



THE AGE OF THE *DICYNODONTIPUS* RECORD FROM THE LOS MENUCOS COMPLEX (RÍO NEGRO PROVINCE, ARGENTINA)

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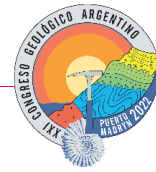
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Small and large pentadactyl tracks, respectively referred to *Dicynodontipus* and *Pentasauropus*, constitute the bulk of the tetrapod track record from the Los Menucos Complex (Cucchi *et al.* 2001), in the North Patagonian Massif, Río Negro province, Argentina. Footprints referable to these two ichnotaxa occurred from two distinct localities close to the Los Menucos town. Regarding the age of the Los Menucos Complex, different proposals were published, mainly pointing to a Late Triassic age (e.g. Casamiquela 1964, Spalletti *et al.* 1999, Gallego 2010). Worth of note is that the exact stratigraphic position of the track-bearing levels in both localities (i.e. Tschering farm for *Dicynodontipus* and Llancaqueo farm for *Pentasauropus*) has long remained uncertain. More recently, the alleged synchrony was questioned on the basis of the tetrapod track global record and an older age was proposed for *Dicynodontipus* footprints (Citton *et al.* 2018, Díaz-Martínez *et al.* 2019). New findings of tetrapod tracks from two horizons of a new track-bearing site, located about 30 km north of Los Menucos and called Puesto Vera, prove to be crucial in disentangling this issue. In the new ichnosite, a 65 metres thick volcanic and volcanoclastic succession is exposed. The partially covered base of the section is a massive, whitish ignimbrite, consistent with the compositional variability of other ignimbrites of the area (dacitic to rhyolitic in composition). Ephemeral sandy fluvial channel deposits, with subordinated fine-grained laminated sandstone and mudstones with plant remains, lie above the ignimbrite through an erosive contact. Footprints are preserved on the top of a fine tuff bed interpreted as an ash-fall deposit. Three ignimbrites lie above, constituting the upper portion of the stratigraphical section. The ichnological material is on the whole poorly preserved, but some footprints retain sufficient characters to allow ichnotaxonomical treatment. The best preserved footprints are longer than wide, plantigrade and pentadactyl. The sole imprint is triangular, resulting proximally tapered and distally expanded. The bases of central digit imprints are almost aligned, while the base of digit V imprint is posteriorly shifted. In poorly preserved footprints, the sole imprint is not characterized by the 'V' shaped morphology, resulting instead circular to ovoidal in shape. The triangular morphology of the sole imprint and the proximal morphology of the digit traces allowed us to tentatively refer the footprints from both the track-bearing horizons to cf. *Dicynodontipus* isp. A more precise ichnotaxonomic assignment is prevented due to the poor detail of the material, the absence of a clear series of manus-pes sets and of complete digit traces. Both the best preserved and the faint footprints resemble the material from the Puesto Tschering ichnosite and fit well with the preservational variability characterizing the record from that locality. Footprints from Puesto Vera are age constrained to a time interval between the Changhsingian (Lopingian) and the Olenekian (Early Triassic), recently obtained with U-Pb radiometric datings from two ignimbrites, respectively those at the base and top of the Puesto Vera stratigraphical section (Falco *et al.* under revision). Thus, previous suggestions about the age of the ichnological record (Citton *et al.* 2018, Díaz-Martínez *et al.* 2019) are proved. Stratigraphic, homotaxy-based correlations between the section at Puesto Vera and that exposed at Puesto Tschering (véase Falco 2019, Falco *et al.* under revision), suggest that the *Dicynodontipus* tracks from the latter locality are, at least, as old as the footprints from Puesto Vera. Thus, the *Dicynodontipus* ichnofauna from the Los Menucos Complex results to be older than previously supposed. The temporal distribution is consistent with the temporal occurrence of the ichnotaxon, which has a global distribution spanning from the Wuchiapingian (Lopingian) of northern Italy to the early Middle Triassic of Germany. The occurrence of age-constrained footprints from the Puesto Vera stratigraphical section constitutes a valuable datum, since it occurs in a mixed volcanic and sedimentary succession across the Permian-Triassic boundary in high-latitude ecosystems, and could likely lead to future inferences about the evolution of the south-western Pangaea at the Palaeozoic-Mesozoic transition.



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