

THE BRONZE AGE INDUS QUARRIES OF THE ROHRI HILLS AND ONGAR IN SINDH (PAKISTAN)

Paolo Biagi, Elisabetta Starnini

Ca' Foscari University, Dipartimento di Scienze dell'Antichità e del Vicino Oriente, I-30123 Venice, Italy; pavelius@unive.it; estarnini@hotmail.com

ABSTRACT. The surveys carried out in Lower Sindh (Pakistan) during the last five years have revealed that the Rohri Hills flint sources were not the only ones to be exploited during the flourishing of the Indus Valley Bronze Age. Although little is known of the lithic raw materials exploitation during the IIIrd mill. cal BC, the Ongar discoveries have opened new perspectives to the knowledge of the economic strategy of the Indus Civilisation. Furthermore, a reanalysis of the distribution pattern and orientation of the Rohri Hills Indus flint quarries seems to indicate their grouping into clusters along the wadis flowing eastwards. This would suggest that, at least the Shadee Shaheed, Mature Indus flint quarries, were mainly exploited by people whose settlements were located along the terraces of the Nara-Hakra watercourse, which, according to the results obtained from the surveys carried out in Cholistan (Bahawalpur state), undoubtedly represented the most intensively settled river system from the middle IVth mill. cal BC onwards.

Introduction

Although little attention has ever been paid to the flint resources of the Copper and Bronze Ages in the Indus Valley (Lahiri, 1992; Ratnagar, 2004), the results obtained from the surveys and excavations carried out in Sindh since the middle of the 1980's have shown that this raw material was of fundamental importance in the economy of the Indus Valley inhabitants of the IIIrd mil. cal BC (Vidale, 2000; Biagi, Starnini, in press), who utilised this raw material mainly for the manufacture of specialised tools instead of metal implements.

The Rohri Hills, in Upper Sindh, have always been considered the most important lithic raw material sources in the Indus Valley, even though, until 1986, nothing was known of the presence of hundreds of flint quarries in the territory, their chronology and mode(s) of exploitation (Allchin, 1976; 1979).

Furthermore, given also the uneasy accessibility of the region, no systematic survey has ever been carried out before the 1990's, except for brief visits in fairly marginal areas. As a consequence our knowledge was limited to a few "spots" around Sukkur (de Terra, Paterson, 1939), Rohri (Allchin, 1979) and Kot Diji (Allchin, 1976), leaving unexplored all the remaining territory, which extends in a north-south direction from the Bukkur Gorge to the western fringes of the Thar Desert, covering an area of some 40 by 16 kms (Fig. 1).

The hills consist of limestone flat-topped terraces (Fig. 2), which belong to the Middle Eocene-Early Oligocene Brahui formation, rich in seams of excellent quality flint nodules (Blandford, 1880).

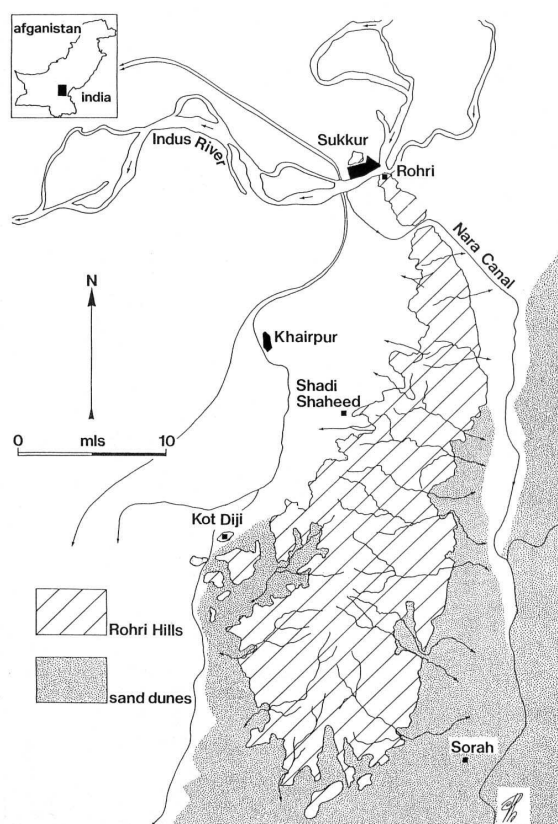


Fig. 1. Map of the Rohri Hills with the localities mentioned in the text (scale in miles)



Fig. 2. View of the Rohri Hills (background) from the Indus Valley

The flint from the Shadee Shaheed Hills sector (Fig. 3) is of a greyish-brown (10 YR5/2) to brown colour (10 YR5/3). According to the petrographic analysis it is mainly composed of microcrystalline quartz and chalcedony (95%) with a few Foraminifers, isolated or aggregated calcite crystals, iron and manganese oxides and small, non silicified organic pellets (Biagi, Starnini, in press). Similarly, also the Ongar area (otherwise called Milestone 101) had never been explored in detail before 2004. The reports by Allchin (1976) and Allchin et al. (1978), describe the presence of excellent quality flint seams in the Gaj formation of the Ongar Hill (Blandford, 1880), on the top of which Palaeolithic workshops of different periods were discovered in the 1970's (Khan, 1979; Biagi, 2005).

The researches undertaken during the last five years showed that Indus Civilisation flint quarries were opened not only at Ongar, but also along the edges of the Daphro and Bekhain Hills (Figs. 4, 7) (Biagi, 2007; Biagi, Franco, 2008). The new discoveries show that the exploitation of the flint resources is much more complex than previously suggested, and that it took place in different regions of Sindh, most probably in rather similar ways.

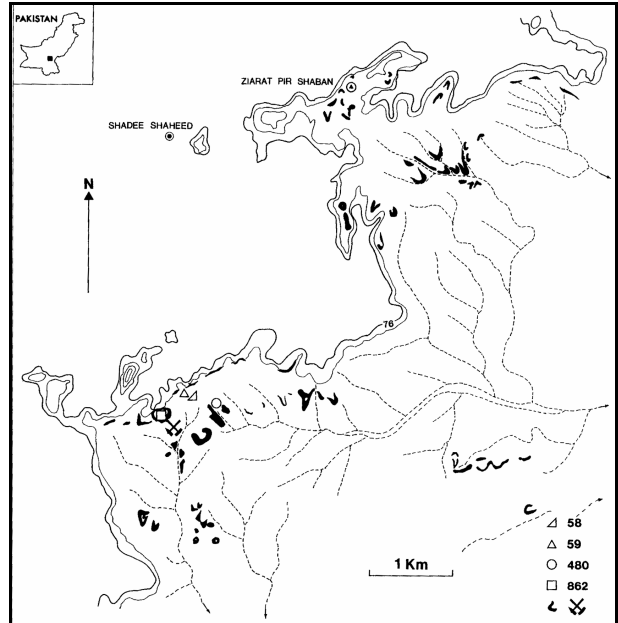


Fig. 3. Distribution map of the flint quarries and workshops discovered near Shadee Shaheed in the Rohri Hills during the field surveys

Although the researches so far conducted in the two above territories are still too limited to reach any definitive conclusion, the scope of this paper is to propose new perspectives about the flint raw material exploitation systems during the Indus Bronze Age, and to point out the existence of alternative sources to those universally (badly) known in the Rohri Hills.

The Rohri Hills (Upper Sindh)

The first groups of Indus flint quarries were discovered in 1986 on the top of the mesas close to the Shrine of Shadee Shaheed (Fig. 5) (Biagi, Cremaschi, 1991). The surveys carried out in the following years showed that they were not unique and isolated, but that the exploited zone extended over an area of at least 10 km along the central-western edge of the hills and its immediate interior (Fig. 3).

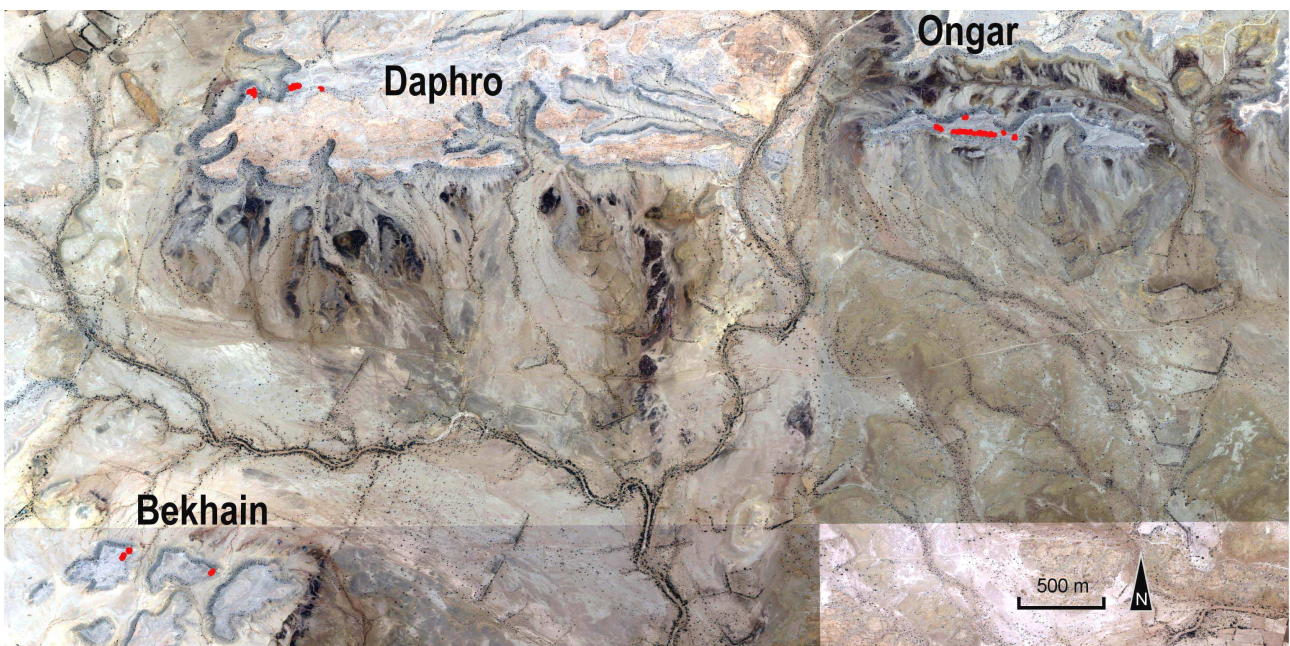


Fig. 4. Satellite image of Ongar, Daphro and Bekhain Hills with the location of the Indus flint extraction areas (dots) (by courtesy of C. Franco)



Fig. 5. The first Indus flint quarries and workshops discovered on the Shadee Shaheed Hills by the Italian expedition

Impressive clusters of hundreds of open-air flint quarries were discovered not only by intensive field surveys, but also by balloon, and satellite images (Fig. 6). Excavations were later undertaken in order to understand the mode(s) of exploitation

of the Indus quarries, the chronology of the extraction sites, and their eventual seasonality of exploitation.

Consequently a few workshops with different types of products were selected for excavation (numbers 58, 59, 480 and 862-W1) (Biagi, Pessina, 1994; Negrino, Starnini, 1995; Negrino et al., 1996) as well as one flint quarry (number 862), within a “C”-shaped cluster inside one of the most extensively and intensively exploited areas of the Hills (Fig. 6) (Biagi et al., 1997).

The fortunate discovery of a small charcoal sample inside the extraction niche allowed us to radiocarbon date the above quarry, which had been exploited during the Mature Indus period (GrA-3255: 3870±70 uncal BP; 2460-2200 cal BC at 1 sigma; Biagi, 1995). The quarry surface was surrounded by small flint-knapping workshops, where the nodules were first tested, and then reduced into bladelets. The quarry bottom was discovered at some 1.5 m of depth. It was marked by dozens of rounded holes, many of which still containing flint nodules ready to be extracted (Fig. 8) (Starnini, Biagi, 2006).

For unknown reasons the quarry was later abandoned, and the Indus workers never went back to the site, which was slowly filled with sand blown from the neighbouring Thar Desert (Fig. 9).

Ongar, Daphro and Bekhain Hills (Lower Sindh)

This group of hills is located south of Hyderabad, in Lower Sindh, some 8 miles north of Jhuga Pir (Fig. 4). At Ongar (Milestone 101), the occurrence of flint seams in the Ranikot limestone beds had already been pointed out by Blandford (1880), while Allchin (1976) and Allchin et al. (1978) were the first to report the presence of prehistoric flint sites on the top of the mesas, which they attributed to different periods of the Palaeolithic.



Fig. 6. Satellite image of four main clusters of Indus flint quarries in the central-western part of the Rohri Hills (Shadee Shaheed Hills) with the location of site 862. The numbers indicate the distribution of the main flint extraction areas visible in the image (by courtesy of C. Franco)

The presence of Indus Civilisation workshops and quarries was first noticed during the 2006 surveys at both Daphro and Bekhain, and again, at Ongar, in 2008 (Fig. 4). Even though most of the prehistoric sites have already been destroyed by recent, illegal limestone quarrying, nevertheless a few of them still exist on top of the mesas of more difficult access.

Along the southern edge of the narrow mesa between Ongar and Daphro, Indus Civilisation flint extraction trenches, flake workshops and clusters of “fresh” artefacts of a brownish grey colour (10 YR6/2) are still clearly visible. Parallel lines of similar structures have been recorded also along the north-westernmost edge of Daphro (Fig. 7), where a few Indus flake workshops with typical subconical, elongated blade cores (Fig.



Fig. 7. Daphro Hills: traces of Indus flint extraction trenches in the foreground



Fig. 8. Rohri Hills Quarry 862. Hollowed flint nodule, *in situ*, ready for extraction



Fig. 9. Rohri Hills Quarry 862 at the end of the 1998 last season, with flint extraction holes visible in the limestone floor

10; N1, 3, 4) were discovered (Biagi, 2006). Similar extraction trenches were also noticed along the edge of two of the Bekhain Hills, from which also a large-sized Indus pre-core, ready for exportation, was found on the surface near a series of shallow open-air trenches already heavily damaged by modern quarrying.

It is important to point out that the small area covered by the field surveys so far conducted in the surrounding region has not lead to the discovery of any Indus settlement located close to the above Indus extractive areas.

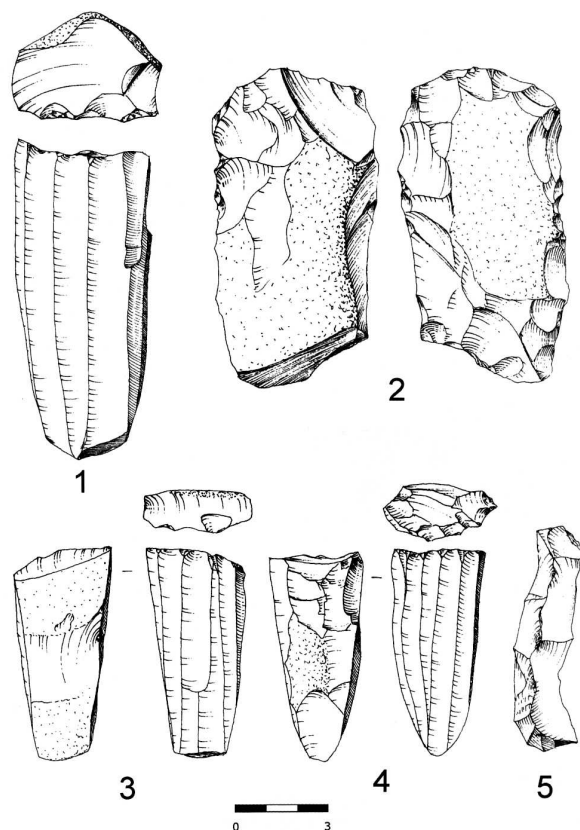


Fig. 10. Daphro: subconical, blade flint cores (1, 3 and 4), pre-core (2) and crested blade (5) from the Indus Civilisation workshops

Discussion

The surveys recently conducted in Lower Sindh have revealed that the Rohri Hills were not the only flint sources exploited in Indus times, as previously suggested (Allchin, 1979). Even though they still seem to represent the most important procurement areas, the hills around Ongar showed that alternative ones did exist in other territories where systematic research had never been carried out before the 2000's.

Nevertheless the Rohri Hills still represent the most intriguing and complex extractive zone, with thousands of quarries, often grouped into clusters, which cover some of the terraces in well-selected areas. Fig. 3 shows the distribution map of the main clusters discovered in the Shadee Shaheed Hills and their interior, the latter distributed on the mesas that border one of the main wadis, which flows to the east, towards the course of the former Nara-Hakra River.

Even though the excavations so far have been carried out exclusively in the Shadee Shaheed Hills (Fig. 3), it is important to remember that:

- 1 – Indus flint workshops existed, and were visible until some 20 years ago, also along the northern edge of the hills, near Rohri (Allchin, 1979). However quarries, such as those discovered around Shadee Shaheed, have never been recorded from the above area even during the 1985 surveys;
- 2 – the outcrops known from different regions of the above hills show flint colour and textural differences, although our knowledge is mainly limited to the Shadee Shaheed variety, which is very homogeneous. Outcrops of variegated, or striped, types are known at least from northern areas, around the present town of Rohri;
- 3 – the flint artefacts from Quarry 862 and the four workshops (58, 59, 480 and 862-W1) so far excavated, yielded typologically, metrically and quantitatively diversified materials, although they are always very easy to attribute to the Indus Civilisation, because of the presence of characteristic products, among which are subconical, elongated blade cores, and narrow bladelet bullet cores;
- 4 – the absolute and relative chronologies of the quarry and workshop clusters are still unknown, given the absence of any datable organic material from the sites surface. The only exception is that of Quarry 862, radiocarbon-dated, from charcoal, to the Mature Indus period (GrA-3255);
- 5 – the exploitation of the flint resources, by quarrying, undoubtedly began during the Early Bronze Age Kot Diji Culture (Khan, 2002), while, so far, there are no proofs of their exploitation during earlier Holocene periods;
- 6 – the seasonality of exploitation is also unknown, even though we have to consider that the limestone hand quarrying currently underway on the hills, mainly by Bugti and Shambani Baloch workers, is interrupted during the hot season, roughly between April and September. These observations are difficult to extend to the IIIrd mill. cal BC, but it is important to point out that nowadays also other stone raw material sources (for instance quartzite at Çakmak, in northwestern Anatolia) are exploited seasonally, when the workers are not engaged in other farming activities.

Conclusion

From the detailed study of the debitage workshops scattered around the Shadee Shaheed quarries, we can deduce that the extraction of the flint nodules depended mostly from the request of a mass production of very regular blades and bladelets (Negrino et al., 1996; Biagi et al., 1997), manufactured on the spot, to be exported, as finished items, to the urban centres of the Indus Civilisation (Kenoyer, 1984; Cleland, 1987). Here, mainly in the handicraft quarters, blades and bladelets were shaped into specific tools, such as, among the others, micro-drills for the piercing of semi-precious stone beads (Pracchia et al., 1985; Vidale, 1987). Traditionally, since many years, the main urban centres that attracted these resources are considered to be those of the Indus Valley, especially Mohenjo-daro, some 75 km, as the crow flies, west of the Rohri Hills, and others, located more close to the hills, amongst which are, for instance, Kot Diji (Khan, 2002) and Lakhueen-jo-daro (Shaikh et al., 2006), although the retrieval method employed during the excavation of all these sites did not favour the collection of relatively small products, flint tools included.

After the last explorations and the detailed mapping of the quarrying sites on the Rohri and Ongar Hills, the general pattern seems to be much more complex than previously suggested. At present we know that:

- 1 – the Rohri Hills were not the only lithic raw material source exploited by the Bronze Age Indus populations in Sindh. Even though they might have been the most important ones for a few hundreds years, others undoubtedly existed, as shown by the discoveries made around Ongar, although they were exploited on a smaller scale and, most probably, covered a more regional distribution radius;
- 2 – the distribution pattern of the Rohri Hills flint quarry clusters, analysed according to the geomorphology of the territory where they are distributed, can provide interesting indications about the probable direction taken by most of the exportation products, which does no longer seem to be as obvious as supposed just a few years ago. In this respect it is important to point out that the hills gently dip towards southeast, and all the wadis that incise them flow towards the east and the southeast. In contrast, their western edge is very steep, and faces the alluvial plain of the Indus from an altitude of some 250 feet, which makes them more difficult to access from this side. This fact is of exceptional importance if we consider that the present-day Nara-Hakra, the natural prolongation of the ancient Saraswati, flows east of the hills, and its course incises the western fringes of the Thar Desert from north to south. The intensive surveys carried out by M. R. Mughal (1997) in Cholistan (Bahawalpur), along the banks of the above dry riverbed, revealed that this was undoubtedly the most intensively settled area throughout the entire Indus period. Preliminary surveys carried out during the last years along the banks of the Nara showed the existence of Indus, and other periods, sites also in this area (Shaikh et al., 2002-2003), although a more systematic research is highly needed to define the Bronze Age settlement network of this important archaeological territory;
- 3 – more effort should be made towards the understanding of the time-span covered by the phenomenon under study. In fact the different morphologies and characteristics of the flint quarries, the flint-knapping ateliers and, moreover, of the debitage products, first of all the blades and cores, are signals of the possible existence of a palimpsest of different exploitation episodes, which needs to be understood in a more detailed way.

Acknowledgements. The 2005-2008 surveys at Ongar were carried out in collaboration with the Institute of Sindhology, Jamshoro University, for which we are most grateful to the Vice-chancellor, Mr. Mazharul Haq Siddiqui, and the Institute's Director, Mr. Shoukat Shoro. Special thanks are also due and to Mir Atta Mohammad Talpur, Mir Farooq Talpur, Mir Ghulam Rasool Talpur, Mir Akhtar Talpur, Mir Rehman Talpur and all the other people who were of great help during the surveys. Thanks are also due to EURAL Gnutti Ltd. (Rovato, Brescia, Italy) that sponsored the 2008 research at Ongar, Dr. C. Franco (Ca' Foscari University, Venice), who took part in the 2008 campaign, and all the Italian and Pakistani members who took part in the Rohri Hills fieldwork seasons.

References

- Allchin, B. 1976. Palaeolithic sites in the Plains of Sindh and their geographical implications. – *The Geographical Journal*, 142, 3, 471-489.

- Allchin, B. 1979. Stone blade industries of early settlements in Sind as indicators of geographic and socio-economic change. – In: *South Asian Archaeology 1977* (Ed. M. Taddei). Series Minor, 6, Istituto Universitario Orientale, Seminario di Studi Asiatici, Naples, 173-212.
- Allchin, B., A. Goudie, K. Hedge. 1978. *The Prehistory and Palaeogeography of the Great Indian Desert*. Academic Press, London-New York-San Francisco, 370 p.
- Biagi, P. 1995. An AMS radiocarbon date from the Harappan Quarry-pit 862 in the Rohri Hills (Sindh – Pakistan). – *Ancient Sindh*, 2, 81-84.
- Biagi, P. 2005. Ongar revisited. – *Sindhological Studies*, 21, 1-21.
- Biagi, P. 2006. The prehistory of Lower Sindh (Pakistan): New results and more perspectives. – In: *Sindh – Past, Present & Future* (Ed. F. Husain). B.C.C.T. & Press, Karachi, 185-201.
- Biagi, P. 2007. Quarries in Harappa. – In: *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures* (Ed. H. Selin). Vol. 2. Springer, Berlin-Heidelberg, 1856-1863.
- Biagi, P., M. Cremaschi. 1991. The Harappan flint quarries of the Rohri Hills (Sindh, Pakistan). – *Antiquity*, 65, 246, 97-102.
- Biagi, P., C. Franco. 2008. Ricerche archeologiche in Balochistan e nel Sindh Meridionale (Pakistan). – In: *Missioni Archeologiche e Progetti di Ricerca e Scavo dell'Università Ca' Foscari – Venezia* (Ed. S. Gelichi). VI Giornata di Studio. Bretschneider, Roma, 9-18.
- Biagi, P., F. Negrino, E. Starnini. 1997. New data on the Harappan flint quarries of the Rohri Hills (Sindh – Pakistan). – In: *Man and Flint* (Eds. R. Schild, Z. Sulgostowska). Proc. VIIth Intern. Flint Symposium. Institute of Archaeology and Ethnology, Polish Academy of Sciences, Warszawa, 29-39.
- Biagi, P., A. Pessina. 1994. Surveys and excavations in the Rohri Hills (Sindh-Pakistan): a preliminary report on the 1993 Campaign. – *Ancient Sindh*, 1, 13-75.
- Biagi, P., E. Starnini (in press). Technological choices and lithic production in the Harappan period: case studies from Sindh (Pakistan). – In: *Lithic Technology, Manufacture and Replication Studies Reconsidered* (Ed. C. J. Bond). BAR Intern. Series, Archaeopress, Oxford.
- Blandford, W. T. 1880. *The Geology of Western Sind*. Memoirs of the Geological Survey of India, XVII (1), Calcutta, 210 p.
- Cleland, J. H. 1987. Lithic analysis and culture process in the Indus Region. – In: *Studies in the Archaeology of India and Pakistan* (Ed. J. Jacobson). Aris and Phillips, Warminster, 91-116.
- de Terra, H., T. T. Paterson. 1939. *The Ice Age in the Indian Subcontinent and Associated Human Cultures with Special Reference to Jammu, Kashmir, Ladakh, Sind, Lindar and Central & Peninsular India*. Carnegie Institute, Washington, 354 p.
- Kenoyer, M. 1984. Chipped stone tools from Mohenjo-daro. – In: *Frontiers of the Indus Civilization* (Eds. B. B. Lal, S. P. Gupta). Books and Books, New Delhi, 117-132.
- Khan, A. R. 1979. Palaeolithic sites discovered in Lower Sind and their significance in the prehistory of the country. – In: *Study in the Geomorphology and Prehistory of Sind. Grassroots* (Ed. A. R. Khan). III (2), Sp. Issue. Institute of Sindhology, Jamshoro, 81-86.
- Khan, F. A., 2002. *The Glory that Was Kot Diji Culture of Pakistan. An Archaeology Outline*. Department of Archaeology, Shah Abdul Latif University, Khairpur, 136 p.
- Lahiri, N. 1992. *The Archaeology of the Indian Trade Routes up to c. 200 BC. Resource Use, Resource Access and Lines of Communication*. Oxford University Press, Delhi, 461 p.
- Mughal, M. R. 1997. *Ancient Cholistan. Archaeology and Architecture*. Ferozsons, Lahore, 170 p.
- Negrino, F., E. Starnini. 1995. A preliminary report of the 1994 excavations on the Rohri Hills (Sindh – Pakistan). – *Ancient Sindh*, 2, 55-80.
- Negrino, F., C. Ottomano, E. Starnini, G. M. Veesar. 1996. Excavations at Site 862 (Rohri Hills, Sind, Pakistan): a report of the 1995 and 1997 campaigns. – *Ancient Sindh*, 3, 67-104.
- Pracchia, S., M. Tosi, M. Vidale. 1985. On the type, distribution and extent of craft industries at Moenjo-daro. – In: *South Asian Archaeology 1983* (Eds. J. Schotmans, M. Taddei). Istituto Universitario Orientale, Dipartimento di Studi Asiatici, Naples, Series Minor, XXIII, 207-247.
- Ratnagar, S. 2004. *Trading Encounters From the Euphrates to the Indus in the Bronze Age*. Oxford University Press, New Delhi, 408 p.
- Shaikh, N., Q. H. Mallah, G. M. Veesar. 2002-2003. Recent discoveries/industrial complexes in Thar, Rohri Hills and adjacent plains: regional perspective. – *Ancient Sindh*, 7, 27-66.
- Shaikh, N., Q. H. Mallah, G. M. Veesar. 2006. The excavation of Indus Period site Lakhueen Jo Daro 2006: A preliminary report. – In: *Sindh – Past, Present & Future* (Ed. F. Husain). B.C.C.T. & Press, Karachi, 238-264.
- Starnini, E., P. Biagi. 2006. Excavations at the Harappan flint quarry 862 on the Rohri Hills (Sindh, Pakistan). – In: *Stone Age – Mining Age* (Eds. G. Körlin, G. Weisgerber). *Der Anschnitt*, 19, Bochum, 195-202.
- Vidale, M. 1987. Some aspects of lapidary craft at Mohenjodaro in the light of the surface record on the Moneer S.E. area. – In: *Reports on Field Work Carried out at Mohenjo-Daro Pakistan 1983-84* (Eds. M. Jansen, G. Urban). *IsMEO Aachen University Mission, Interim Reports*, 2, 113-149.
- Vidale, M. 2000. *The Archaeology of Indus Craft. Indus Craftpeople and Why We Study Them*. ISIAO, Rome, Reports and Memoirs, Series Minor, IV, 165 p.