

# Chapter 1

## Introduction



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**Abstract** This book explains that after long periods of prehistoric research in which the importance of the archaeological as well as the natural context of rock art has been constantly underestimated, research has now begun to take this context into focus for documentation, analysis, interpretation and understanding. Human footprints are prominent among the long-time under-researched features of the context in caves with rock art. In order to compensate for this neglect an innovative research program has been established several years ago that focuses on the merging of indigenous knowledge and western archaeological science for the benefit of both sides. The book composes first the methodological diversity in the analysis of human tracks. Here major representatives of anthropological, statistical and traditional approaches feature the multi-layered methods available for the analysis of human tracks. It second compiles case studies from around the globe of prehistoric human. For the first time the most important sites which have been found worldwide are published in a single publication. The third focus of this book is on first hand experiences of researchers with indigenous tracking experts from around the globe, expounding on how archaeological science can benefit from the ancestral knowledge.

**Keywords** Prehistoric human tracks · Methodological diversity · Indigenous tracking

Prehistoric human tracks entered into archaeology on a side track more than 100 years ago when human footprints from the Ice Age were discovered in 1906 in the Palaeolithic cave of Niaux in southern France (Cartailhac and Breuil 1907: 222, 1908: 44; Pales 1976):

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Ajoutons qu'en deux points épargnés par les pieds des visiteurs modernes, nous avons noté, à la surface d'un sol analogue, mais un peu moins ferme, l'empreinte des genoux nus d'un homme qui avait rampé sous une voûte basse, et celles de nombreux pieds également nus, appartenant à des adultes et à des enfants. (Cartailhac and Breuil 1907: 222)<sup>1</sup>

But the interest in these sources was a rather modest one since only Bégouën (1928) and Vallois (1928, 1931) made scientific studies on them, while many tracks in other sites were destroyed without recording. Archaeologists treated the remaining tracks similar to most other sources they deal with: measuring, recording, copying and casting were the means applied to get at a deepened understanding. Tracking, i.e. reading of tracks, was not applied so that this realm of knowledge made its first appearance in academia only in 1990 with Louis Liebenberg's book *The Art of Tracking, the Origin of Science* – and yet the insights of this book remained a dormant potentiality for unjustifiably long time. It was only from the first decade of the twenty-first century onwards when more and more scholars and projects turned their attention towards prehistoric human tracks thus attempting to catch up with ichnology which for a long time had developed as a specialized field of research, mainly coming from the analysis and interpretation of dinosaur tracks (Lockley 1999). Interpretation of tracks in criminal forensics had taken its own, isolated development (Matthews David 2019) before archaeologists and forensic specialists pooled their accumulated knowledge and experiences (Bennett and Budka 2019). With these turns in research strategies, it was acknowledged that human tracks are an important contextual source for the understanding of people's behaviour in the past which previously had mainly concentrated on the sensational footprint finds at Laetoli in Tanzania (Leaky and Harris 1987). Besides learning from these earliest footprints about the development of bipedal locomotion the understanding of human behaviour was of particular interest in the Palaeolithic caves harbouring masterpieces of prehistoric art such as Niaux, Pech-Merle, Tuc d'Audoubert or Chauvet-Pont d'Arc Cave. But also many other sites around the globe with fossilized human tracks gained growing attention (Lockley et al. 2008, 2016; Pasda 2013) and experienced the application of state-of-the-art technology for documentation and analysis (Bennett et al. 2009, 2016; Crompton et al. 2011). However, scientific methods do not attain much deeper insights than concluding the body height of a person, where the footprint length represents 15% of body height (the formula is virtually unchanged since Topinard 1877), but as Bennett and Morse (2014: 148) point out, there lies vast fuzziness in these results. Nevertheless this estimated size is from which an educated guess of the age of the person is made (Bennett and Morse 2014: 152–154). Because of these shortcomings of scientific methods, some projects turned to involve indigenous trackers in prehistoric human spoor interpretations (e.g. Webb et al. 2006; Pastoors et al. 2015), and this confirmed the known but hitherto neglected ability to glean deeper information from footprints (Liebenberg 1990; Biesele and Barclay 2001; Lowe 2002; Gagnol 2013; for the reliability of

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<sup>1</sup>“Let us add that at two points not affected by the steps of modern visitors, we noted, on the surface of a similar but slightly less firm ground, the bare knee prints of a man who had crawled under a low arch, and those of many equally bare feet, belonging to adults and children” (translated by the authors).

indigenous track reading see Stander et al. 1997. Wong et al. 2011). Wherever indigenous specialists were involved as ichnologists, they were able to considerably augment the insights about human behaviour at a site thus showing the rich potential of information resting in these sources, if adequately well preserved. Expectable critique of these analyses and interpretations points out the lack of testability and validation (e.g. Bennett and Budka 2019: 155), but scientific methods, for their part, are presently unable to provide dependable falsification with their proper methods, which would demonstrate their supremacy. Instead, interpretation with a large team of scientists of complex tracks seemingly remaining from human/animal interaction (possibly a hunt) in the Pleistocene (Bustos et al. 2018) eventually has to turn to speculation about intentions and behaviour of humans and animals in order to find a cogent narrative for what the tracks preserve of an event.

## Examples of Indigenous Spoor Interpretation

The list of prehistoric sites mentioned in this volume (Happisburgh, Bâsura Cave, Formby Point, Laetoli, Le Rozel, Calvert Island, Vârtop Cave, Ciur-Izbuca Cave, Aldène, Theopetra Cave, Ojo Guareña Cave system and Willandra) where scientific methods have been applied clearly shows that the identification of the trackmakers by morphometric analyses is not sufficient to capture the potential of the dynamic processes stored in the spoor. At each of these sites, more or less complex events were hypothesized but as was to be expected their accuracy and scope varies due to the personal experience of the respective authors. This procedure constitutes the unspoken application of the pre-iconographic description in western art according to Panofsky (Panofsky 1962). Practical experience (familiarity with objects and phenomena) is an absolute prerequisite for a successful application of the pre-iconographic description, from which a positive correlation between experience and descriptive accuracy can be derived. In the Tracking in Caves project carried out in Tuc d'Audoubert, the outstanding experience in reading tracks by indigenous ichnologists was used (Pastoors and Lenssen-Erz 2020; see Lenssen-Erz and Pastoors Chap. 6; Pastoors et al. Chap. 13). Their expertise was applied not only to the prehistoric spoor in Tuc d'Audoubert but also in the caves of Niaux, Pech-Merle and Fontanet.

In Niaux Cave (Ariège, France) 38 footprints are known in a small diverticule. Western academic analysis found some order in an initially seemingly chaotic distribution of footprints by identifying two to three subjects with an age of 9–12 years (Pales 1976: 92–93). The indigenous ichnologists saw an unequal number of footprints and identified a girl (7–13 years; age classes according to Martin 1928) as their sole trackmaker. The spoor was executed in a controlled, not a chaotic manner and in an upright body posture, which is a puzzle since the ceiling is too low to stand upright (Pastoors et al. 2015).

The cave of Pech-Merle (Lot, France) reveals a total number of 17 footprints. Last western academic analysis interpreted the spoor as the result of one single trackmaker, a big child, adolescent or a small adult (Duday and García 1983). The

indigenous ichnologists identified five subjects with an age between infans II (7–13 years) to *maturus* (41–60 years) (Pastoors et al. 2017). They saw four adults, two male and two female and one younger male (7–13 years) crossing the location separately – independent of each other. Furthermore, they detected two events deviating from normal walking: subject S5, a female adult, carried additional weight, and subject S3, a boy of 9–10, turns left abruptly.

The third cave that has been briefly surveyed by the indigenous ichnologists is Fontanet (Ariège, France). Due to various circumstances, the exact number of prehistoric spoor is unknown. In any case, no complete western academic analysis has yet taken place. Currently Lysianna Ledoux is working on a complete inventory of the spoor. First results are available for three track fields of different sizes (Ledoux 2019). Accordingly, on the largest of the three areas, plate 1, 62 tracks were inventoried (identified and measured). Beside footprints there are some handprints and especially numerous slipping marks. The number of trackmakers is assumed to be between two and six subjects, including children, on the basis of metric analyses. In addition to recording the identity of the trackmakers, Ledoux is also concerned with the identification of events. As an example, three tracks suggest a squatting position, extending on the feet, and the left hand resting back against the ground (Ledoux 2019: 253). The indigenous ichnologists counted on 2 study areas (plate 1 and plate 3 at Ledoux 2019) in Fontanet a total 28 prehistoric human traces (27 footprints and one knee) of 17 subjects that could be combined to a total of 8 trackways, which made up 15 events (Pastoors et al. 2015). Among them there are six men on plate 1, two women, one boy, three girls and one unspecific male (covering altogether an age from *infans* I to *maturus*). On plate 3 there are four subjects, all male, between *juvenis* (14–20 years) and *maturus* (41–60 years). In addition to the information on the identity of the trackmakers, the experienced trackers were able to identify some special events apart from normal walking. On plate 1 subject S5 had slipped, subject S6 was going fast and subject S10 was kneeling. Then a group consisting of four subjects was identified, who were walking together. These are subject S1, female *adultus*, subjects S2 (male *infans* II), S3 (female *infans* II) and S4 (female *infans* I). In addition, plate 3 was exclusively identified as an area of normal walking. No footprint shows a direct relation to the results of the drawing activities carried out on the ground.

What we have here are results of an analysis by indigenous experts that is part of a daily practice in many pre-industrialized societies. Information on contemporaries, their whereabouts and their doings, in these societies is independent of self-observed evidence or reporting and information. What those who grew up in industrialized societies with paved and tarred surfaces in most of their life-world may read from the face of a person (known or unknown) is also frozen in footprints, irrespective of the wearing of shoes or not (pers. comm. Kxunta; Gagnol 2013; see Gagnol Chap. 19) and therefore readable for those with developed tracking skills. Since there can be no doubt that this depth of information gleaned from tracks is being disclosed not by trancing, dreaming, hallucinating or vision but instead by a positivist approach to the analysis of hard data – i.e. an immediate intuitive assessment of complex measures and textures as well as of biological, zoological, hydrological, meteorological, pedological, cultural, social, sedimentological and physical context – it should in

the long run also be detectable by scientific means. Tracking is a parascientific process implying reasoning in an analogous way to western sciences, using induction, deduction and abduction in order to generate new knowledge (Liebenberg 1990). While western morphometric approaches restrict themselves to inductive methodology, indigenous trackers, whose approach can be labelled morpho-classificatory, can imply induction, deduction or abduction depending on data quality, as was mentioned above.

With this book we want to fathom how far scientific and indigenous ichnology have advanced towards their meeting point where both can fully and competently assess the results of the other. Since tracking does not take recourse to alien types of rationality, logic or causality and by no means includes any esoteric facets, practitioners of scientific ichnology may find a useful guide in this book for the recognition of and the advancement towards indigenous ichnology which shows the potential of what can be gleaned from tracks, while still continuing exchange with colleagues from around the globe.

## On this Book

Tracks are probably the oldest element of human perception that has been the object of expert analysis ever since humans hunt. *Homo sapiens* is not a born successful hunter of any sizeable game since we have a comparatively poor eyesight (also missing the *Tapetum lucidum* that makes many animals seeing well in the dark), a rather poor sense of smelling and we would be too slow, clumsy and harmless for successful hunting – if not intelligence came into play. Everything beyond a turtle poses a true challenge if we want to get it alive. Therefore reading tracks will probably during the whole human history have been an important means and advantage for the procurement of fresh meat; it would have been an existential necessity for every adult person to acquire solid knowledge in all disciplines of environmental sciences. Consequently Liebenberg (1990) identified tracking as the origin of science.

Adding to this first appraisal of the analytic and even epistemic value of the human ability to read tracks, we want this book to provide a state-of-the-art collection of chapters that represent the best contributions to the field of track analysis at the beginning of the third decade of the twenty-first century. In this digital epoch, there are sophisticated technological solutions to grasp all attributes that characterize tracks, and contributions from around the world show how these are being implemented in many places. Besides this welcome development and enrichment, there is another, paradoxical development in which many indigenous traditions are on the verge to disappear, while it is only now that western science understands that these traditions harbour irretrievable treasures of knowledge for the understanding of certain archaeological source. The patron of the conference on Prehistoric Human Tracks in Cologne and Mettmann 2017, Hermann Parzinger, expounds in his foreword to this book on this point, emphasizing that indigenous knowledges belong to the toolkit with which people master living – not only survival – in all kinds of

environments, based on accumulated knowledge inherited from the ancestors, a topic to which the new Humboldt Forum in Berlin will dedicate considerable space.

It is the aim of this book to give a comprehensive overview of the investigation of human footprints in terms of methods and of locations and enriching these with perspectives on tracks from various indigenous groups. Addressing the main sessions of the conference on Prehistoric Human Tracks, this book is divided in the three parts:

- Part I – Methodological diversity in the analysis of human tracks
- Part II – Case studies from around the globe
- Part III – Experiences with indigenous experts

Part I, the methodological part of this book, covers three principal aspects of archaeological research with chapters on technical means, on experimental archaeology and on the attempt to open research towards new knowledge systems. Bennett and Reynolds give a welcome overview of the technical means that are developed today and additionally provide a useful array of different ways of how to visualize data or evidence on tracks (Chap. 2). Meritoriously they also provide a checklist for running field research on tracks.

Among the ultimate goals and challenges of the various digital methods is the ability to discriminate tracks of an individual from those of co-occurring individuals. As McClymont and Crompton point out in their following chapter, two imprints of a foot of one person are never identical so that the fuzziness of an imprint needs to become part of the formula by which an individual can be pinned down by his or her footprint transposed to data (Chap. 3). Besides the information on an individual, footprints also freeze information about locomotion processes and about the character of the locomotion.

Important means of archaeology to generate insight into processes and phenomena are experimental renditions. From the working group of Cussac Cave in southwestern France Ledoux and her co-authors report about their endeavours to better understand taphonomic processes inside a karst cave (Chap. 4). Importantly they focus on the effects of intermittent floodings which are a common phenomenon in caves. McLaren and co-authors also describe experiments by which they not only re-created footprints in clayey ground but also controlled how plant remains and macrofossils became imprinted in the ground by stepping on (Chap. 5). By covering the footprints with sand and excavating them experimentally, inferences about the depositional conditions in the Late Pleistocene were corroborated.

The final chapter of this first part of the book by Lenssen-Erz and Pastoors takes an encompassing epistemological view of the art of tracking as parascientific practice (Chap. 6). Doubts in indigenous experts' inferences would be very obvious and justified should they arrive at results that contradict any reasonable expectations of which people may have entered the caves and how they behaved there. However, the tracking experts simply augment the depth of exploration of the data, i.e. they interpret the track with its visible attributes, refining the results and expectations of scientific researchers. This cannot be characterized as being unscientific simply because no scientific discipline presently has the means to disprove them, but instead

it is a lack of series of measurements which the sciences will keep on suffering from before they arrive at an equally dependable resolution.

Part II of the book, dealing primarily with prehistoric track sites from around the globe, opens with an instructive chapter by Trinkaus and co-authors about how to analyse and interpret various elements on skeletal foot remains (Chap. 7). It is through the combined assessment of these accumulated details which makes the authors conclude that many imprints of bare feet, which are the normal case in prehistory, yet retain the markers to identify the consistent use of protective footwear. While this chapter covers a wide range of periods of human evolution, the following chapters are ordered chronologically, beginning with the hominin footprints of Laetoli. Being the prototype of prehistoric human tracks, it is a welcome contribution of Cherin and co-authors that they review the rather long history of research on these tracks, connecting it to the present where digital methods and scanning have become state of the art in research (Chap. 8). What Laetoli is for Africa, Happisburgh is for Europe, but even though they are considerably younger, they were an ephemeral phenomenon. While they could not be preserved in place due to tidal activities, their preservation and afterlife, as it were, are not only secured in archaeology but also in the arts, as Ashton exemplifies with citations from a poem and a popular book on walking (Chap. 9).

The four human footprints of Theopetra Cave in Greece, according to the authors Kyparissi-Apostolika and Manolis, are the oldest European tracks that arguably could be either of Neandertal origin or early *Homo sapiens* (Chap. 10). They seem to originate from two young children of whom one is assumed to have worn footwear, thus supporting the postulate of Trinkaus and co-authors. More and undisputed Neandertal tracks are reported from Le Rozel from French Normandy by Duveau and co-authors (Chap. 11). The sheer mass of more than 250 footprints at this site, sided by a number of handprints, makes this an exceptional site for the understanding of Neandertal behaviour and group life of about 80,000 BP. Only some 13,000 years younger and therefore also of Neandertal origin are footprints that Onac and co-authors present from Vârtope Cave in Romania – together with a plethora of younger footprints of *Homo sapiens* found in Ciur-Izbuca Cave, also in the Carpathians (Chap. 12). A cave with an equally large number of Pleistocene footprints is Tuc d'Audoubert in the French Pyrenees, presented by Pastoors and co-authors (Chap. 13). In this cave the track reading of indigenous trackers was practiced most meticulously (only the cave of Aldène received equally intense investigations, but this is still unpublished) and the results, presented in a systematized scheme, allow to follow, as it were, certain individuals through the cave. They seem to have undertaken a one-time exploration of the cave system during which some of them procured certain materials, e.g. bear teeth. Interestingly also in the Late Pleistocene, a similar one-time visit into a deep cave was paid by a small group of individuals to Bâsura Cave in Italy, as presented by Avanzini and co-authors (Chap. 14). And again, same as in Tuc d'Audoubert, here, too, not only adults but also adolescents and even very small children were part of the exploring group. Another parallel between the two cave visits is that even difficult passages where crawling or dangerous climbing is required did not prevent the groups from bringing



the small children, and none of the visitors in either group who left imprints wore shoes nor leg clothes. A well comparable case to the two mentioned ones is reported by Galant et al. from the Mesolithic period from Aldène Cave in Hèrault region of southern France (Chap. 15). Again, visitors of all ages and both sexes left their imprints and all seem to have been in the cave only once – apparently for the purpose of exploration only. Interestingly, conditions in the cave have preserved many traces of the lighting management that the Mesolithic explorers had to implement. Since with regard to lighting they had no technological advantage over the Late Pleistocene, this practice can be taken as a potential model for comparable explorations during earlier periods. These insights will in the near future be associated with the results of the investigations by indigenous experts in this cave.

More evidence on secular behaviour in the Mesolithic comes from the footprints at Formby Point on the English Coast on the Irish Sea on which Alison Burns expounds (Chap. 16). Here human and animal tracks are mixed, and this appears to reveal consciousness of the tracks in the people who thus articulated in behaviour their relationship to animals and to the landscape. As other track sites on coasts, the Formby tracks were bound to disappear once they had been exposed whereas caves can preserve footprints for millennia. This is the case to a large extent in the huge Ojo Guareña Cave system in northern Spain, presented by Ortega and co-authors (Chap. 17). While this cave preserves evidence from the Upper Palaeolithic onwards, tracks are dated to the Chalcolithic period at around 4300 calBP and that is why this chapter concludes the chronologically ordered part of the book. The partially sandy sediment on the floor shows far more than 1000 human footprints in various places, which constitute vast areas that cannot be explored without destroying tracks. In some parts of the cave system, tracks show again a one-time exploration as the purpose of the visit, while other parts convey clear evidence of several visits – apparently relating to the dark zones of the cave as symbolic and social landscape.

Part III of this book intends to encourage an opening of discourse from a closed academic environment to other ways of knowing in that besides the conventional realms of academic exchange we also aim at presenting experiences of researchers from their encounters with indigenous experts, be they hunters or herders. The chapters clearly show that such encounters instil a rather personal and emotional but also humble relationship between experts from different worlds of knowing – perhaps partly because the close insight of western scholars into a special field of knowledge in a culture without books and formal teaching shows that meticulous analysis and understanding of phenomena in our world with the human sense can surpass any technological apparatus. While tracking usually works with the optical sense for the analysis and interpretation of visual signs, Lye in her contribution on Batek from the Malayan rainforest shows that the hearing sense can take precedence over seeing should the environment require this (Chap. 18). But as in visual tracking, hunters tracking sounds with the ear reach a fine resolution that seems virtually impossible to the layperson. In addition, in the rainforest also olfactory traces need to be carefully included. Since the human tracking ability typically has a connotation with spoor recognition by hunter-gatherers, the contribution of Lye is a welcome broadening of scope regarding the senses that can be involved.



Another broadening of scope comes from the second chapter of this part by Gagnol who looks at the tracking abilities of nomadic pastoralists of the Sahara, where he has done tracking research (Chap. 19). This is the first source (based on Gagnol 2013) where the same stunning tracking abilities – that are known from hunter-gatherers – are well and comprehensively documented among peoples with other subsistence strategies. Just as with hunter-gatherers, the camel herders of the Sahara, too, have equally sophisticated tracking skills regarding animal or human tracks. For the latter the particularly skilled experts maintain that even social aspects can be read from tracks. In addition, Gagnol independently found out that expert tracking also requires the mastering of abductive reasoning (cf. Liebenberg 1990), labelled hodological strategy in his chapter, thus providing unprejudiced corroboration of Liebenberg's postulate that tracking at least partly is based on a scientific mindset.

Other quasi-epistemological aspects of tracking are raised in Bieseles chapter that draws on her decades of experiences with and living among hunter-gatherer trackers in the Kalahari (Chap. 20). She can report, *inter alia*, from her observations on how these experts reach dependable results when reading tracks which – as an exchange of personal insights – is embedded in their sharing ideology. But Bieseles also reports on how challenging it was in the beginning to integrate western and San analytical practice in the Tracking in Caves project.

A pioneering project of the integration of scientific and indigenous knowledge is the topic of Webb's chapter who after the discovery of the Pleistocene footprints in the Willandra Lakes in southern Australia was the first to call indigenous experts to help understand an archaeological source (Chap. 21). The success of this collaboration is an inspiration to other projects because it showed that the interpretations of the Aboriginal track experts were completely plausible and generated information "that we could not have obtained in any textbook and even a lifetime in archaeology".

With this Willandra project and the since 2013 ongoing Tracking in Caves project, practical collaboration between scientific and indigenous experts has gone some way together, but they had to design routines and practices without having established models at hand. Therefore the concluding chapter by Zwischenberger reviews the characteristics of western and indigenous expertise and how such different knowledge traditions can collaborate on eye level (Chap. 22). Based on this review and on the analysis of various ethical protocols of indigenous groups, she compiles guidelines for the collaboration of scientific and indigenous experts. Thus a circle closes back to the first chapter in part I where Bennett and Reynolds provide a checklist for the practical encounter with tracks as archaeological source which Zwischenberger's contribution complements with an analogue list comprising points that need to be observed when investigating such sources with indigenous support.

Reading prehistoric human tracks constitutes a perhaps unique kind of discourse not only for archaeology but for our knowing of the world in general. With the most sophisticated means of analysis and computing, we of today try to understand and explain the very same sources, aiming at the very same results as we as a species will have done millennia ago: we find tracks of conspecifics, and we want to know who was here before me, what did she or he do and how did she or he feel. Admitting that whatever apparatus we use, our results remain wanting, we of today fortunately can call the support of indigenous experts who master reading tracks without the help of

any technology and yet arrive at much deeper understanding. They allow us to get a glimpse of which information our prehistoric ancestors would have had access to when encountering human tracks. With reading prehistoric human tracks, we can liaise our epistemological procedures not only with experts from other cultures but also with the knowledge even of our Pleistocene ancestors.

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