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An Archaeological Survey in the Neighbourhood of Thari in the Thar Desert (Sindh)

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AN ARCHAEOLOGICAL SURVEY IN THE NEIGHBOURHOOD OF THARI IN THE THAR DESERT (SINDH, PAKISTAN)

ABSTRACT - During the survey carried out northeast of the town of Thari in the Thar Desert, many sites were discovered on the surface of the sand dunes that surround the salt-water basins of Ganero and Jamal Shah Sim. Most of these sites consist of flint scatters among which are geometric microliths of different shape and dimension. Some of them can be attributed to the Mesolithic, while others are probably older and might belong to the end of the Late Palaeolithic. Some other sites, which yielded typical painted potsherds, belong to the Kot Diji Culture. This preliminary survey has revealed the great archaeological potential of the salt-water lake area of Thari, where hundred of sites are still to be discovered.

PREFACE

The scope of this paper is to illustrate and discuss the finds from the archaeological sites discovered during the survey carried out in January 2001 by the "Joint Rohri Hills Project" in the salt lake region north east of the town of Thari, in the Thari District of Upper Sindh.

Until a few years ago little was known of the archaeology of the Thar Desert around Thari. The most important discoveries had so far been reported in the PhD Thesis of Professor G.M. SHAR (1995), while almost nothing was known of the Early Holocene prehistory of the area from which only a few Mesolithic sites were discovered during the last years of research (BIAGI and KAZI, 1995; SHAR *et al.*, 1996). The scarcity of Mesolithic sites in the Thari desert region greatly contrasted with was known for the neighbouring Rajastan where sites of this period are well documented (MISRA, 1977; 1985).

THE 2001 SURVEY

A brief reconnaissance survey was carried out between January 31st and February 4th, around the salt-water basins of Ganero and Jamal Shah Sim. During this week, 16 new archaeological sites were discovered and 3 others, already found during the previous season,

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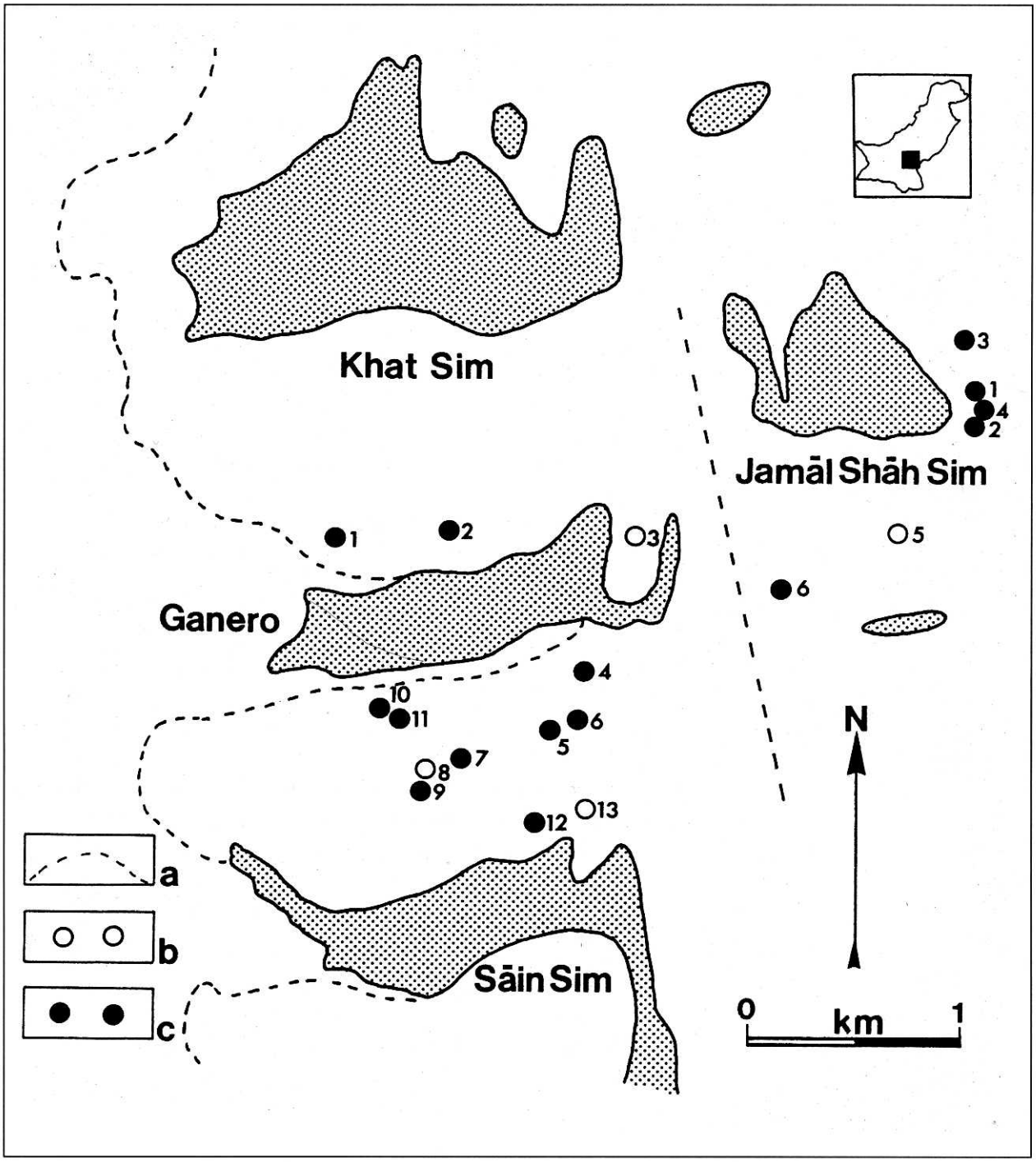

Fig. 1 - Distribution map of the archaeological sites discovered during the 2001 survey. The JS sites are to the right of the hatched line and the GNR ones to the left. a) limit of the Thar Desert dunes, b) Kot Diji and later sites, c) Late Palaeolithic/Mesolithic sites (*drawing by P. Biagi*).

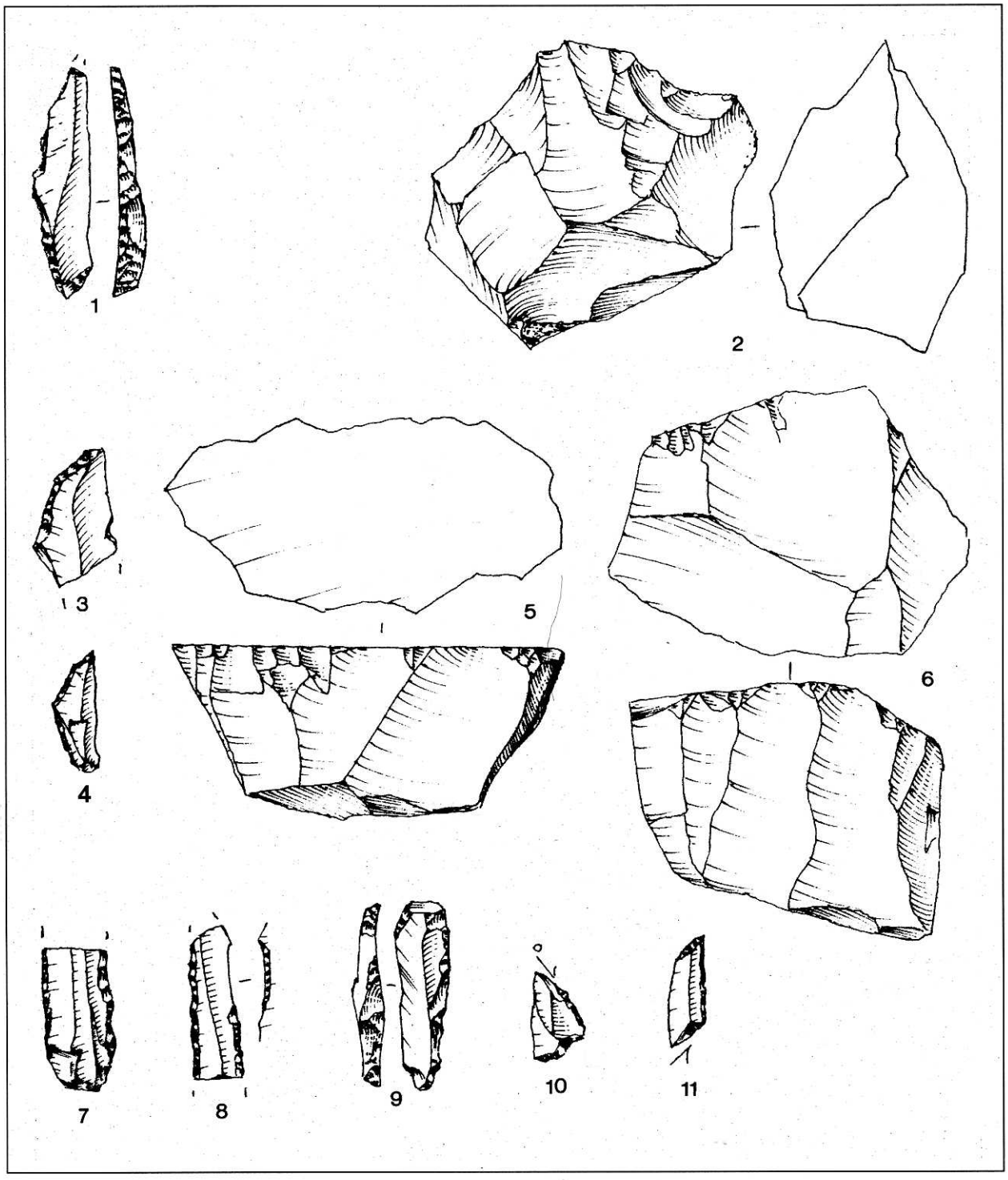

Fig. 2 - Flint tools and cores from GNR1 (1 and 2), GNR2 (3-5), GNR7 (6-8) and GNR10 (9-11) (1:1) (*drawings by G. Almerigogna*).

were revisited (fig. 1). Many of them consist of flint scatters the cultural attribution of which can be tentatively given on the basis of the typology of the more characteristic tool types. The assemblages are obtained from Rohri Hills flint, whose nearest sources outcrop some 5 km east of the lakes. The artefacts are weathered and patinated, often of brown (7.5YR 5/3) to light brown (7.5YR 6/3) colour.

The sites of Ganero 1 (GNR1) and 2 (GNR2) had already been discovered by one of the authors (G.M.V.) in 2000. GNR1 is a scatter of flint artefacts located in a depression between the sand dunes that slope towards the northern shores of Lake Ganero, some 500m east of the village of Ghot Lakhmir Shar[1]. The flint assemblage collected from GNR1 is rather poor. It is composed of 52 unretouched artefacts (31 of which complete), 1 total backed point on a bladelet obtained with abrupt, deep, direct retouch along the left side (fig. 2/1) and 1 one discoidal core with flakelet detachments (fig. 2/2). On the basis of the typological characteristics of these two latter finds the site is most probably attributable to the end of the Palaeolithic or to the beginning of the Mesolithic.

The geographic location of GNR2 is almost identical to that of GNR1. It lies midway between the villages of Ghot Lakhmir Shar, to the west, and Ganero, to the east. The flint assemblage of this site consists of 244 artefacts (59 of which complete), 2 cores and 7 instruments. Among the cores 1, fragmented, is polyhedrical, 1 is subconical with bladelet-like flakelet detachments (fig. 2/5). The instruments include 1 isosceles triangle on a microbladelet (fig. 2/4), 1 probable distal fragment of backed point on a bladelet (fig. 2/3) and 4 fragments of bladelets with simple, marginal, direct retouch.

The site of Ganero 3 (GNR3) is located just to the south of the homonymous village, close to the lakeshore (fig. 3, top). The ruins of a Mosque mark the site. From the surroundings of its remains were collected many potsherds (fig. 4) that can be attributed to different Historical periods (Shar, pers. comm. 2001).

The site of Ganero 4 (GNR4) lies on the top of a stabilized dune southeast of the homonymous lake. Sighting from the site, the village of Ganero is at 5°. The flint collection of GNR4 consists of 537 artefacts (170 of which complete), 2 cores, 2 crested blades and 15 instruments. The flint instruments include very characteristic types, among which are 9 isosceles trapezes on bladelets, with totally retouched truncations (fig. 5/3-11) 2 of which are fragmented; 2 scalene triangles, 1 on a bladelet with abrupt, deep, direct retouch on the left side (fig. 5/1), 1 on a microbladelet with marginal, abrupt, direct retouch on the right side (fig. 5/2); 1 proximal fragment of a parallel-sided bladelet with simple, marginal, direct, bilateral retouch (fig. 5/12) and 3 flakelets with abrupt, marginal, direct retouch (fig. 5/13-15), 1 of which is fragmented. Of the 2 cores 1 is a pyramidal bladelet type with flat, single platform, the second is prismatic with flat, single platform and bladelet detachments (fig. 5/16). The presence of trapezoidal arrowheads on bladelet would attribute this site to the end of the Mesolithic period.

Just some 250m south southwest of it is located the site of Ganero 5 (GNR5), on the top of the dune cordon from which the lake of Sain Sim is visible to the south. From this site the village of Ganero is at 10°. The flint assemblage from GNR5 is very scarce. It consists of 29

[1] The location of the sites mentioned in the text was not precisely defined. In some cases their position was obtained with the use of a compass, sighting and calculating the number of degrees from the nearest village.

Fig. 3 - View of sites GNR3 (top) and GNR8 (bottom) (*photographs by P. Biagi*).

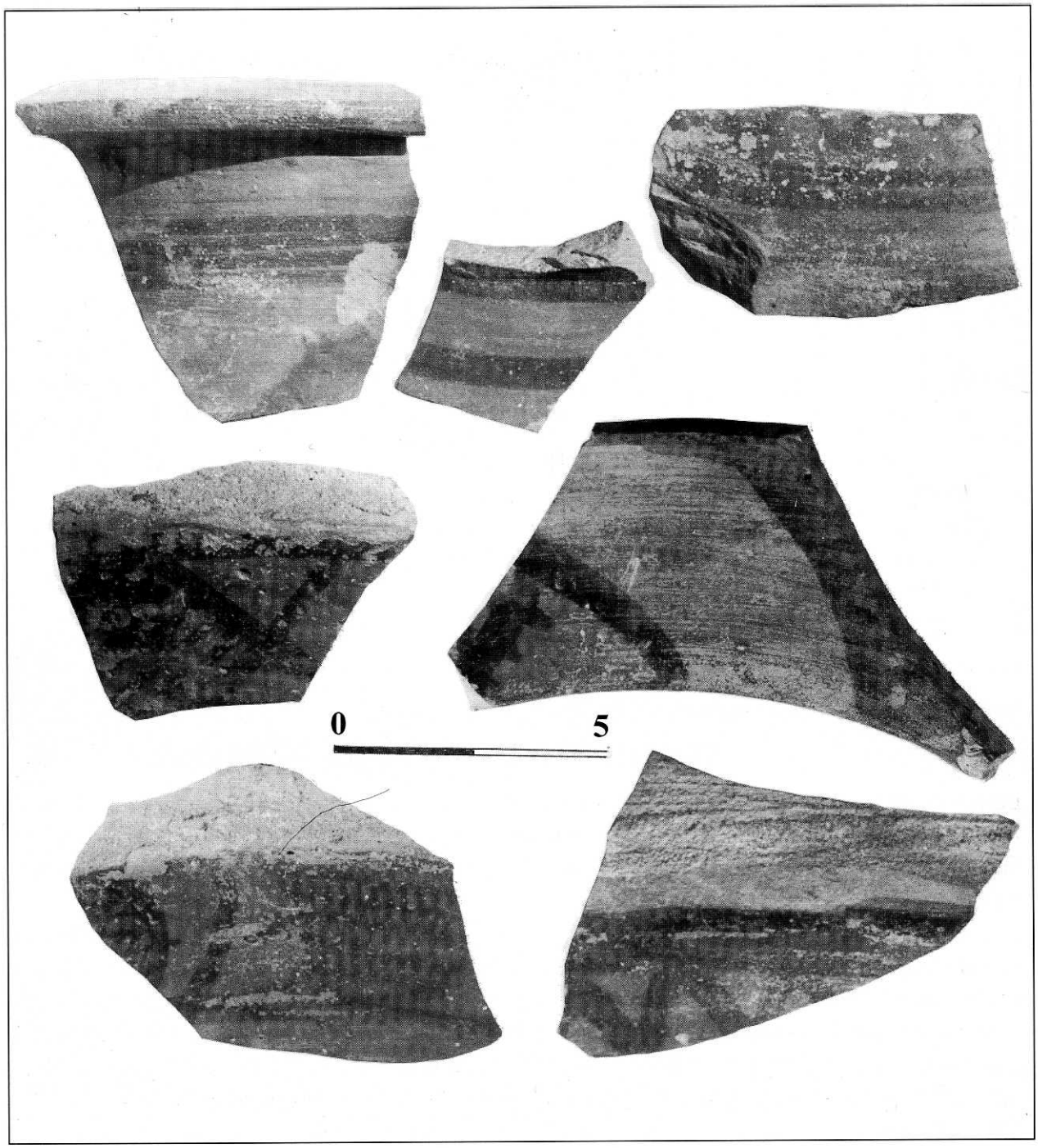

Fig. 4 - Ceramic potsherds from GNR3 (*photographs by M. Spataro*).

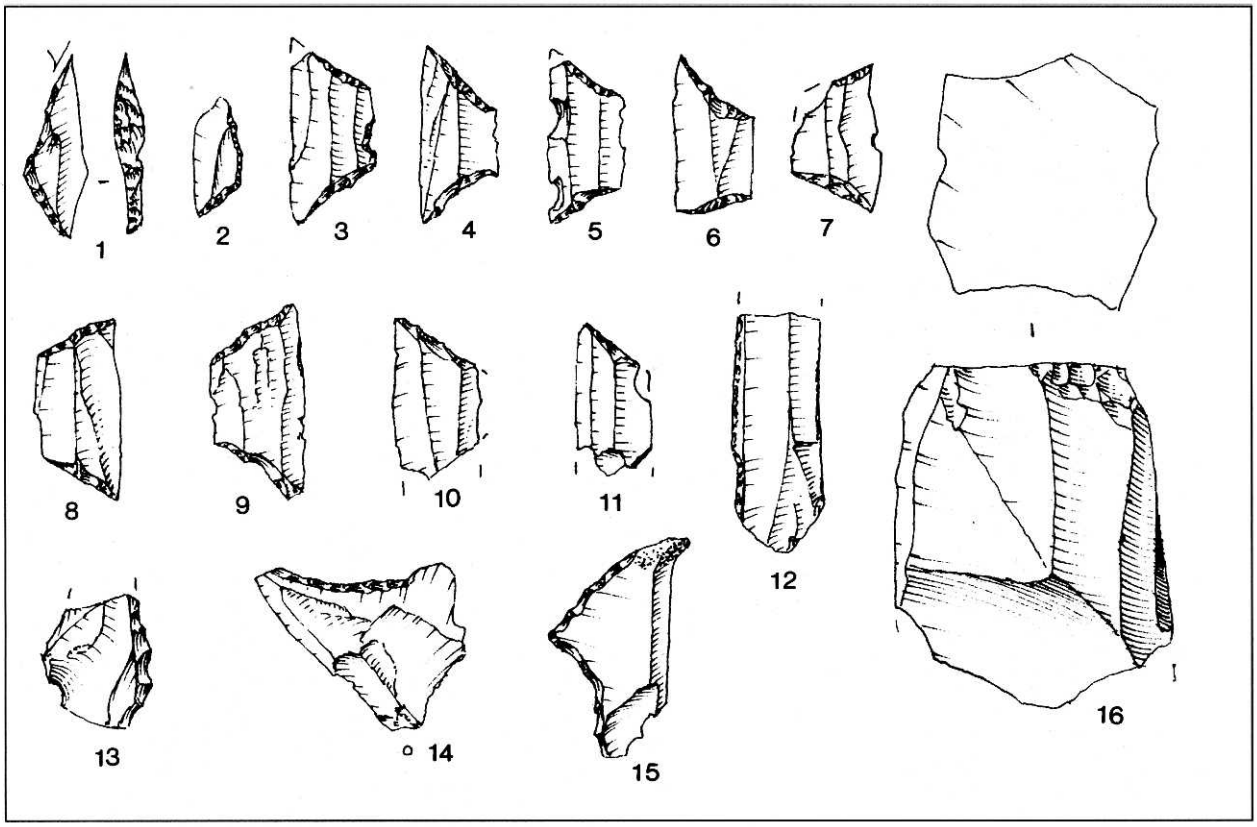

Fig. 5 - Flint tools and core from GNR4 (1:1) (*drawings by G. Almerigogna*).

pieces among which is 1 flakelet subconical core. The cultural attribution of this flint scatter is uncertain. Close to this latter site, a few dozen metres southeast of it is located the site of Ganero 6 (GNR6) from the surface of which only 41 unretouched flint artefacts were collected.

Ganero 7 (GNR7) lies southwest of the preceding sites, close to the top of the sand dune cordon. Sighting from this site the village of Goth Lakhmir Shar is located at 315°. The flint assemblage of GNR7 comprises 613 artefacts, 148 of which are complete. There are 7 cores, 3 of which are prismatic with flakelet detachments, 2 with a flat and 1 with a prepared platform; 1 is of prismatic, bladelet type with a flat platform, and 1 is a subconical bladelet core with prepared platform (fig. 2/6). The last specimen is in a very fragmentary condition. The instruments are represented by 2 fragmented bladelets with simple, marginal, bilateral retouch (fig. 2/7 and 8).

Ganero 8 (GNR8) (fig. 3, bottom) is of great importance because it represents the first Kot Diji Culture site discovered in this territory. It is located just to the southwest of GNR7. From GNR8 the village of Goth Lakhmir Shar lies at 320°. From the surface of this site comes a rich pottery assemblage including characteristic Kot Dijian types, such as red-slipped potsherds with fish-scale painted patterns (Spataro, 1998-99) as well as ceramic bangles and "cakes". The flint assemblage consists of 118 artefacts, 58 of which are complete. The collection also includes 1 subconical bladelet core with simple, plain platform (fig. 6/7), 1 heavily worn (percussion marks), spherical hammerstone (fig. 6/8), 1 crested blade, 1 side

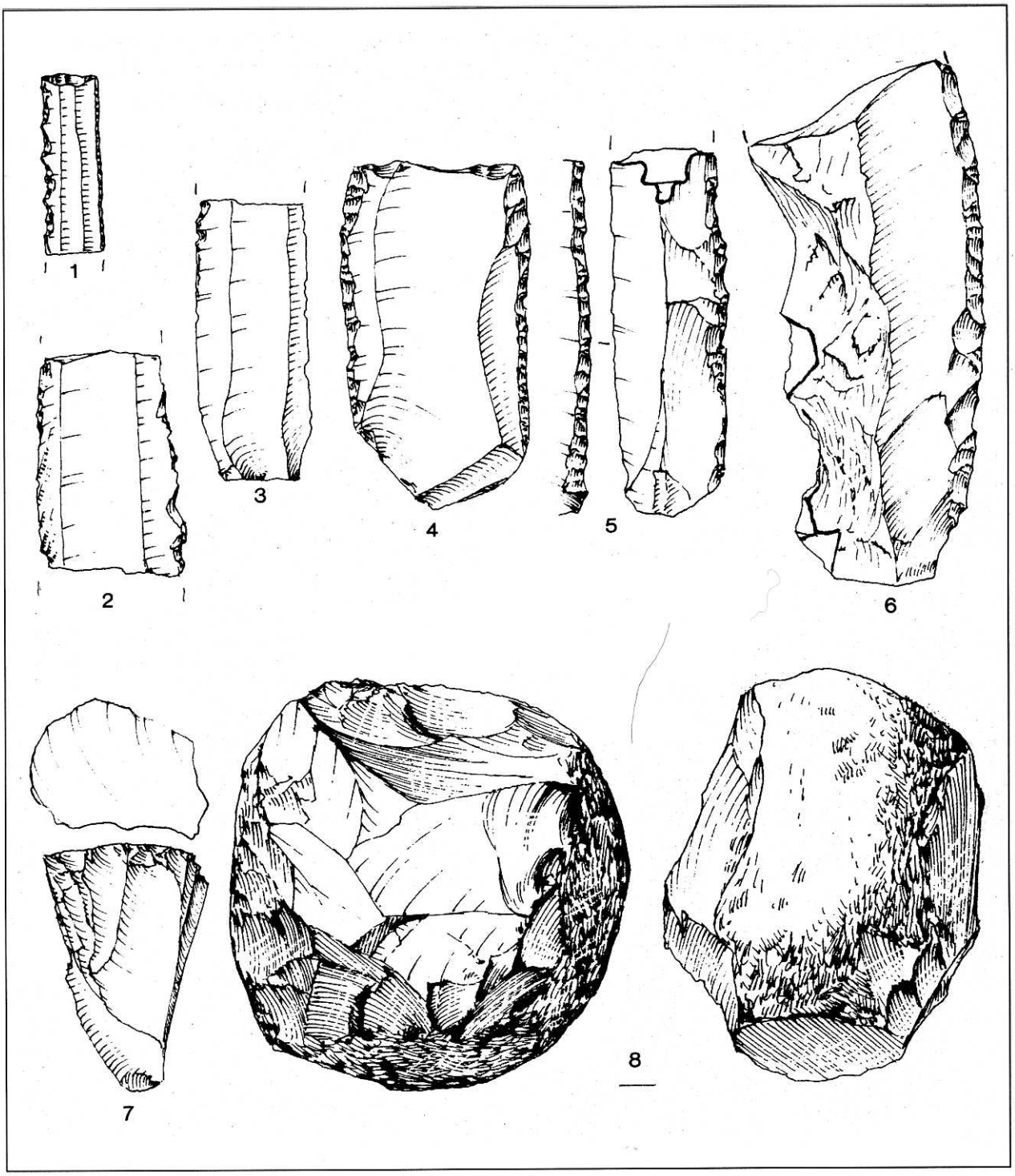

Fig. 6 - Flint tools and core from GNR8 (1:1) (*drawings by G. Almerigogna*).

Fig. 7 - View of sites GNR9 (top) and GNR10 (bottom) (*photographs by P. Biagi*).

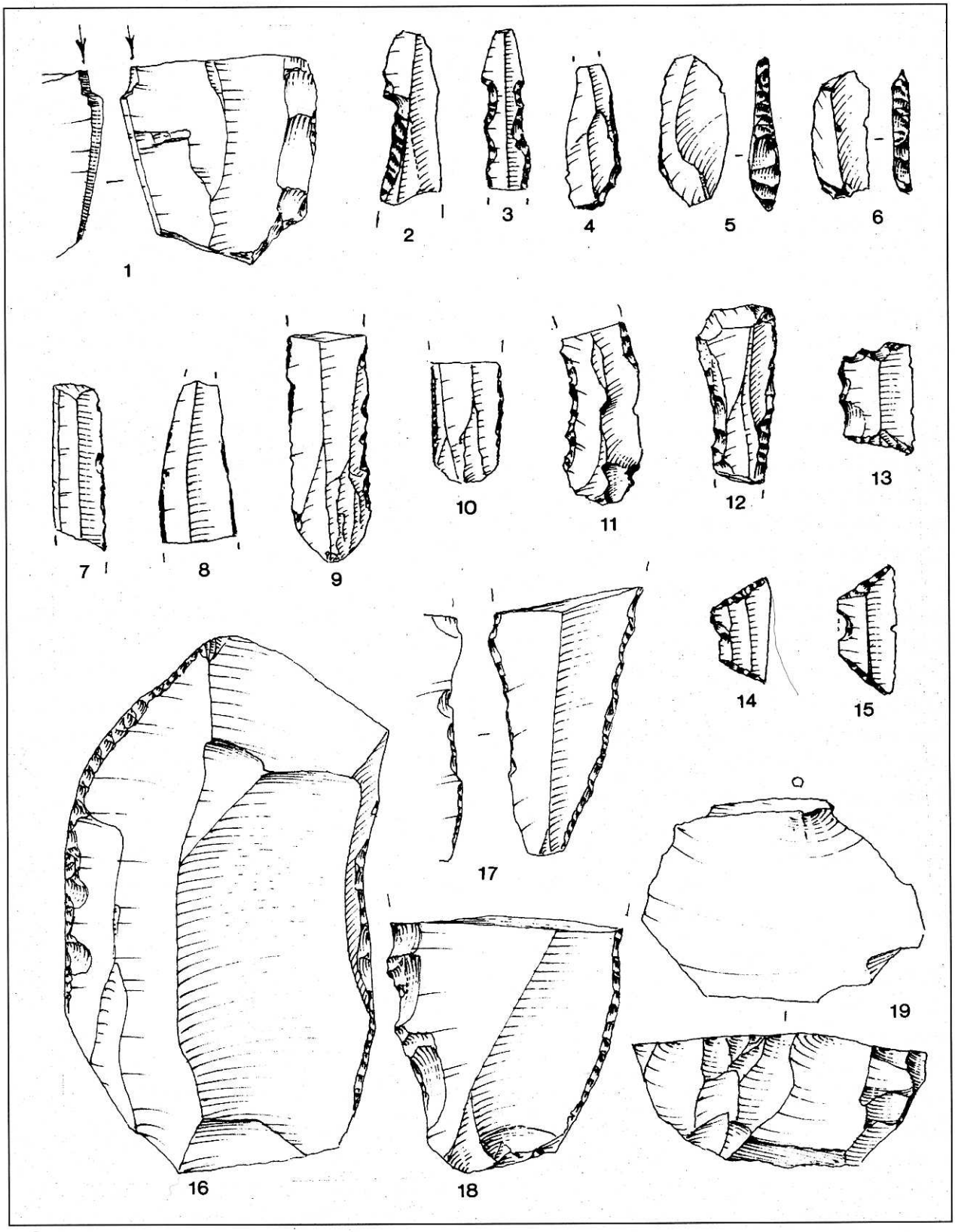

Fig. 8 - Flint tools and core from GNR9 (1:1) (*drawings by G. Almerigogna*).

scraper on corticated, broken, long blade with semi-abrupt, deep, continuous, direct retouch on the right side (fig. 6/6), 6 parallel-sided blades with different types of retouch, from semi-abrupt, deep, alternate (fig. 6/5) to simple, deep, bilateral, direct (fig. 6/4) and simple, marginal, direct (fig. 6/2 and 3), and 1 horizontal, straight truncation on a narrow bladelet with complementary semi-abrupt, marginal, sinuous, direct retouch on the left side (fig. 6/1).

South of GNR8 was found the site of Ganero 9 (GNR9), just south of the top of the dune, towards the lake of Sain Sim (fig. 7, top). The chipped stone assemblage from this site is composed of 913 artefacts, 233 of which are complete. GNR9 yielded 5 cores. Of these, 1 is a flakelet type on a flake (fig. 8/19), 1 is prismatic, 1 discoidal and 1 subconical with bladelet-like flakelet detachments, and 1 is fragmented. The assemblage also includes 1 crested blade and 1 crested flake. The instruments are represented by 1 simple, lateral burin on a wide flake (fig. 8/1), 3 isosceles trapezes on bladelet with oblique, totally retouched truncations (fig. 8/13-15), 1 total backed point obtained with abrupt, marginal, direct retouch on the right side (fig. 8/4), 2 bladelets with abrupt, deep, bipolar retouch on the left site (fig. 8/5 and 6), 4 fragments of abrupt-retouched, denticulated bladelets (fig. 8/2 and 3), 6 fragments of bladelets with simple, marginal, direct retouch (fig. 8/7-12), 8 side scrapers, 1 of which complete on a large flake (fig. 8/16) and 7 fragments (fig. 8/17 and 18). Part of this assemblage is attributable to the Late Mesolithic, as indicated by the occurrence of trapezoidal arrowheads, although other tools might belong to a more recent period.

Moving north, towards the southwestern shore of Lake Ganero, is located the site of Ganero 10 (GNR10) (fig. 7, bottom). Sighting from this site the village of Goth Lakhmir Shar is at 330°. The flint assemblage from GNR10 comprises 105 artefacts, 52 of which are complete. The instruments include 1 probable straight perforator on a narrow bladelet with heavily worn proximal, working edge (fig. 2/9) and 2 scalene triangles on microbladelets. One of these has the long truncation with *piquant trièdre* point (fig. 2/10); the second is elongated with *piquant trièdre* short truncation and complementary abrupt, marginal, left, direct retouch at the point (fig. 2/11).

The site of GNR11 lies on the small terrace just to the southeast of GNR10. From its surface come only 19 unretouched artefacts and 2 flakelet cores, both of discoidal shape, 1 with simple and 1 with prepared platform. The age of this flint collection is uncertain; it is most probably of non-Mesolithic age.

The assemblage of GNR12 was found further to the south, facing the north eastern shore of lake Sain Sim. Ganero 12 consists of a small concentration of 41 flint pieces and 1 ceramic bead fragment. East of it is located GNR13, just in front of a bend of the northeastern shore of lake Sain Sim. This site yielded a few potsherds and 100 unretouched flint artefacts, 36 of which are complete. The tools include 1 double, lateral, simple burin on a corticated blade with marginal, semi-abrupt retouch on the right side, 1straight point on a blade obtained with simple, bilateral, alternate retouch, 2 parallel-sided, narrow blades, 1 of which with semi-abrupt, deep, bilateral, inverse retouch, 1 very worn broken fragment of straight perforator on a parallel-sided narrow bladelet, and 1 side scraper obtained with simple, marginal, direct retouch on the left side. The cultural attribution of this site is uncertain. It might, perhaps, be attributed to the Neolithic or to the Kot Dijian period.

The survey along the shores of Lake Jamal Shah Sim was carried out on February 3rd and 4th, 2001. The first site visited was that of Jamal Shah Sim 1 (JS1) that had already been

discovered by one of the authors (P.B.) and by Professor G.M. Shar, in February 2000. The scatter of flints that characterises this large site is distributed over some 100m along an east-west depression, east of the south eastern shore of the salt basin. The depression id delimited, to the south, by a high sand dune cordon running in the same direction.

The flint collection from this site is composed 1131 artefacts, 202 of which are complete. It includes 17 bladelet and flakelet cores of prismatic or subconical shape with plain, flat platform (fig. 9/26-28), 1 heavily worn prismatic specimen, most probably used as a hammerstone, and 4 core fragments; 1 crested blade; 27 instruments and 1 proximal, backed microburin (fig. 9/25).

The instruments are represented by 5 backed points on a microbladelet of different typology: 1 is a partial backed point obtained with abrupt, deep, direct retouch on the left distal edge (fig. 9/1); 1 is a double, total backed point obtained with abrupt, deep, direct retouch on the right side (fig. 9/2); 1 a total backed point obtained with abrupt, deep, direct retouch on the right side, with complementary abrupt, marginal retouch at the distal edge (fig. 9/3); 1 is a total backed point with semi-abrupt, deep, direct retouch, obtained from a small flakelet (fig. 3/4); 1 is a probable broken backed point with abrupt, deep, bipolar retouch (fig. 9/12). Apart from these tools, the collection includes 2 broken, elongated, scalene triangles with abrupt, deep, direct retouch (fig. 9/10 and 11); 7 fragments of backed microbladelets and bladelets (fig. 9/5-9); 7 isosceles trapezes with oblique, totally retouched truncations obtained from bladelets (fig. 9/15-21); 2 more truncations of this type most probably belong to two more broken specimens (fig. 9/13 and 14); 3 broken bladelets with simple, marginal, direct retouch (fig. 9/22 and 23) and 1 flakelet with abrupt, deep retouch on the right side (fig. 9/24). From this surface scatter also come two medial fragments of perfect, parallel-sided blades with a very pale brown patina (10YR 7/3), which seem to be extraneous to the complex. The flint assemblage from this site is attributable to the Mesolithic on the basis of the presence of trapezoidal geometrical arrowheads, other geometrical tools, backed blades and one microburin.

The site of Jamal Shah Sim 2 (JS2) is located on a flat sand terrace that faces the south eastern shore of the homonymous lake (fig. 10, top).

From the surface of JS2 come 923 artefacts, 250 of which are complete. There are 12 flakelet cores, 3 of which are subconical (fig. 11/5, 6 and 8) and 2 are prismatic (fig. 11/7) and 1 crested blade. The instruments are represented by 4 simple burins on a flake with one or more lateral blows (fig. 11/1-4), 1 elongated scalene triangle with complementary abrupt, marginal retouch at the proximal edge (fig. 12/15), 2 backed points and truncation on narrow bladelets (fig. 12/11 and 12) obtained with abrupt, marginal, direct retouch, one of which has a complementary abrupt, marginal retouch at the proximal edge (fig. 12/11). The backed points are 6, 4 of which are total, curved types on bladelets, obtained with abrupt, deep, direct (right or left) retouch (fig. 12/6, 7, 9 and 10), 2 are on a broken microbladelet with abrupt, deep, direct retouch (fig. 12/13 and 14). The collection also includes 8 fragments of backed retouched bladelets (fig. 12/1-5, 8), 3 pieces of bladelets with simple, marginal retouch, 1 thick, straight, tanged point with heavily worn proximal edge and abrupt, deep, bilateral, direct retouch at the distal edge (fig. 12/16), 2 fragments of side scrapers on flakelets and 1 long, broken blade obtained with semi-abrupt, deep, direct, bilateral retouch (fig. 12/17). This latter instrument seems to be extraneous to the complex, which is possibly to be

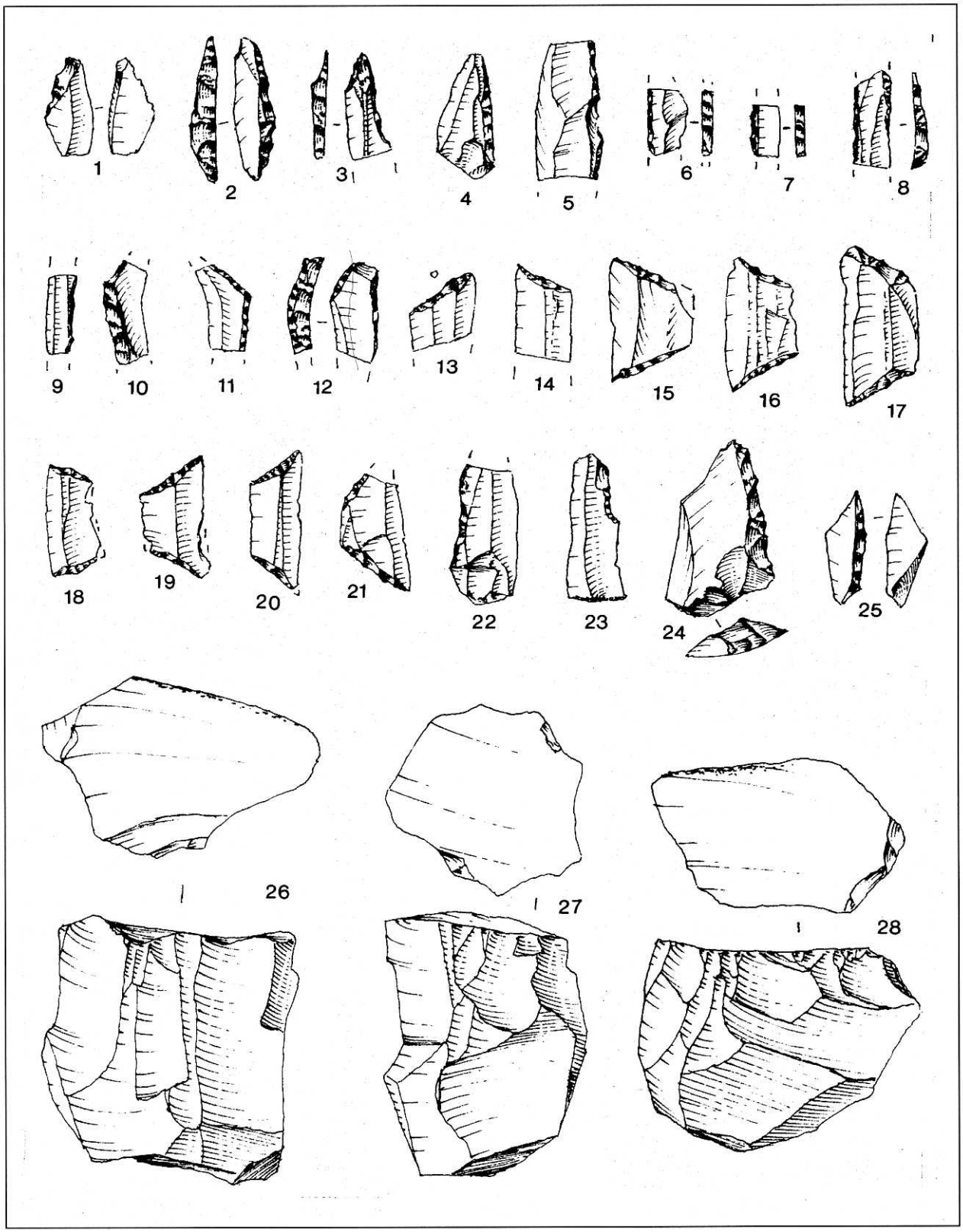

Fig. 9 - Flint tools and cores from JS1 (1:1) (*drawings by G. Almerigogna*).

Fig. 10 - View of sites JS2 (top) and JS4 (bottom) (*photographs by P. Biagi*).

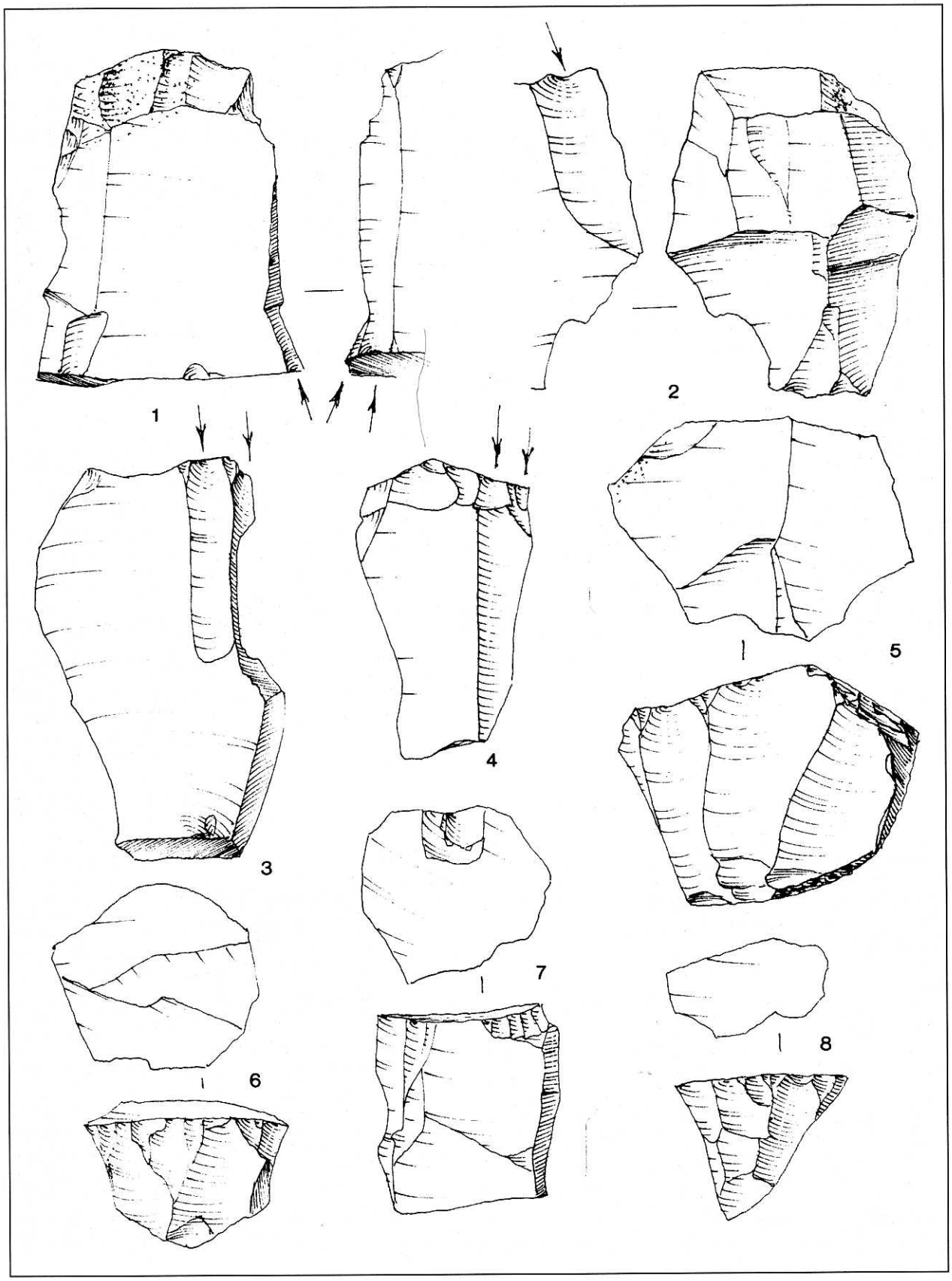

Fig. 11 - Flint tools and cores from JS2 (1:1) (*drawings by G. Almerigogna and P. Biagi*).

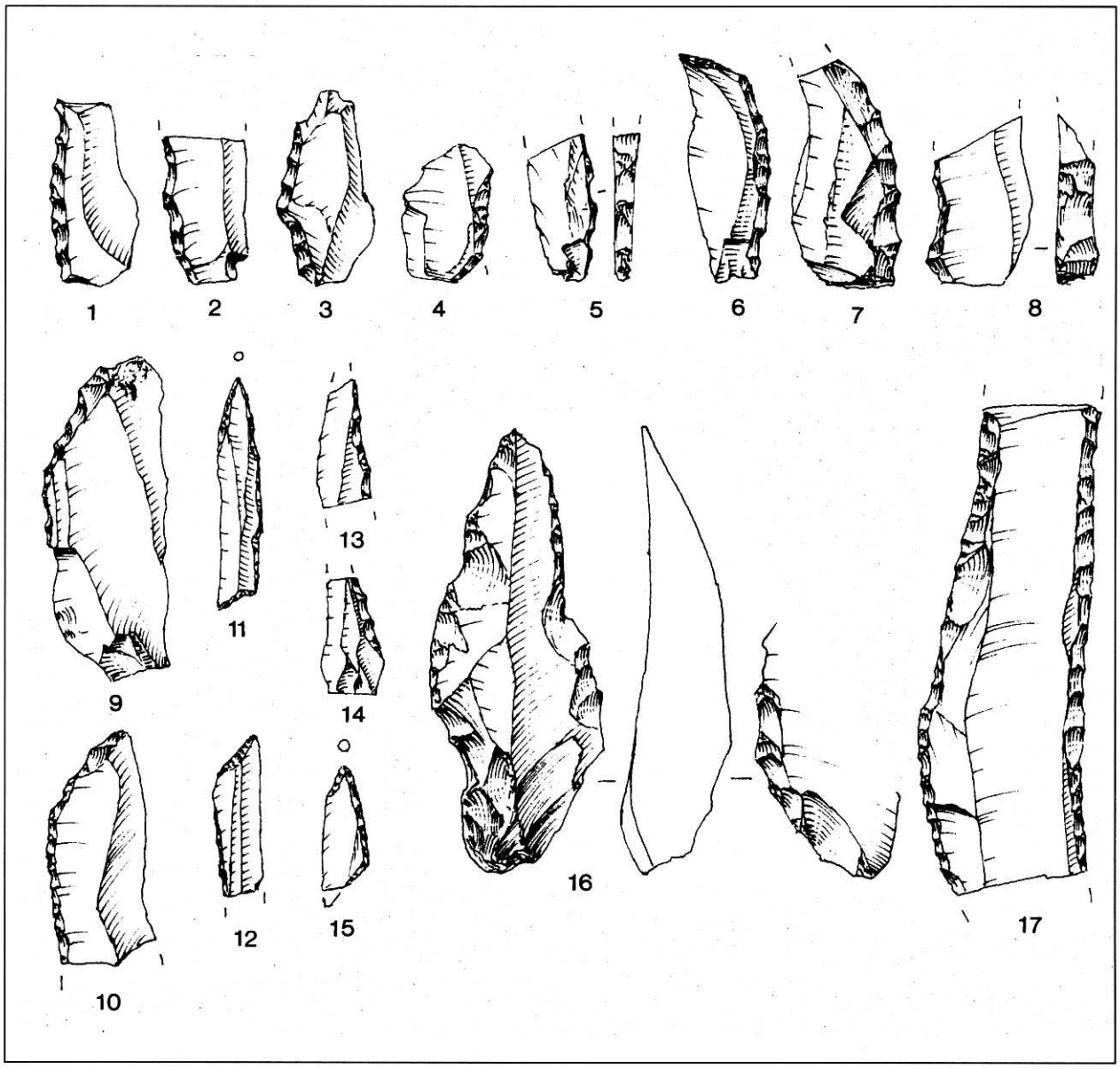

Fig. 12 - Flint tools from JS2 (1:1) (*drawings by G. Almerigogna*).

attributed to a final period in the development of the Late Palaeolithic, and might belong to a more recent occupation (Neolithic? Kot Dijian?).

The site of Jamal Shah Sim 3 (JS3) lies north of the site of JS1, on the top of the sand dune that delimits the sloping depression where this latter site is located.

1121 artefacts were collected from the surface of this site, 291 of which are complete. The cores are 8, of subconical, bladelet or bladelet-like flakelet type with simple, plain (fig. 13/11) or prepared (fig. 13/10) platform. 3 prismatic specimens with plain platform and bladelet detachments are also represented. 1 narrow bladelet, "bullet type" core, with simple, flat platform seems to represent a later frequentation of the area (fig. 13/9). The instruments include 1 simple, lateral burin on a corticated blade (fig. 13/1); 1 bladelet total backed point obtained with abrupt, deep, direct retouch along the right side (fig. 13/2); 1 microbla-

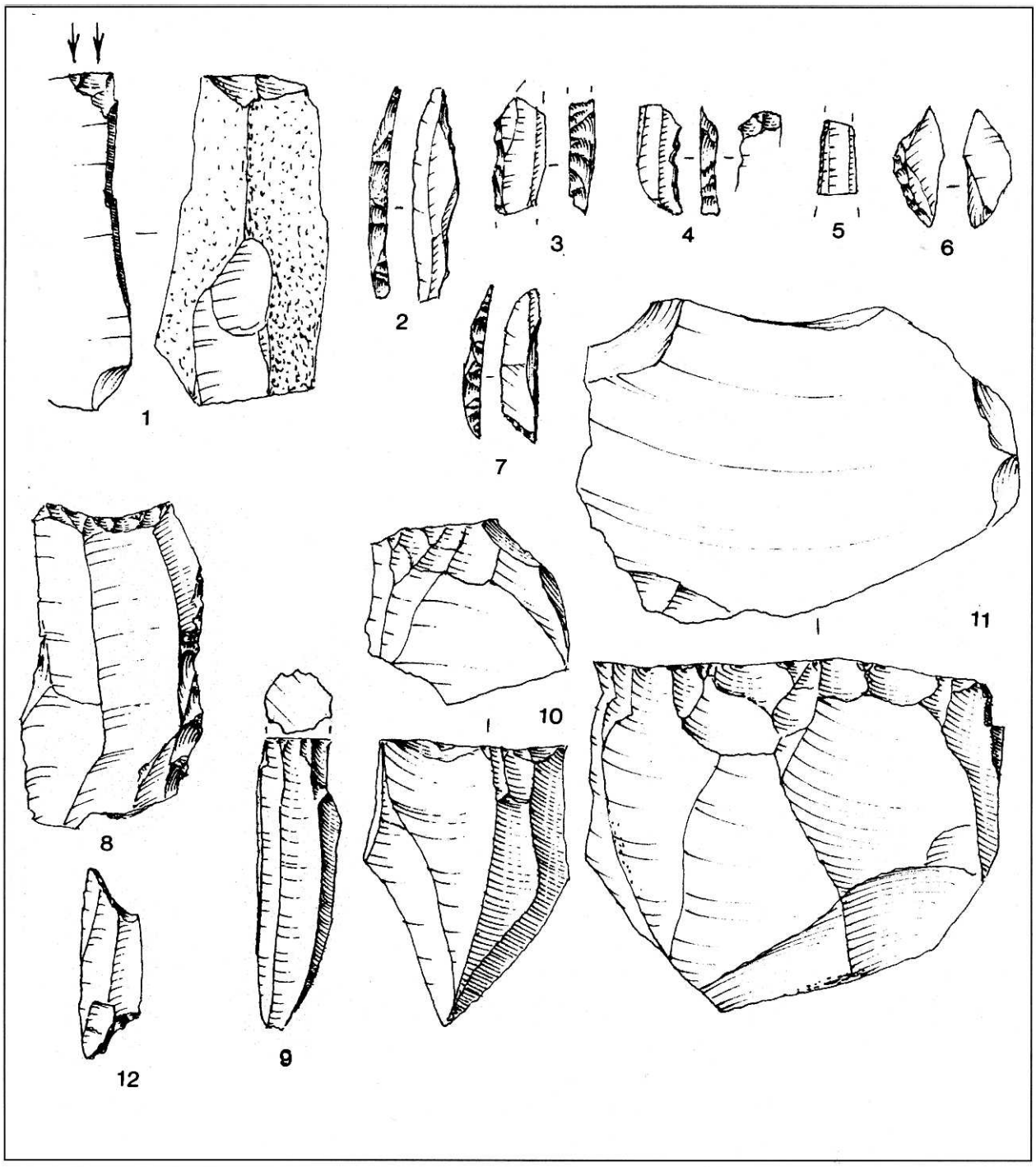

Fig. 13 - Flint tools and cores from JS3 (1-11) and geometric tool from JS6 (12) (1:1) (*drawings by G. Almerigogna*).

delet backed point and truncation obtained with abrupt, deep, direct retouch along the right side and oblique, direct truncation at the proximal edge (fig. 13/7); 3 broken, abrupt, deep, direct retouched microbladelets (fig. 13/3-5); 1 proximal microburin on a probable lunate geometric tool obtained with abrupt, deep, direct retouch (fig. 13/6) and 1 side scraper opposed to a concave truncation on blade-like flake (fig. 13/8).

On the highest sand dune cordon, just to the east of JS2, facing the slope of JS1 lies the

site of Jamal Shah Sim 4 (JS4) (fig. 10, bottom), which yielded 681 artefacts, 185 of which are complete, 6 cores, 1 microburin and 13 instruments. The cores are 2 flakelet subconical specimens with prepared platform (fig. 14/14 and 15), 2 flakelet, polyhedrical, and 1 prismatic types, both with plain, simple platforms. The instruments include 2 lateral, simple burins on a flake (fig. 14/1 and 2); 1 broken isosceles trapeze with totally retouched truncations on a bladelet (fig. 14/6); 1 scalene triangle with *piquant trièdre* short truncation on a microbladelet (fig. 14/7); 2 total backed points obtained with abrupt, deep, direct retouch (fig. 14/3 and 8); 5 fragments of backed bladelets (fig. 14/5, 9-13), 1 of which is obtained with abrupt, deep, bipolar retouch (fig. 14/11); 1 narrow bladelet with simple, deep, direct retouch and one flakelet with abrupt, deep, inverse retouch. The collection also includes 1 large, proximal, ordinary microburin (fig. 14/4).

The site of Jamal Shah Sim 5 (JS5) was discovered midway between the southern shore of the above-mentioned lake and a small, narrow, nameless basin that lies some 800m to the south. The site consists of a scatter of parallel-sided bladelets, characterised by a very pale brown patina (10YR 7/3), hundreds of which were found on the surface of the site (fig. 15), and a few typical Kot Diji Culture potsherds. Just a few of these bladelets were collected and the length and the width of only 50 specimens, was measured. The results indicate that their length is between 8.5 and 18.0 cm and their width between 1.5 and 4.5 cm. They all have been intentionally snapped, as shown by the type of breakage towards the distal edge (fig. 16/1-10). Only one specimen is retouched. It is a bladelet with a straight truncation at the proximal edge and semi-abrupt, marginal, continuous retouch along the right side (fig. 16/11). Among the other artefacts one should mention 1 fragment of crested blade (fig. 16/12) and 1 fragment of a long blade core (fig. 16/13).

The pottery is represented by two sherds with black painted bands (fig. 16/14 and 15), one of which is characteristic of the Kot Diji Culture both for its shape and decoration. It is a fragment of a globular vessel with everted, undercut rim (see KHAN, 1965: fig. 21/1). A third potsherd belongs to a deep vessel with slightly everted rim (fig. 16/16). This unique assemblage is undoubtedly to be attributed to the Kot Diji Culture.

The single find of site Jamal Shah Sim 6 (JS6) was found close to a tractor track, some 800m south of the lake. From this site the Ganero village lies at 285°. The find is an isosceles trapeze with slightly concave, totally retouched truncations (fig. 13/12).

DISCUSSION OF SOME FLINT ASSEMBLAGES

Following BAGOLINI's (1968) method, the complete, unretouched artefacts from seven sites, with more than 100 such tools, have been measured to develop the length:width and length-width:thickness diagrams of fig. 17, whose results are shown in table 1.

The results are quite homogeneous. The elongation indexes indicate that flakes (almost always over 30%) always prevail over blade-like flakes (ca. 20-27%). They are followed by wide flakes (ca. 15-24%) or blades (ca. 11-20%) according to the different assemblages, by very wide flakes (ca. 2-9%) and narrow blades (ca. 1-5%). The number of very narrow blades and extremely wide flakes is irrelevant (always less than 1%).

The dimension indexes are also similar with the exception of those of sites JS1 and JS4. The assemblages are mainly composed of normoliths (ca. 36-46%), followed by microliths

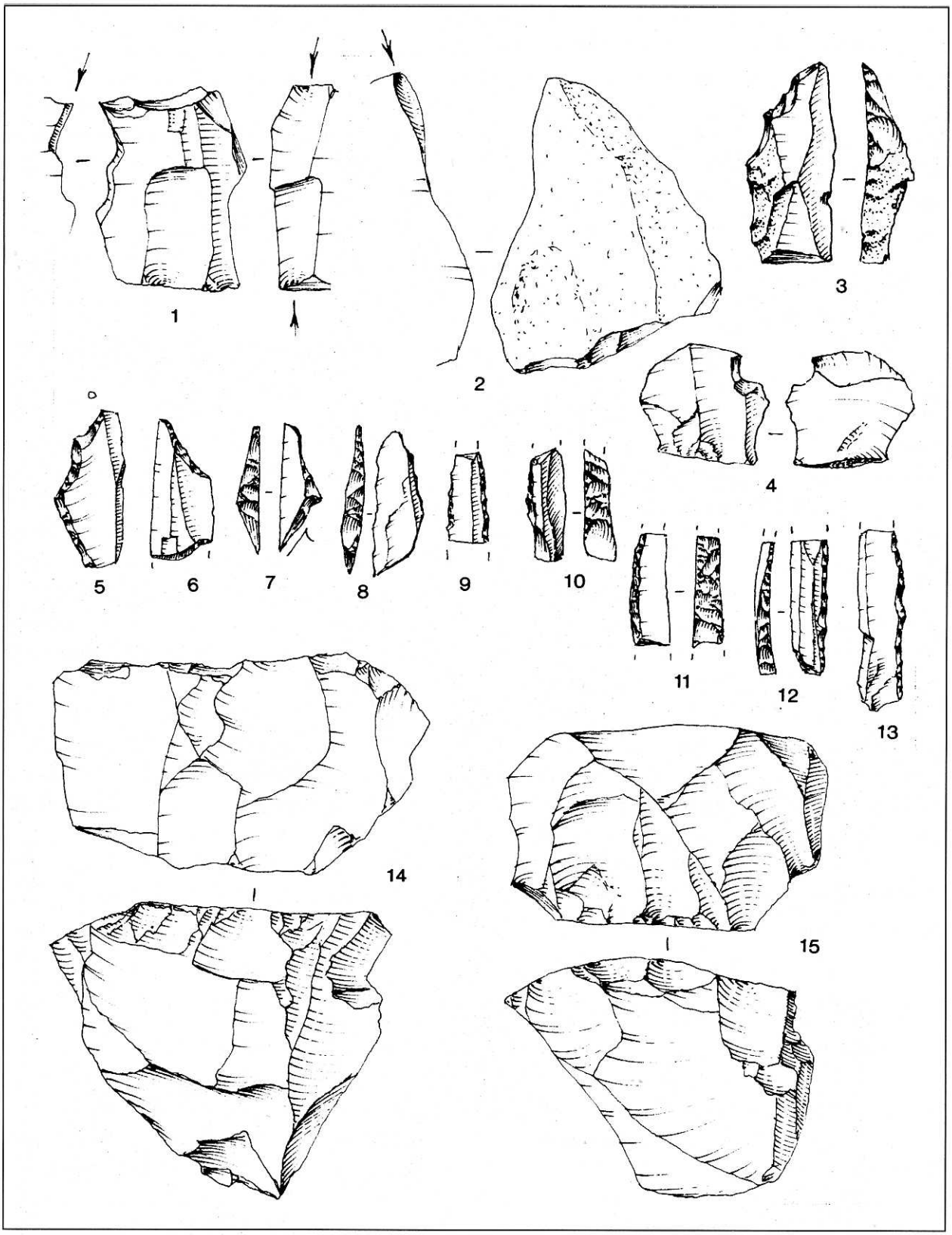

Fig. 14 - Flint tools and cores from JS4 (1:1) (*drawings by G. Almerigogna*).

Fig. 15 - Scatter of flint blades on the surface of site JS5 (*photograph by P. Biagi*).

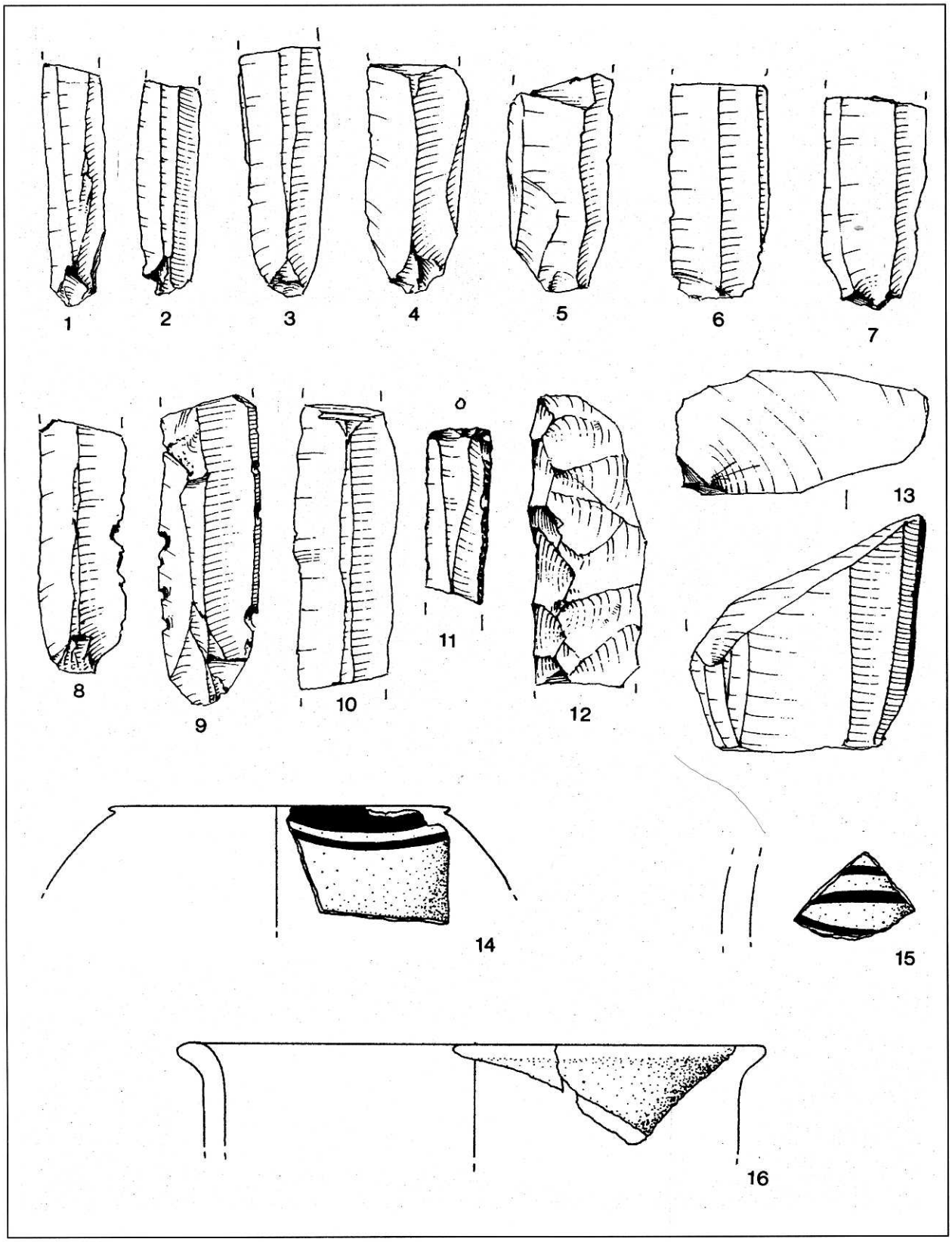

Fig. 16 - Flint blades (1-10), tool (11), crested blade (12), core (13) (1:1) and potsherds (14-16) (1:2) from JS5 (*drawings by G. Almerigogna and P. Biagi*).

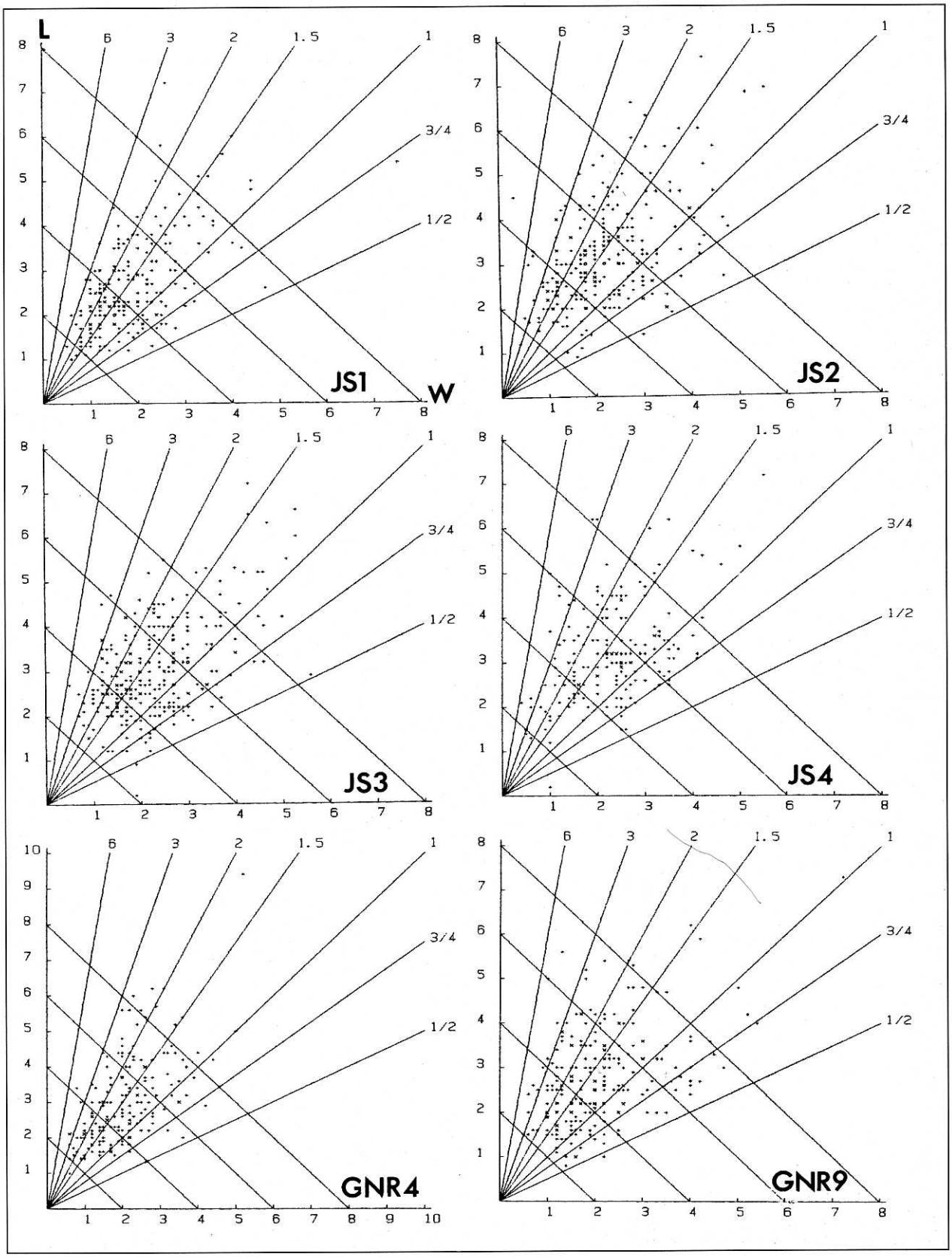

Fig. 17 - Length:width diagrams of the complete, unretouched flint artefacts from JS1, JS2, JS3, JS4, GNR4 and GNR9 (*drawing by P. Biagi*).

Table 1

Category	Limits	SITES													
		JS1		JS2		JS3		JS4		GNR4		GNR7		GNR9	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Elongation Indexes															
Very narrow blades	>6	0	0.00	1	0.40	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Narrow blades	6-3	2	0.99	9	3.60	7	2.41	10	5.41	4	2.35	5	3.38	9	3.86
Blades	3-2	38	18.81	45	18.00	34	11.68	29	15.68	35	20.59	6	10.81	34	14.59
Blade-like flakes	2-1.5	50	24.75	67	26.80	72	24.74	46	24.86	41	24.12	30	20.27	51	21.89
Flakes	1.5-1	72	35.64	72	28.80	102	35.05	62	33.51	57	33.53	47	31.76	72	30.90
Wide flakes	1-0.75	30	14.85	41	16.40	52	17.87	30	16.22	28	16.47	35	23.65	43	18.45
Very wide flakes	0.75-0.50	10	4.95	14	5.60	22	7.56	7	3.78	4	2.35	14	9.46	23	9.78
Extremely wide flakes	<0.50	0	0.00	1	0.40	2	0.69	1	0.54	1	0.59	1	0.68	1	0.43
(blade index)			(19.80)		(22.00)		(14.09)		(21.09)		(22.94)		(14.19)		(18.45)
Dimension Indexes															
Hypermacroliths	>8	9	4.47	23	9.20	21	7.28	12	6.48	11	6.47	16	10.81	9	3.87
Macroliths	8-6	25	12.39	51	20.40	68	23.36	52	28.11	39	22.93	37	25.01	41	17.59
Normoliths	6-4	73	36.15	113	45.20	112	43.99	86	46.49	65	38.24	54	36.49	102	42.07
Microliths	4-2	90	44.56	62	24.80	74	25.43	29	15.66	53	30.58	40	27.03	84	36.06
Hypermicroliths	<2	5	2.48	1	0.40	0	0.00	6	3.24	2	1.18	1	0.68	1	0.43
Carenation Indexes															
Hyperflat	>8	5	2.48	2	0.80	3	1.03	0	0.00	5	2.94	6	4.05	4	1.72
Very flat	8-4	71	35.15	65	26.00	102	35.05	63	34.05	68	40.00	54	36.49	86	36.91
Flat	4-2.5	95	47.03	121	48.40	134	46.05	78	42.16	68	40.00	62	41.89	109	46.87
Thick	2.5-2	20	9.90	34	13.60	31	10.65	22	11.89	16	9.41	16	10.81	23	9.87
Carenated	2-1.5	9	4.46	20	8.00	15	5.15	15	8.11	10	5.88	8	5.41	9	3.86
Very carenated	1.5-1	2	0.99	6	2.40	4	1.37	5	2.70	3	1.76	2	1.35	1	0.43
Hypercarenated	<1	0	0.00	2	0.80	2	0.69	2	1.08	0	0.00	0	0.00	1	0.43

and macroliths and by a much lower percentage of hypermacroliths and hypermicroliths. The exceptions are the assemblages from site JS1 and JS4. The unretouched flint industry of JS1 is mainly represented by microliths (44.56%) followed by normoliths (36.15%) and by macroliths (12.39%), while that of JS4 is characterised by normolithis (46.49%) followed by macroliths (28.11%) and by microliths (15.66%).

The carenation index shows quite a standardized production technique. The flat arte-

facts (ca. 40-48%) always prevail over very flat (ca. 26-40%) and thick products (ca. 9-13%). The other classes are represented by much lower percentages of tools: carenated (ca. 4-8%), very carenated (ca. 1-3%), hyperflat (ca. 0-4%) and hypercarenated (ca. 0-1%).

The results indicate that the manufacturing technique of the Ganero and Jamal Shah Sim flint industries was mainly oriented towards the production of flat or very flat, normal or small-sized flakes and blade-like flakes.

The blade indexes are rather homogeneous ranging from 14.09 at JS3 to 22.94 at GNR4. Nevertheless it is to be pointed out that these indexes might be slightly underestimated because blade artefacts are easier to break and because they have often been transformed into instruments such as trapezoidal geometrics and microlithic, abrupt retouched tools.

The general composition of the more important flint industries is given in table 2 below.

Table 2

Sites	JS1	JS2	JS3	JS4	GNR1	GNR2	GNR4	GNR7	GNR9	GNR10
Unretouched artefacts	1131	923	1112	681	51	244	537	613	913	105
(complete)	(202)	(250)	(291)	(185)	(31)	(59)	(170)	(148)	(233)	(52)
Cores	18	12	8	5	1	2	2	6	5	-
(fragments)	(4)	(-)	(-)	(-)	(-)	(1)	(-)	(1)	(1)	(-)
Crested blades/flakes	1	1	-	-	-	-	2	-	2	-
Burins	-	4	1	2	-	-	-	-	1	-
Isosceles trapezes	7	-	-	1	-	-	9	-	3	-
(truncations)	(3)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Scalene/isosceles triangles	2	1	-	1	-	1	2	-	-	2
Backed points	5	6	1	2	-	1	-	-	1	1
Backed blades and truncation	-	2	-	-	-	-	-	-	-	-
Backed points and truncation	-	1	1	-	1	-	-	-	-	-
(fragments of backed tools)	(7)	(8)	(3)	(5)	(-)	(-)	(-)	(-)	(6)	(-)
microburins	1	-	1	1	-	-	-	-	-	-
Retouched bladelets	3	3	-	1	-	3 (f)	1 (f)	1 (f)	6 (f)	-
Straight points	-	1	-	-	-	-	-	-	-	-
Side scrapers	-	2 (f)	1	-	-	-	-	-	8 (7f)	-
Abrupt retouched flakes	1	1	-	1	-	-	3	-	2	-

Dissimilarities in the composition of the flint assemblages from these sites can be noted in the variable number of tool classes, as for instance, the presence/absence of typical tools such as trapezoidal geometrics or other types of abrupt retouched instruments. The importance of the isosceles trapezoidal microliths at GNR4, where they represent 60% of the tools, is noteworthy. On the contrary, there are sites where the number of abrupt retouched tools is very high. At JS2 and JS4, they represent 62% and 57% of the instruments. At these sites, the microburin technique seems to have been employed only in the manufacture of triangles (and possibly of backed points), but not of trapezes. The noticeable industrial va-

riability might indicate that the sites are not all contemporaneous. The presence of trapezes seems to characterise the more recent sites. The industries of JS2, JS3 and JS4, represented by abrupt retouched instruments, are most probably (slightly) older than those with trapezoidal microliths. They also yielded a few burins, mainly obtained from flakes.

Other flint assemblages from the same region were collected from the dunes surrounding the lakes of Lunwaro Sim (LS2), Sain Sim (LS1) and Pir Nago (PN1) (Biagi and Shaikh, 1998-99: 67). The richest site is that of LS1 that yielded several trapezoidal geometrics obtained from bladelets, very similar to those of JS1, GNR4 and GNR9, while the flint assemblages from LS2 and PN1 are more poor. The first includes one backed blade and truncation, one crescent and three microburins; the second is represented by two microlithic backed points and one small subconical core

DISCUSSION

The discovery of archaeological sites in the salt-water lake region east of Thari is of major importance because it fills a gap in our knowledge on the last hunter-gatherers of the region at the start of the Holocene and on the beginning of the urbanization period in the territory. Flint sites belonging to the Mesolithic are well known in the neighbouring Rajastan. Also the Rajastani Mesolithic sites are distributed on the top of sand dunes often facing salt-water and fresh-water basins or river courses. Their absolute chronology is still very uncertain as for many Indian Mesolithic sites, most of which have yielded contrasting radiocarbon dates (Chakrabarti, 1999: 99).

Although the Mesolithic flint assemblages of Rajastan are extremely similar to those of Upper Sindh, the only Indian site from which a reliable chronological and typological seriation has been obtained is that of Patne in Maharastra (Sali, 1989). It represents the only site so far excavated from which a detailed sequence that covers the Late Palaeolithic and the Mesolithic periods, has been brought to light. Here the Mesolithic seems to represent a technological continuation of the final Late Palaeolithic industries, marked by the appearance of new types of geometric microliths.

The discovery of Mesolithic sites on the top of the Thar Desert dunes of Upper Sindh indicates that the sand dunes were already stabilised at least by the beginning of the Holocene (Goudie, 1973) when the last hunter-gatherers settled, as indicated by the abundant traces of Mesolithic (and most probably final Palaeolithic) flint industries left on their peaks.

Of major importance is also the discovery of Kot Diji Culture materials in this area of great archaeological potential. It is the first time that sites of this period are found in this territory. Even though the two assemblages so far discovered (GNR8 and JS5) only consist of potsherds and flint scatters, their relevance is noteworthy for a better understanding of the exploitation of this landscape through the ages. The Kot Diji sites of GNR8 and JS5 are very different from each other. The first yielded an interesting pottery assemblage and just a few flint artefacts; while the second, JS5, is a unique complex, represented by very specific technological pieces, namely hundreds of (unused?) intentionally snapped, parallel-sided bladelets that, for unknown reasons, were abandoned or thrown away in the desert.

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REFERENCES

BAGOLINI, B. 1968 - *Ricerche sulle dimensioni dei manufatti litici preistorici non ritoccati.* Annali dell'Università di Ferrara, ns, section XV, 1 (10): 196-219.

BIAGI, P. and KAZI, M.M. 1995 - *A Mesolithic Site near Thari in the Thar Desert (Sindh-Pakistan).* Ancient Sindh, 2: 7-12.

BIAGI, P. and SHAIKH, N. 1998-99 - *Preliminary Report of the Surveys and Excavations Carried out by Members of the "Joint Rohri Hills Project" in January-February 2000.* Ancient Sindh, 5: 65-75.

CHAKRABARTI, D.K. 1999 - *India. An Archaeological Guide. Palaeolithic Beginnings to Early Historic Foundations.* Oxford University Press, New Delhi.

GOUDIE, A. 1973 - *The Environmental background to early man in the dry zone of North-West India: The geomorphic evidence for climatic change.* In HAMMOND, N. (ed.) *South Asian Archaeology*: 29-37. Duckworth, London.

KHAN, F.A. 1965 - *Excavations at Kot Diji.* Pakistan Archaeology, 2: 13-85.

MISRA, V.N. 1977 - *Prehistory and Palaeoenvironment of Rajastan.* In AGRAWAL, D.P. and PANDE, B.M. (eds.) *Ecology and Archaeology of Western India*: 31-54. Concept Publishing Company, Delhi.

MISRA, V.N. 1985 - *Microlithic Industries in India.* In MISRA, V.N. and BELLWOOD, P. (eds.) *Recent Advances in Indo-Pacific Prehistory*: 111-122. Oxford & IBH Publishing Co., New Delhi-Bombay-Calcutta.

SALI, S.A. 1989 - *The Upper Palaeolithic and Mesolithic Cultures of Maharashtra.* Deccan College, Pune.

SHAR, G.M. 1995 - *Prehistoric and Historic Sites in the West of the Rohri Hills and the Thar Desert.* PhD Dissertation. Free University Berlin (unpublished).

SHAR, G.M., NEGRINO, F. and STARNINI, E. 1996 - *The Archaeological Finds from Duhbi (Thar Desert, Sindh, Pakistan).* Ancient Sindh, 3: 39-47.

SPATARO, M. 1998-99 - *An Archaeometric Analysis of the Kot Dijian Pottery Assemblage of Ganero 8 in the Thar Desert (Thari, Sindh, Pakistan).* Ancient Sindh, 5: 77-91.

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