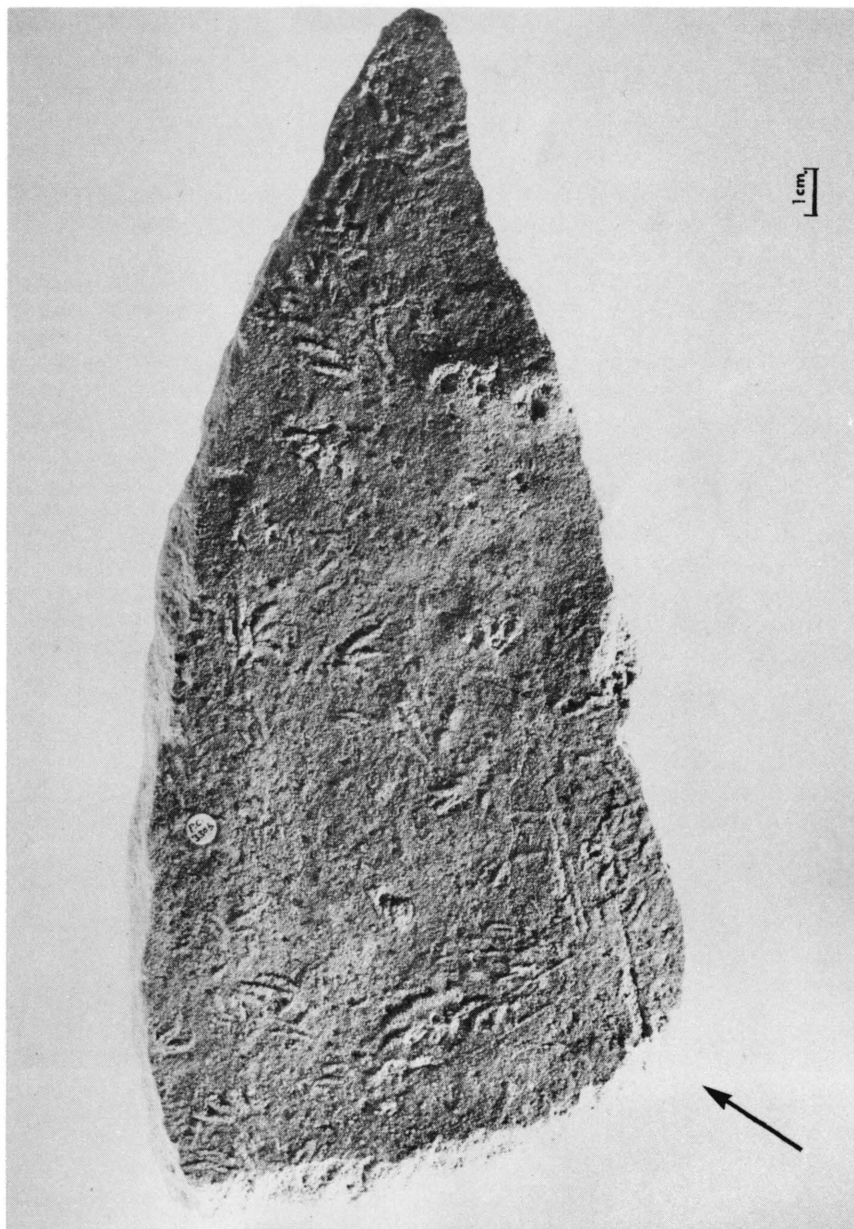
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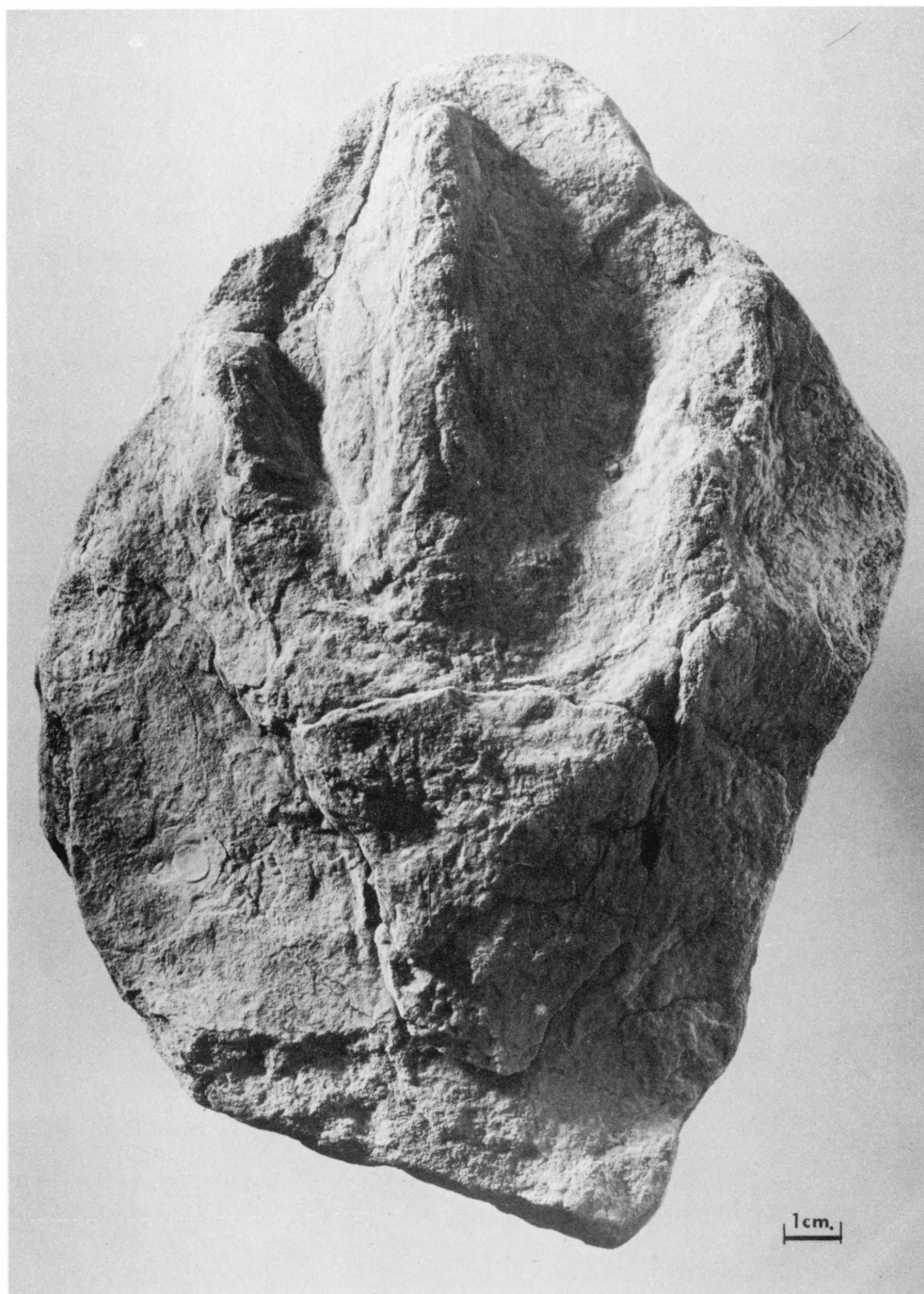
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Undersurface of slab of Keuper Waterstones from Mapperley Park, Nottingham, showing many small vertebrate tracks. The arrow indicates the direction of illumination.



Swinertonichnus mapperleyensis ichnogen. et. sp. nov.
Footprint on underside of a slab of Keuper Waterstones from Mapperley Park,
Nottingham.



Deuterotetrapous plancus ichno sp. nov.
Track on underside of a slab of Keuper Waterstones from Dale Abbey,
Stanton-by-Dale, Derbyshire.

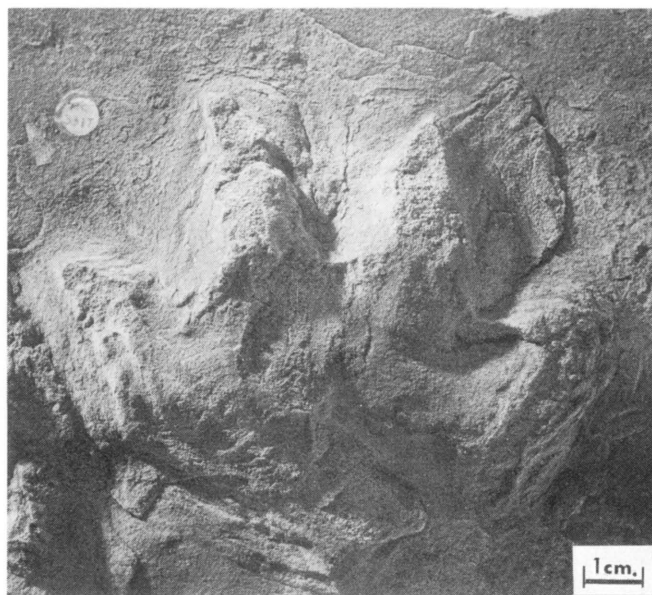


Fig. 1. *Coelurosaurichnus* sp. Fig. 2. *Brachychirotherium coburgense* Aumann. Undersides of slabs of Keuper Waterstones from Mapperley Park, Nottingham.