

Short Communication

The Discovery of Ichno-fossils of the Middle Jurassic Dinosaurs in the Central Salt Range, District Khoshab, Punjab, Sub-Himalayas, Pakistan

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(Article history: Received: June 01, 2015; Revised: June 17, 2015)

Abstract

The ichno-fossils of the Middle Jurassic Dinosaur were discovered for the first time in the Central Salt Ranges of Pakistan in the form of dinosaurs' footprints, which were imprinted in the limestone with mud cracks in the upper most part of the Middle Jurassic Samana Suk Formation near Mahorian, district Khoshab, Punjab-Pakistan. It is highly recommended that a concerted attempt be made carry out a systematic excavation to find out the most probably fossilized skeletal body structure/parts of the Middle Jurassic dinosaurs in this area and establish a "Punjab University Research and Training Dinosaur Site" under the umbrella of University of the Punjab, Lahore.

Key words: Ichno-fossils, Middle Jurassic, Dinosaurs, Central Salt Range-Pakistan

To cite this article: NIZAMI, A.R. AND FAHIM, M., 2015. The discovery of Ichno-fossils of the Middle Jurassic Dinosaurs in the Central Salt Range, District Khoshab, Punjab, Sub-Himalayas, Pakistan. *Punjab Univ. J. Zool.*, 30(1): 37-41.

INTRODUCTION

The carbonate rocks, particularly, limestones have proved to be the best fossil repositories (Scoffin, 1987). The limestones of the shallow shelf Samana Suk Formation of Middle Jurassic age (Fatmi, 1972; Fatmi *et al.*, 1990) have been reported highly fossiliferous at different stratigraphic levels (Sheikh, 1991, 1992; Mertmann and Ahmad, 1994; Ahmad *et al.*, 1997; Sheikh *et al.*, 2005; Nizami *et al.*, 2007, 2008, 2009). These fossils represent a diverse range of floral and faunal fossils. This unique set of fossils includes well preserved complete body fossils of invertebrate and vertebrate fauna, their skeletal grains, faunal molds and castes along with a large variety of ichno-fossils (Sheikh, 1991, 1992; Mertmann and Ahmad, 1994; Ahmad *et al.*, 1997; Malkani, 2003a; Sheikh *et al.*, 2005; Nizami *et al.*, 2007, 2008, 2009). In addition superb fossil content of some of the dinosaurs species have, also, been documented in Pakistan (Malkani and Anwar, 2000; Wilson *et al.*, 2001; Malkani *et al.*, 2001; Malkani, 2003a and b; Malkani, 2006) and elsewhere in the world (Weber, 1981; Cole *et al.*, 1985; Kuban, 1985, Godfrey, 1985; Kuban, 1986a, b and c; Thomas

and Farlow, 1997; Kuban, 2010). The literature survey conducted by these authors revealed that no previous worker has reported any of the fossils belonging to any species of dinosaurs from the studied area. Therefore, the discovery of ichno-fossils of the Middle Jurassic dinosaurs made by the authors is the first of its kind in the Central Salt Range-Pakistan (Fig. 1).

Previous Investigations

The dinosaur track-ways and footprints were discovered first ever in the riverbed of Paluxy River, some as early as 1908 (Webb, 1976; Moriss, 1986, 2013). The Paluxy River, also, known as the Paluxy Creek, is flowing in the Erath County, Texas, USA. It is a tributary of the Brazos River. The North Paluxy River and the South Paluxy River converge near Bluff Dale, Texas and join the Brazos River just to the east of Glen Rose, Texas in the south central Somervell County after flowing a distance of 47km (Ron *et al.*, 1996). Since this first ever discovery several other dinosaur track-ways and footprints have been found and recorded in this area. The other similar and well-known dinosaur track-ways sites, studied here, include: The Taylor Site, the Blue Hole Ballroom, and the Blue Hole Parlor. These tracks, studied and

documented, were found in the Cretaceous Limestone (Neufeld, 1975; Branch, 2006; Kennedy, 2008; Kuban, 2010). The locals found these dinosaur footprints in the early 1930s for the first time in one of rock layer of the Lower Cretaceous Glen Rose Formation near Glen Rose at the Dinosaur Valley State Park Texas, USA. These tracks in the Paluxy River were studied by a palaeontologist, Roland Bird, in 1938 (Kuban, 2010). Subsequently he excavated these tracks in 1939 (Moore, 2014)

and made these tracks famous in the scientific community. According to Moore (2014) these dinosaur tracks found near the Glen Rose are thought to be the best in the world. However, these were mistaken as the human footprints by a number of creationists and were widely publicized as evidence against the Geological Time Scale and in favour of “Young Earth Creationism” (Neufeld, 1975; Branch, 2006; Kennedy, 2008; Moriss, 2013).

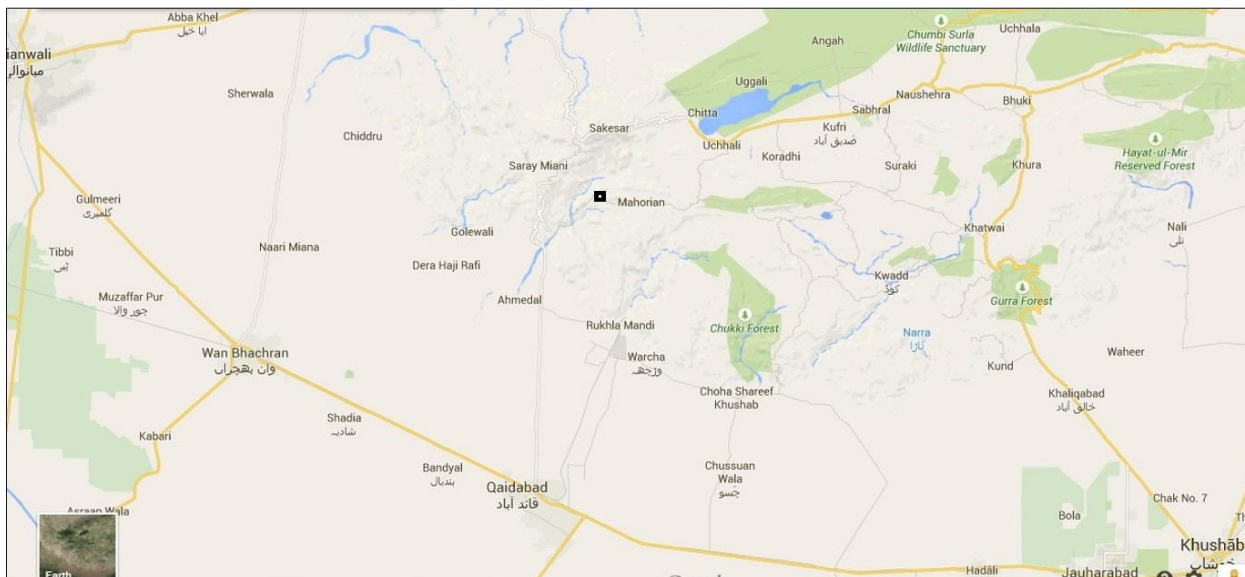


Figure 1: Map showing location of the study area, Mahorian(■), near Quaidabad, District Khoshab, Punjab, Central Salt Range, Pakistan.

The Paluxy dinosaur track-ways and footprints were taken as the human footprints in the first instance, however, these were actually antiquated “human” footprints due to mud collapse containing high moisture content. Later on these footprints were determined, established and reported as dinosaur track-ways by a number of workers (Weber, 1981; Cole *et al.*, 1985; Kuban, 1985; Godfrey, 1985; Kuban, 1986a, b and c; Kuban, 2010).

The documentation and publication of research findings of these workers made the Paluxy River site popular and further attracted the attention of researchers from all around the world. In this way the Paluxy River remained famous as controversial site for several years.

Discovery of dinosaur footprints

The present authors discovered ichnofossils of the Middle Jurassic Dinosaurs on 22nd March, 2015 in the form of a collage of Middle

Jurassic Dinosaurs’ footprints for the first time in the Central Salt Range-Pakistan during a pursuit of fossil hunting in this area. During this pursuit the authors were inspecting an exposed horizon of limestone with mud cracks in the upper part of the Middle Jurassic Samana Suk Formation in the areal extent of the localities, namely, Amb Sharif and Mahorian, District Khoshab, Punjab, Central Salt Range-Pakistan. Subsequently a few footsteps like impressions were found on this exposed horizon of limestone. These spotted footsteps like impressions were investigated thoroughly in field, literature and laboratory. A keen and careful comparison of these footprints was made with already discovered and reported footprints and trackways of dinosaurs (Weber, 1981; Cole *et al.*, 1985; Kuban, 1985; Godfrey, 1985; Kuban, 1986a, b and c; Kuban, 2010). This comparative study demonstrated that these footprints were made by bipedal dinosaurs’

tracking with three toes and displayed that the dinosaurs were walking on the soles of feet instead of toes and it has been usually found in

such fossilized tracks of dinosaurs (Kuban 1985, Godfrey, 1985 and Kuban, 2010).



Figure 2: Field photography showing the dinosaur footprints on an outcrop of the Middle Jurassic limestone, near Mahorian, District Khoshab, Punjab, Central Salt Range-Pakistan.

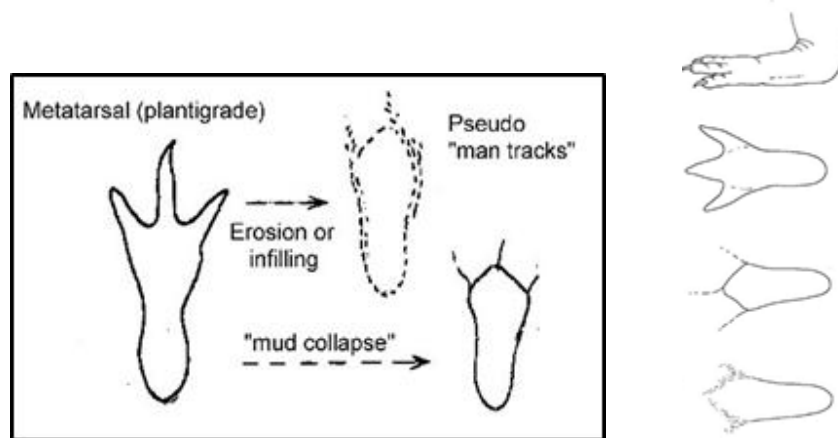


Figure 3: Illustrating how three-toed dinosaurs produced elongate tracks (Modified after Kuban, 1986).

As an outcome of these comparative investigations these footprints were recognized as "real dinosaur footprints" imprinted in the studied rock outcrop and belong to one of the dinosaur track ways, which represents to the dinosaurs' ichno-fossils of 140ma age approximately. These track ways point out towards the characteristics of ecological habitat and living patterns of the dinosaurs of the particular geological age. These track ways conform to previously explored assortment of dinosaur footprints by a number of workers in Pakistan and elsewhere in the world (Fig. 2-3).

The nature preserved this wonderful dinosaur site for perspective visitors, like student, scholars, researchers, teachers, professors and general public for millions of years prior to its discovery by these authors. Due to inadequate knowledge about its basic and applied research importance in the host mountainous area. It may most likely be perceived that the local illiterate population may destroy this high value research site. Yusuf (2011) reported that Mr. Muhammad Sadiq Malkani from Geological Survey of Pakistan (GSP), Quetta, the geologist and explorer of the Middle Jurassic dinosaurs' track ways in the

Broach Nala, near Mallakhel, District Mianwali, was almost shocked to see that the unique site was brutally cut down by hydraulic machines excavating coal from the mines present in its vicinity. The present authors, therefore, took immediate temporary measures to preserve this important geological/ paleontological site due to its potential academic and research applications in future.

Keen and comparative investigations executed in the field, literature and laboratory established the followings:

1. The footprints like impressions found on the mud cracked outcrop of limestone are taken as the ichno-fossils of dinosaurs living in the studied area.
2. These ichno-fossils belongs to the Middle Jurassic Dinosaurs as these have been found in the limestone of the Samana Suk Formation of Middle Jurassic age.
3. These ichno-fossils represent dinosaur track ways and are indicative of the characteristics of ecological habitat and living patterns of the dinosaurs of the particular geological age.

By appreciating the importance of this newly discovered site regarding its immense academic and research value it is highly recommended that a concerted attempt be made carry out a systematic excavation to find out the most probably fossilized skeletal body structure/parts of the Middle Jurassic dinosaurs in this area. It is, also, recommended establish a "Punjab University Research and Training Dinosaur Site" here along with a paleontological park. As it is now open to all weathering processing along with man-induced degradation and is not secure, particularly, after its discovery. Therefore to protect the site in first instance and develop it afterwards into an interpretation and training centre is highly required. It is the way of promoting geological knowledge in the host area in particular and in Pakistan in general. The patch of limestone bed hosting the foot prints of the Middle Jurassic dinosaurs may be protected, preserved and housed in a secure building.

REFERENCES

AHMAD, S., MERTMANN, D. AND MANUTSOGLU, E., 1997. Jurassic shelf sedimentation and sequence stratigraphy of the Surghar Ranges,

Pakistan. *Jour. Nepal Geol. Soc.*, **15**: 15-22.

- BRANCH, G., 2006. Paluxy Foot prints. In: *Encyclopaedia of Anthropology, Thousand Oaks, California*, (Ed. H. J. Birx), **4**: 1818.
- COLE, J.R., GODFREY, L. AND SCHAFERSMAN, S., 1985. Mantracks? The Fossils Say No! *Creation/Evolution*, **5**: 37-45.
- FATMI A.N., HYDERI, I.H. AND ANWAR, M., 1990., Occurrence of the Lower Jurassic Ammonoid Genus *Bouleiceras* from the Surghar Range with a revised nomenclature of the Mesozoic rocks of the Salt Range and Trans Indus Ranges (Upper Indus Basin), *Geol. Bull. Punjab Univ.*, **25**: 38-46.
- GODFREY, L.R., 1985. Foot Notes of an Anatomist. *Creation/Evolution*, **1**(5): 16-36.
- KENNEDY, B., 2008, *Human Footprints beside Dinosaur Tracks? Let's Talk* Fort Worth Star-Telegram, p B02
- KUBAN, G.J., 1985. *The Texas Man Track Controversy*. Self-published, Complete Evaluation with Photographs and Maps. Box 663, Brunswick, Ohio, 44212 USA
- KUBAN, G.J., 1986a. The Taylor Site Man Tracks. *Origins Research*, **9**(1): 1-9.
- KUBAN, G.J., 1986b, Review of ICR *Impact* article 151. *Origins Research*, **9**(1): 10-15.
- KUBAN, G.J., 1986c. A Summary of the Taylor Site Evidence. *Creation/Evolution*, **6**(1): 10-18.
- KUBAN, G.J., 2010. *The Paluxy Dinosaur/Man Track Controversy*, Self-published, Complete Evaluation with Photographs and Maps, Box 663, Brunswick, Ohio, 44212 USA
- MALKANI, M.S., 2006. Biodiversity of Saurischian Dinosaurs from the Latest Cretaceous Park of Pakistan. *J. App. Em. Sc.*, **1**(3): 108-140.
- MALKANI, M.S., 2003a, First Jurassic Dinosaur Fossils found from Kirthar Range, Khuzdar District, Balochistan-Pakistan, Barkhan District, Balochistan. *Geol. Bull. Univ. Peshawar*, **36**: 73-83.
- MALKANI, M.S. 2003b, Pakistani Titanosauria: are Armoured Dinosaurs? *Geol. Bull. Univ. Peshawar*, **36**: 85-91.
- FATMI, A.N., 1972. Stratigraphy of the Jurassic and Lower Cretaceous rocks and Jurassic ammonites from northern

- areas of West Pakistan, *British Mus. Nat. Hist. Bull. (Geol)*, **20**(7): 299-380.
- MALKANI, M.S. AND ANWAR, C.M., 2000. Discovery of First Dinosaur Fossil in Pakistan, Barkhan District, Balochistan. *Geol. Survey Pak. Inform. Rel. No. 732* 16p
- MALKANI, M.S., WILSON, J.A. AND GINGERICH, P.D., 2001. First Dinosaur from Pakistan. *J. Vert. Paleontol.*, **21**: 77A (Abstract).
- MERTMANN D. AND AHMAD, S., 1994. Shinawari and Samana Suk Formations of the Surghar and Salt Ranges, Pakistan: Facies and Depositional Environments. *Z. dt. Geol. Ges.*, **145**: 305-317.
- MOORE, R., 2014. Did Humans Live with Dinosaurs? Excavating 'Man Tracks' along the Paluxy River. *The American Biology Teacher*, **76**(4): 243-246.
- MORRIS, J.D., 1986. The Paluxy River Mystery. *Acts and Facts*, **15**(1): 4.
- MORRIS, J.D., 2013. Paluxy River: The Tale of the Trails. *Acts and Facts*, **42**(5): 12-14.
- NEUFELD, B., 1975. Dinosaur Tracks and Giant Men. Geoscience Research Institute, Beirut, *Origins*, **2**(2): 64-76.
- NIZAMI, A.R. AND SHEIKH, R.A., 2007. Microfacies analysis and diagenetic settings of the Samana Suk Formation, Chichali Nala Section, Surghar Range, Trans Indus Ranges, Pakistan. *Geol. Bull. Punjab Univ.*, **43**: 37-52.
- NIZAMI, A.R. AND SHEIKH, R.A., 2009. Microfacies analysis and diagenetic settings of the Middle Jurassic Samana Suk Formation, Sheikh Budin Hill Section, Marwat Range, Trans Indus Ranges, Pakistan. *Geol. Bull. Punjab Univ.*, **44**: 69-84 Pakistan.
- RON, T., DOUGLAS E.B. AND ROY R.B., 1996. *New Handbook of Texas*. Texas State Historical Association (TSHA), Texas, Austin.
- SCOFFIN, T.P., 1987. *An introduction to carbonate sediments and rocks*, Blackie and Sons, Ltd., London, UK.
- SHEIKH, R.A., 1991. Deposition and diagenesis of the Samana Suk Formation, Kala Chitta Range, North Pakistan. *TERRA Abstracts*, An Official Journal of the European Union of Geosciences-VI, France **3**(1).
- SHEIKH, R.A., 1992. *Deposition and diagenesis of Mesozoic Rocks, Kala Chitta Range, Northern Pakistan*. Ph.D. dissertation, Imperial College, London.
- SHEIKH, R.A., SAQI, M.I., JAMIL, M.A., JAMIL, M.T. AND KHURRAM, F., 2005. Paleogeographic environment and reservoir potential of Middle Jurassic Carbonates of Pakistan. 1st International Kashmir Science Conference, Muzaffarabad, Azad Jammu and Kashmir, Pakistan.
- THOMAS, D.A. AND FARLOW, J.O., 1997. Tracking a Dinosaur Attack, *Scientific American*, **277**(6): 48-53.
- WEBB, W.P. AND ELDON, S.B., 1976. *The Handbook of Texas: A Supplement*, Texas State Historical Association, Austin, USA.
- WILSON, J.A., MALKANI, M.S. AND GINGERICH, P.D., 2001. New Crocodyliform (Reptilia, Mesoeucrocodylia) from the Upper Cretaceous Pab Formation of Vitakri, Balochistan-Pakistan. *Contrib. Mus. Paleontol., Univ., Michigan*, **30**(12): 321-336.
- YUSUF, S., 2011. Rare Dinosaur footprints in Pakistan. *The Daily Dawn*, <http://www.dawn.com/news/617762/rare-dinosaur-footprints-in-pakistan>, Pakistan