TRIASSIC FOOTPRINTS FROM ARGENTINA.

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ABSTRACT. Footprints are described from the Triassic of Argentina. They represent two forms; one a quadruped of probable amphibian origin, the other a typical bipedal dinosaur track almost identical with comparable trails from the Triassic of the Connecticut Valley. To the first, which represents an unknown form, the name *Parabatrachopus argentina* is given, while the second is referred to the genus *Anchisauripus*, new species *australis*. The type material is in the collections of the American Museum of Natural History, New York.

THROUGH the good offices of Dr. George G. Simpson of the American Museum of Natural History, New York, there have recently been sent to the writer six slabs of red sandstone, together with several excellent photographs. The material came to Doctor Simpson from the finder, Senor J. Román Guiñazú of the Dirección de Minas y Geología, Buenos Aires, in the hope that a description of this interesting material might be published. The footprints, which represent at least two unrelated genera, are strikingly like certain ones found in the upper series of Triassic sandstone and shale of the Connecticut Valley and serve to corroborate the finder's assumption of Triassic age of the beds wherein the specimens were found. The material is from the Paganzo beds, which are believed to be of Triassic age, and the locality is the Sierra de Las Quijadas, northwestern San Luis, Argentina. A footnote by Doctor Simpson states that Senor Guiñazú's Spanish phrase "'NO de San Luis' could mean either 'northwestern part of San Luis province' (Argentina), or 'northwest of the town of San Luis'. Both are true. In Nágera's atlas of Argentina (Buenos Aires, 1926) the Sierra de las Quijadas (meaning 'Jawbone Range') is shown as a short range running from slightly west of north to slightly east of south, between Lat. 32½° and 33° S. and just west of the 67th meridian, 90 to 110 kilometers northwest of the town of San Luis, in extreme northwestern San Luis Province near the corner where San Luis, San Juan, and Mendoza Provinces meet." (Personal communication.)

The matrix is a fine-grained, red sandstone with one edge weathered to a light pinkish gray. The specimens, unfortunately, are not sufficiently large to give a sequence of footprints

for the determination of the length of stride and width of trackway. The same limitation is seen in the several photographs submitted, which are those of the slabs in question. This renders our visualization of the trackmakers, especially the quadrupedal one, incomplete, for the manner of gait, whether sprawling or with the feet under the body, is of importance as an aid to determining the taxonomic position of the maker. In the case of the bipedal form, a sequence is of less importance because of the obvious similarity to well-known Connecticut Valley forms in which the stride is known.

Parabatrachopus argentina n. g. et sp.

(Plate 1, Fig. 1. Text Fig. 1.)

Holotype: No. A. M. 1805. This is a small slab bearing the impressions of the left fore and hind feet of a quadrupedal animal. No. A. M. 1806 shows clear impressions of the right manus and pes, but the three other nos., A. M. 1807, 1809, and 1810, the prints are too obscure for details, although all five could have been made by the same animal for they agree in size and such other features as are discernible.

Horizon and locality as given above.

Collector: J. Román Guiñazú.

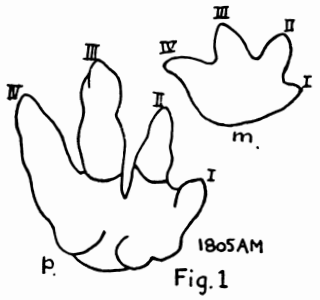


Fig. 1. *Parabatrachopus argentina* n. g. et n. sp. m, left manus, p, left pes. No. A. M. 1805 x½.

Generic characters: Quadrupedal, tetradactyl, semiplantigrade; manus with four broad, clawless digits directed through an angle of at least 135°. About half the linear dimensions of the pes. Pes with four digits all directed forward, without distinct claws, the fourth toe somewhat the longest. Manus and pes close together, the former lying within and slightly in

advance of the latter. Length of stride and width of trackway unrecorded.

This form resembles most closely the genus *Batrachopus* from the Connecticut Valley Triassic (Lull, 1915, p. 174). The chief distinctions seem to lie in the lack of claw impressions in the pes and in its shorter and broader proportions. In size it lies within the range of the several species of *Batrachopus*, four of which are smaller while but one is larger than the form under consideration.

Specific characters: Manus: Length, 28 mm.; distance between lateral tips, 40 mm.; breadth of manus, 40 mm. Divarication of digits I and II, 44°; of II and III, 45°; of III and IV, 48°. Pes: Length of digit I, 24 mm.; of II, 30 mm.; of III, 37 mm.; of IV, 45 mm.; of the foot, 57 mm.; distance between lateral tips, 52 mm. Divarication of digits I and II, 20°; of II and III, 17°; of III and IV, 21°.

Discussion: Some years ago a specimen of a small, long-limbed Parasuchian, *Stegomus longipes* Emerson and Loomis (1904, pp. 377-380) was found at Longmeadow, Massachusetts. This has been correlated with the ichnite *Batrachopus gracilis* as its probable maker, for the size, length of stride, and width of trackway all correspond with fair assurance (Lull, 1915, pp. 109, 177). Both were found in the same formation and the fossil lies well within the geographic limits of the ichnite species. In *Parabatrachopus*, however, a correlation is more difficult owing to the isolation of the tracks and the fact that the apparent absence of claws seems to debar the trackmaker from the reptilian class.

A faunal list, published by von Huene (1939, pp. 490, 491), from the upper Rio do Rasto Shichten (Upper Triassic) in Rio Grande do Sul, Brazil, gives a fauna very near, both geographically and in time, to that of the footprints. But the list includes reptiles only and no amphibia. Of the reptiles in von Huene's list the Dicynodonts and Cynodonts seem definitely debarred, and the same is true of the saurischian dinosaurs. There remain, however, the Pseudosuchia of which two genera and five species are recorded. The disparity in size between manus and pes and the number of digits impressing are items of correspondence, but again the absence of claws seems to be an obstacle and the stride and trackway might also be were they known.

Stegocephalia are also to be eliminated as possible makers of the footprints for the weight of the huge, armored head requires a manus more nearly equal to the pes in size for its support. Doctor Romer, with whom the problem was discussed, suggested the possibility of a "prourodele," as yet undiscovered, which might fulfill the need for a clawless form whose fore feet could be materially smaller than the hind feet because of the light weight of the unarmored head.

Anchisauripus australis n. sp.

(Plate 1, Fig. 2, 3. Text Fig. 2.)

Holotype: Nos. A. M. 1807 and A. M. 1808. The footprints are isolated impressions of the right pes. Part of a third track may be seen on No. A. M. 1806.

Horizon, locality, and collector as above.

Generic characters: Tridactyl, digitigrade acuminate claws, well-marked phalangeal pads. Hallux probably rotated to the

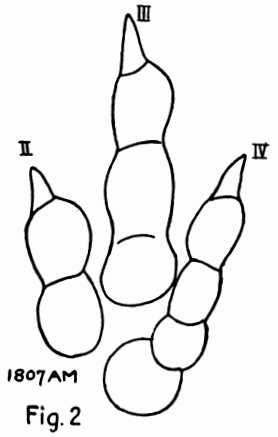
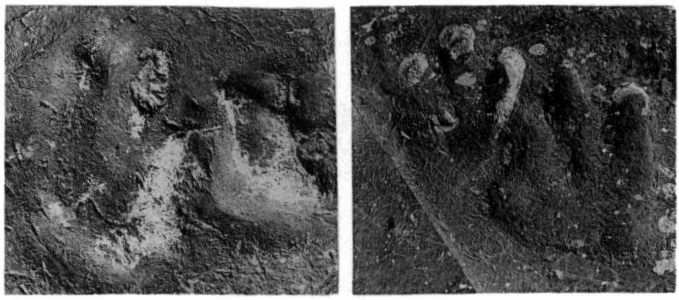


Fig. 2. *Anchisauripus australis* n. sp. No. A. M. 1807. Right pes. x½.

rear, but not impressing in the several tracks shown so that the tridactyl character alone is in evidence.

Specific characters: Length of digit II, 52 mm.; of III, 78 mm.; of IV, 75 mm.; of the foot, 107 mm.; distance between lateral tips, 57 mm. Divarication of digits II and III, 13°; of III and IV, 18°. Length of step and width of trackway unrecorded.



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IMPRESSIONS OF ARGENTINE TRIASSIC FEET

FIG. 1. *Parabatrachopus argentina* n. g. et n. sp.
Left manus and pes. No. AM 1805.

FIG. 2. *Parabatrachopus argentina.*
Right manus and pes. No. AM 1806.

FIG. 3. *Anchisauripus australis* n. sp.
Right pes. No. AM 1807.
All ½ natural size.

Discussion: The outline of this track, while disagreeing in certain minor details from the holotype of *Anchisauripus dananus* of the Connecticut Valley, lies within the range of the many impressions attributable to that species, especially No. 9/14 of the Amherst College Collection. Hence the Argentine form is not specifically distinguishable by the ordinary criteria of ichnite description. Because of its remoteness geographically another name is doubtless permissible, especially as ichnite species are not precisely determinable in terms of ordinary specific criteria and often may, and probably do, include several species of actual trackmakers whose footprints would be indistinguishable. The specific name *australis* is therefore proposed for the Argentine ichnite.

This is obviously the footprint of a Saurischian carnivorous dinosaur of small size. In the Connecticut Valley the dinosaur *Anchisaurus colurus* Marsh, now called *Yaleosaurus colorus* (Marsh) by von Huene, has been correlated with the ichnite *Anchisauripus dananus* with a high degree of probability, for they correspond in size, time, and place and in the abundance of these tracks.

In von Huene's list (1939) three Coelurosauria appear, one of which is *Spondylosonia absconditum*; the other two, genus and species indeterminate. I am unable to make a comparison of the feet of any of these with the Argentine footprint, but they suggest the possibility that the Coelosauria known or yet to be discovered will include this trackmaker.

List of Works to Which Reference is Made.

Emerson, B. K., and Loomis, F. B.: 1904, On Stegomus longipes, a new reptile from the Triassic sandstones of the Connecticut Valley. Amer. Jour. Sci., 42, pp. 377-380.

Huene, F. von: 1939, Die Altersbeziehungen der südamerikanischen Gondwana-Fauna, Physics, t. XIV, pp. 489-497.

Lull, R. S.: 1915, Triassic life of the Connecticut Valley. Connecticut Geological and Natural History Survey, Bulletin No. 24, pp. 1-285.

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