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## A Bronze Age for Southern Arabia

by Alessandro de Maigret

On 13 December 1981, while carrying out a short exploration of the ancient monuments situated in the region betwen  $San'\bar{a}'$  and  $M\bar{a}'rib$ , within the framework of the research on the cultural precursors of the Sabaean Kingdom, we came across the remains of a large, apparently prehistoric site which was unparalleled among the known ruins in Southern Arabia at that time (<sup>1</sup>).

The site was a vast dwelling agglomeration of more than one hectare in area, situated on a small flat rise lying at the foot of the Gabal 'Urqūb in Hawlān at-Țiyāl, and has been denoted as WYi from the name of the nearby Wādī Yanā'im.

Both the ground plan and the construction technique used differed considerably from those of the Sabaean settlements. The structures consisted of solid rows of highly patinated natural granite blocks set in the ground. These structures seemed to be linked together to delimit free circular areas some 20-30 metres in diameter and their ground plans were either circular, elliptical or sub-rectangular. The perimeters were often interrupted by one or more entrances and there were one or two isolated blocks in the centre.

The abundant stone industry found on the surface pointed to the existence of a large Late Neolithic settlement. However, considerable doubts were raised by the pottery, which was also abundant. This pottery was quite different from that which we had begun to collect and catalogue in the various Himyarite sites on the highlands, and also differed radically from the small amount of Neolithic pottery found so far in Yemen. This was a completely new find that could only be situated in the period lying between the Neolithic and the Sabaean. The hypothesis was comforted by the observation of an apparent typological parallel with the 'caliciform' pottery finds of the Levanto-Mediterranean coast (<sup>2</sup>).

From the year of the discovery of WYi, the Italian Archaeological Mission of IsMEO, which had begun implementing an archaeological training pro-

<sup>(&</sup>lt;sup>1</sup>) A. de Maigret, Two Prehistoric Cultures and a New Sabaean Site in the Eastern Highlands of North Yemen, Raydan, 4 (1981), pp. 194-8.

<sup>(&</sup>lt;sup>2</sup>) Id., Ricerche archeologiche italiane nella Repubblica Araba Yemenita. Notizia di una seconda ricognizione (1981), Oriens Antiquus, 21 (1982), p. 245.



Fig. 1 - Map of the settlements in the Gabal 'Urqūb/Al-A'rūš region.

gramme in the Yemen Arab Republic on behalf of the Department of Cooperation for Development of the Ministry of Foreign Affairs, in agreement with the Yemeni General Organization for Antiquities and Libraries directed by the Qādī Ismā'īl Al-Akwa', carried out a further two more intensive research campaigns in the region east of the Ṣan'ā'-Damār road, between the 2300 and 2000 m a.s.l. contour lines (Hawlān, Al-Hadā') (<sup>3</sup>). Many other sites similar to WYi were found and the analysis of the structures, pottery and stone industry, together with the excavation of a number of sample sites, has revealed a fairly clear, although still incomplete, picture of a culture that finally bridges the 'long, puzzling occupational gap' that has always been found between the Neolithic and the Sabaean period (<sup>4</sup>).

The settlements so far found on the eastern Yemen highlands are situated immediately east of the geological strip of Tertiary-Cretaceous sandstones ('Tawīlah Group'), stretching from the Ğabal Ţiyāl to the north to the huge Quaternary lava plain of the Ğabal Isbīl to the south. Most of the sites seem to be situated on the pre-Cambrian granite basement along a line that never moves far away from the edge of the sedimentary rocks. These rocks also include the two large, separated Jurassic limestone tablelands ("'Amrān Series") of the Suḥmān/'Urqūb, to the north, and of the Dulā' al-A'mās/Banī Buḥayt, to the south (<sup>5</sup>).

Occupation tends to occur in the vicinity of *widiān* that follow tectonic fracture lines in the basement: (from the north) Wādī Hawrah-Wādī Ahnayš (*HAWi-ii*, *RAQi*, *ALi-ii*), Wādī Kurayb (*BSUi-ii*), Wādī Yanā'im (*WYi-iii*), Wādī Nağid al-Abyad (*NABi-ii*, *iv-v*), Wādī Niğād (*NIGi-iii*,  $\bigcirc Ri$ ), Wādī Rayqah (*GSHi-ii*), Wādī Rahāmah (*WRAi*, *SAii-iii*), Wādī al-'Iš (*WUiv*, *vii*), or near canyon-shaped *widiān* gouged out of the limestone/sandstone rocks: Wādī Habābid (*BAHi*, *MASi*, *SRi*, *HGNiii*), Wādī Banī 'Isā (*GAI-ii*, *MAAi-iii*).

In 1984 the surface exploration was given the systematic form of a total reconnaissance of the sites, which are concentrated along the great north-south fault at the foot of the Gabal 'Urqūb (W. Hawrah/W. Nağid al-Abyad/W. Şwayhāt) and along its east-west offshoots (W. Yanā'im, W. at-Tayylah, W. Niğād) (fig. 1; 2a). The geological survey was accompanied by the archaeological exploration and the first information concerning the palaeo-environmental situation began to take shape, and with it the first conclusions regarding the main

(<sup>3</sup>) Cf. IsMEO Activities in the Yemen A ab Republic, East and West, 33 (1983), pp. 340-4, for the 1983 campaign; 34 (1984), forthcoming, for the 1984 campaign.

(<sup>4</sup>) G.L. Harding, Archaeology in the Aden Protectorates. London 1964, p. 5; J. Chelod, Introduction générale, in J. Chelod (e.l.), L'Arabie du Sud, histoire et civilisation, Paris 1984, pp. 27-8.

(<sup>5</sup>) M.J. Grolier, W.C. Overstreet, Geological Map of the Yemen Arab Republic (San'a), 1:500.000, Reston 1978.







Fig. 2b - Site NABii/I-II, from west (Wādī Nağid al-Abyad, al-A'rūš, Hawlān at-Tiyāl).



Fig. 3 - General ground plan of excavations in site of NABvii (Wādī Nağid al-Abyad, al-A'rūš, Hawlān at-Țiyāl).

palaeo-economic aspects of the pre-Sabaean population of this region of Hawlan.

Of course, we must wait for the results of the analyses carried out on the samples taken from the thick eroded walls of the alluvial sediments in order to obtain accurate stratigraphic information and confirmation of the datings. However, on the basis of the work carried out by Dr B. Marcolongo in the region it may already be stated that a peculiar alternating sedimentary condition in the valleys was suitable for maintaining a constant moisture level with the help of the underground aquifers of the nearby limestone masses to the west. The populations perceived these fortunate conditions and developed a flourishing farming activity. As we shall see, this is largely confirmed by the archaeological data.

Along the A'rūš/'Urqūb fault some 25 sites of the WYi period have been found. The contrast with the only two present villages (Banī Tawq, Al-Hindiyah) indicates how important were the alluvial sediments, today reduced to fragmentary strips along the valley sides or to steep-sided islands in the present river beds, in supporting the high population density of ancient times. The settlements, which are thus never found below the ancient sediment level, are situated high up on the valley walls, either directly on the valley side itself, or else further out, on the crest of the lateral watershed or at the beginning of short secondary valleys (fig. 2b).

A trial trench dug in a small site on the Nağid al-Abyad (*NABvii*) (figs. 3; 4c) showed that the natural stratigraphic sequence of the main valleys is repeated in a similar pattern, although on a reduced scale, in the side valleys. This observation is important because it enables us to relate the archaeological finds to the sedimentological events. In particular, it has enabled us to show that the protohistoric structures of the site (lev. 2) were contemporary with the pedological level potentially most productive for agricultural purposes, i.e. the thin sediment of aeolian origin permanently impregnated by the water of the Gabal 'Urqūb and supported by the impermeable clay layers of the lower level (lev. 3, 'Neolithic', of *NABvii*) (fig. 4d).

The choice of the position of the settlements around this ecological unit was dependent on: (1) the need to control a given area of farmland; (2) the ready availability of building material supplies; (3) the defensibility of the position.

The first requirement is indicated by the regular gaps between the sites along the valleys (fig. 1). In this connection, it must be said that the settlements can be grouped in two categories: (a) small sites, less than  $1000 \text{ m}^2$  in area; (b) large sites, more than  $10000 \text{ m}^2$  in area. The second type of site is found to lie at large, regular intervals along the valleys. They seem to dominate well defined territories over which the first type of sites are scattered. This pattern does not appear to be random and probably reflects a function related to the agricultural exploitation of the territory.



Fig. 4a - View of lower part of site MASi from northwest (Wādī Ḥabābid, Suḥmān, Ḫawlān aṭ-Ṭiyāl).



Fig. 4b - Cooking-pit 1 of MASi after excavation.



Fig. 4c - Sondage 1 at site NABvii from south.



Fig. 4d - NABvii: detail of layout of protohistorical structure 'L 1' in the level of eolian origin (lev. 2), which is superimposed on the clay level with neolithic industry (lev. 3).



Fig. 5 - General ground plan of site RAQi (Wādī Hawrah, al-A'rūš, Hawlān at-Tiyāl).

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Fig. 6b - Dyke of site HAWi from east (Wādī Ḥawrah, al-A'rūš, Hawlān aṭ-Ṭiyāl).

Fig. 6a - Dyke of site RAQi from east.



Fig. 6c - East sector of site RAQi from north.



Fig. 6d - Site of NIGi from west (Wādī Niǧād, al-A'rūš, Hawlān aṭ-Ṭiyāl).

Some deviation from this first and more important requirement governing the optimal choice of settlement site could sometimes be tolerated in order to satisfy also the second requirement, i.e. that of the ready availability of building materials. This would not have been difficult in itself in view of the rocky nature of the area. However, in the majority of cases the sites can be seen to be situated on slopes surmounted by dykes (figs. 5; 6a-b) or, in the case of a small number of villages on the limestone plateau, are built up against the step formed by the head of a sedimentary layer (figs. 4a; 9b). This technique made the best granite available and, in any case, ensured the availability of material that could be easily removed and transported along the slope for the construction of the elliptical or sub-rectangular basements of the dwellings (figs. 7-9). This made it possible also to satisfy the third requirement, i.e. defensibility, by ensuring the protection of the rear of the settlement.

We have already seen how the sites can be divided into two separate groups according to their size. This division also corresponds to a difference in structure. The small sites consist of a free circular or oval area whose perimeter is delimited by a row of loosely connected rooms (figs. 3; 10; 11c-d). The larger ones are formed by grouping several modules of this type together. The single units sometimes seem to be simply juxtaposed, while in other cases a greater degree of integration is apparent from the ground plan (figs. 5; 6c; 11b). This marks the beginning of complex agglomerations that, even when there are no signs of any true urban integration, represent the transition from a mere farming village to a multi-purpose centre.

The finding of large, single buildings constructed of bigger blocks and situated in the centre of the more extensive sites (see WYi, RAQi) points to the public nature of some of the activities carried on in this period (fig. 7b-c). The presence of a building given over to communal religious practices could, for instance, explain why the small villages (which presumably represent separate family groups) were gathered together in the same place. The existence of some form of worship is in any case attested by the finding in site BSUi, in a context of protohistoric stone industry and pottery, of a phallic idol obtainel from a pebble (fig. 12). This artefact is of great importance since it is perhaps the oldest document of its kind found so far in Southern Arabia. Trading, to obtain locally unavailable resources, could be another of the reasons for the gradual growth of certain specific centres. This is apparently indicated by the location of the larger sites (WTHv, WYi, RAQi) at the points of intersection of the lines of communication and by the presence of obsidian, trachyte and bronze, which are not included among the mineral resources of al-A'rūš/'Urqūb.

The complete excavation of the rooms concentrated in one of the squares of WYi ('quarter A'), carried out in August 1984 (fig. 10), has made it possible to clarify the architecture of the individual dwellings. The houses consisted of two adjoining oval or sub-rectangular rooms, both facing on to the square,



Fig. 7a - Pottery in situ in site of WUiv (Wādī al-'Iš, Al-Ḥadā').



Fig. 7b - Elliptical granite structure in eastern sector of RAQi.



Fig. 7c - Rectangular granite structure in central sector of RAQi.



Fig. 7d - Circular basalt structure of WUiv.



Fig. 8a - Sub-rectangular sandstone/limestone structure at site of MASi.



Fig. 8b - Sub-rectangular granite structure in site of NABi (Wādī Nağid al-Abyad, al-A'rūš, Hawlān at-Țiyāl).



Fig. 8c - Sub-rectangular granite structure in site NABviii (Wādī Nağid al-Abyad, al-A'rūš, Hawlān at-Ţiyāl).



Fig. 8d - Sub-rectangular granite structure in site of WTHi (Wādī a<u>t</u>-Tavylah, al-A'rūš, Hawlān a<u>t</u>-Tiyāl).



Fig. 9c-d - Oval granite structures of NABv (Wādī at-Tayylah, al-A'rūš, Hawlān at-Tiyāl).

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Fig. 10 - Map of 'A quarter' of WYi (Wādī Nağid al-Abyad, al-A'rūš, Hawlān at-Ţiyāl).





one of which was used as a dwelling and the other for the storage and processing of goods (figs. 13; 14). The houses themselves were built on a base of untrimmed, naturally squared granite blocks; the walls were made of smaller stones (found inside the rooms after the collapse of the walls) and perhaps of earth, with a thatched roof which, in order to span the whole area, was supported by double central pillars, the monolithic bases of which are still visible.

The beaten earth floors were lower than the natural ground level of the site. The dwelling floors were excavated down to a depth of about thirty centimetres, until they reached bed-rock, and the thrust of the external soil was withstood by means of a horizontal vault system formed by the rounded shape of the row of foundation stones. Thus dug into the earth, the dwellings must have appeared rather low when viewed from the outside.

Internal partition walls, perimetral benches, thresholds, hinges, stores for grain and other products are the most commonly found stone structures (figs. 15; 16a-b). Grindstones, pottery and bones are abundant, particularly in the stores (fig. 16c). Some holes dug in the naked rock under the floor of one room (L1) indicate, by means of their direction and some wooden remains, the use of a system of poles which, in this particular case, must have been used to suspend a vase with impressed decoration (figs. 13; 17b-c).

Outcrops of naked rock are visible in most of the square in 'quarter A'. Here, in front of the stone L1, there is a pit (diam. about 1 m) lined with granite slabs, which had been used for cooking meat (L2) (fig. 15d). This function is indicated by the finding of sheep/goat bones in two identical pits excavated in 1983 in the site of Al-Masannah (MASi) (A. Zarattini) (fig. 4b). The fact that this particular site was less eroded (fig. 4a) led to the finding of a large fireplace in the centre of the courtyard. Although somewhat different in that they are lined with sandstone slabs, these rooms are similar in ground plan and layout to those in WYi (\*) (fig. 8a).

The pottery of this period can be distinguished from that of later periods in the composition of the clay and the morphology of the vases. The high specific weight, reddish colour and with large black or white inclusions sticking out from the surface give it a peculiar appearance which facilitates attribution even when only a few fragments gathered on the surface are available.

Careful firing of the clay was not enough to ensure adequate campactness of the pottery, perhaps because of the inferior quality of the paste. The potsherds are often found to contain more sand than clay and are thus extremely friable. In conjunction with a surface finish using somewhat rudimentary techniques, this gives the surface finds a characteristic coarse appearance with the temper materials prominently displayed.

(<sup>6</sup>) Cf. IsMEO Activities..., East and West, 33 (1983), figs. 46-47.



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Fig. 14a - WYi: view of loci 'L 10' and 'L 11' after excavation, from south.



Fig. 14b - WYi: locus 'L 3' after excavation, from east.



Fig. 14c - WYi 'L 1-3', from north-east.



Fig. 15a - WYi: detail of door on north side of sterehouse 'L 11'.



Fig. 15b - WYi: detail of hinge on inside of north door of locus 'L 11'.



Fig. 15c - WYi: base of transverse partion of storehouse-workshop 'L 1'.



Fig. 15d - WYi: cooking-pit 'L 2'.



Fig. 16a - WYi: furniture for storage of food inside locus 'L 11'.



Fig. 16b - WYi: detail of base of partition between 'L 10' and 'L 11'.



Fig. 16c - WYi: pottery in north corner of locus 'L 5'.



Fig. 16d - Dam made of granite blocks near site of NIGi.



Fig. 17a - Grindstones, mullers, mortars and pestles from WYi.



Fig. 17b-c - Deep bowl with impressed decoration from WYi, 'L 1'.

The excavated materials have been better preserved (figs. 18; 19) and allow the applied clay depurations to be observed (either in the form of slip or wash) to cover up the coarseness of the ware. In some cases, particularly inside the vases, a rough form of stick burnish has been carried out on the refined clay. Organic inclusions are fairly rare, and it is precisely the preference for a plentiful mineral 'degraissant' (coarse granitic sand) which gives this pottery its characteristic heavy, compact appearance.

Neglecting the details of the variations characterizing individual productions, this pottery can be divided into two main classes:

1) Pottery with rather loose-textured clay, untreated external surface, very clear traces of large inclusions which are scraped along during hand working and have left deep furrows in the surface. The reddish colour often tends towards a brownish or greyish hue, perhaps also as a result of the frequent burn marks. The internal surface of the vases is smooth and contrasts distinctly with the rough appearance of the outside walls. Pottery that could be defined as 'kitchenware' is made out of this clay. This ware is made up of medium-sized globular 'hole-mouth' jars, without bottoms and often with horizontal handles (fig. 18: 1-4, 8-9) and wide low platters with straight, slightly thickened rims (fig. 18: 5-7). There are frequent traces of burning on the jars. 'Scraped' tempering materials are typical of the external face of the plates corresponding to the bottom. Typologically speaking, large platters account for the bulk of the ware of this period. The pottery in this class is not decorated.

2) Pottery with more refined clay, or with smaller mineral tempering materials or temper not visible on the surface, better firing and more compact texture. The surface is smooth, with wash coating often altering the original colour of the clay by adding lighter hues (orange or deep pink, or even brown or dark beige). Typical of this class of pottery are the numerous characteristic medium-sized spherical jars with everted rim and naturally rounded bottom (fig. 19: 1-2), and a type of deep bowl, often bottomless, with ledge-handles placed near the rim (fig. 19: 3-4). While the jars show no signs of surface finish, the bowls have often been stick-burnished and bear a peculiar form of impressed decoration, apparently executed using a rotating tool (figs. 17 b-c; 19: 3-4). Less frequently, also incised decorations (nail marks) or applied decorations (rope motives) are found (fig. 19: 5); painted decoration is absent. Probably related to the jars with everted rims are several large spouts, some of which are provided with an internal filter.

The lithic industry, found both on the surface and in the excavations, is quite different from the more sophisticated repertory of the preceding Neolithic period. It is characterized by the production of flint, quartz and obsidian flakes from which the tools are subsequently obtained (end-scrapers, side-scrapers, perforators, denticulates, notches) (fig. 20a-b). Together with these classical tools,





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The presence of cores and numerous 'hammer-stones' in the sites indicates that stone tools were produced locally. The fact that flake tools were accepted as sufficient (which gives the industry its typical second-rate appearance) reflects a type of generalized production of no great value that was merely linked to contingent uses. Other kinds of technologically more sophisticated tools were used for the more specialized tasks. This is shown by the finding of two bronze objects — a burin with a broad punch and a square section haft found during the excavation of NABvii (lev. 2) (fig. 21d), and a fragment of a tool of unknown function found on the surface at HAWi, i.e. in an exclusively protohistoric context (fig. 21c).

Stone grinding tools were found in large numbers in many of the sites explored. As many as 142 were found at WYi alone, either on the surface or during excavation (fig. 17a). Most of these tools were probably used in processes to transform cereal products. This is certainly true of the larger grindstones, with their concave surface and high abrasive power (trachyte), provided with elongated mullers, usually of the same material, found in the communal working areas or workshops. Other, more specialized types of processing are attested by numerous smaller semi-oval grindstones made of fine granite or sandstone, as well as sophisticated mortars made of the same material and used with dark basalt pestles.

The other objects found in the excavations include, in addition to the 'hammer-stones' mentioned above, also chalcedony and cornelian necklace beads (MASi), a fragment of an alabaster pendent (?), in which the careful wheel turning seems to point to the use of metal tools (fig. 21a-b), a small polished basalt axe (fig. 20c).

The main farming activity of the populations during this period is attested by palaeobiological analysis as well as by geomorphological research and artefactual evidence. The impressions of seeds in the pottery indicate that wheat, sorghum, barley, oats and millet were cultivated (see report by L. Costantini below). The animal bones found in cooking pits at MASi (S. Bokonyi) and in the rooms of 'quarter A' at WYi (see report by F. Fedele below) refer to the raising of oxen, goats, sheep and pigs.

Samples of charcoal found near the hearth in the square of MASi, have given a mean C14 dating of 1980  $\pm$  80 B.C. according to the results obtained by the Dating Radiological Laboratory of the Norwegian Institute of Technology (1983). The charcoal fragments of the L1 posts in WYi have given a later date:



Fig. 20a-b - Lithic industry from excavation of WYi.





Fig. 21a-b - Fragment of alabaster pendent (?) from WYi, 'L 1'.



Fig. 21c - Bronze tool from HAWi (surface).



Fig. 21d - Bronze chisel from 'sondage 1' from NABvii (lev. 2).

 $1750 \pm 80$  B.C. These laboratory results substantially confirm the general archaeological framework in which the culture in question had been included ever since the first finding of WYi, i.e. the end of the Syro-Palestinian Ancient Bronze Age, or more particularly the so-called 'Intermediate EB-MB Age' of K. M. Kenyon (<sup>7</sup>), 'MB I' of W.F. Albright (<sup>8</sup>) or 'EB IV' of G.E. Wright (<sup>9</sup>).

Of course, no actually identical features are revealed by the pottery comparisons, also because the Palestinian materials of the period mostly come from graves. However, in my opinion, strong similarities can be found in the eversion of rims, preserved in natural profiles without any thickening or shaping, in the globular shape of the vases, the absence of bottoms, the frequency of the holemouth jars and the presence of ledge/loop handles and large spouts (<sup>10</sup>). The large platters, so common in Yemeni culture, have no equivalent among the Palestinian funerary material, perhaps because of the specifically everyday nature of their usage, although there are abundant parallels in the pottery found in the layers of the sites of BA III (and BA IV of Megiddo) (<sup>11</sup>).

However, the parallels with the Mediterranean area are not restricted to pottery alone. The ground plan of the village of Har Yeruham in the Negev, one of the rare Palestinian settlements of the 'Intermediate EB-MB Age' not to consist solely of graves, contains sub-rectangular structures (dwellings, workshops with grindstones, pottery and lithic industry) made of untrimmed blocks laid on bed rock and provided with bases for central pillars which are highly reminiscent of the structures of WYi (<sup>12</sup>). Moreover, also the custom of digging the dwellings into the soil is a common feature of the Palestinian cities of the Ancient Bronze Age (<sup>13</sup>).

Of course, some gaps and differences exist in these comparisons. For instance, in Yemeni culture the large pear-shaped vases and extremely common flat bottoms are missing and in Palestine the typical impressed decorations are absent. However, despite also the distance between the areas and the environmental differences, they can still, in my opinion, be said to share definite features, which is not true, for instance, in the comparison between 3rd-2nd

(7) K.M. Kenyon, Archaeology in the Ho'y Land, London 1964, p. 136.

(8) W.F. Albright, The Archaeology of Palestine, Beirut 1977<sup>4</sup>, p. 80.

(<sup>9</sup>) G.E. Wright, The Archaeology of Palestine, in G.E. Wright (ed.), The Bible and the Ancient Near East. Essays in Honour of W.F. Albright, London 1961, pp. 86-8.

(<sup>10</sup>) R. Amiran, Ancient Pottery of the Holy Land, Jerusalem 1969, p. 79 sgg., photo 76-92, tavv. 22-4.

(11) Ibidem, p. 67, tav. 18: 3-6; p. 78.

(<sup>12</sup>) M. Kochavi, The Excavations at Hzr Yeruham, Preliminary Report, Bull. Israel Explor. Society, 27 (1964), pp. 284-92; id., in Encyclopaedia of Archaeological Excavations in the Holy Land, Jerusalem 1978, fig. a, p. 1219.

(13) K.M. Kenyon, Archaeology in the Holy Land, London 1964, p. 114.

millennium materials from Africa and eastern Arabia. It would thus appear that the comparison work should now be shifted northwards. The recent finding of 'post-Neolithic' sites with similar structures, stone industry and pottery in the southwest (<sup>14</sup>) and northwest (<sup>15</sup>) areas of Saudi Arabia merely confirm that this is the right direction to move in.

It is difficult to establish the exact duration of the A'rūš culture. As we have seen, the C14 datings tell us that, during the period in which the Amorite cultures of the Middle Bronze Age had long since been established in Palestine, the Ancient Bronze Age tradition still persisted in Southern Arabia.

A comparative study of the pottery found in our Yemen sites reveals some variations in the techniques and morphology, despite the overall continuity of the tradition. A greater simplicity in the formal conception of the vases, accompanied by peculiar local features in their execution, is certainly indicative of a more ancient production. On the other hand, an increase or variation in the morphologies, together with a standardization of the techniques used, is indicative of a later production. In fact, the pottery range found at MASi is more restricted than that of WYi, while the WTHv and RAQi range is even more highly developed.

Since the latter sites have not yet been excavated, it is not possible to make any definitive statement, although it is quite likely that this 'protohistoric' or 'post-Neolithic', or perhaps even better, 'Bronze Age' culture of Southern Arabia can be extended to cover the entire 2nd millennium B.C., thus bridging the gap with the Sabaean period.

As has already been stated, the formerly flourishing region of western A'rūš has now been almost entirely abandoned. The absence of settlements of the Sabaeo-Himyarite period is evidence of a sudden and definitive abandonment of the protohistorical settlements. The explanation for this again comes from the geomorphological and sedimentological analyses. It is now necessary to await the results of the analyses of the stratigraphic samples in order to ascertain the exact date of the phenomenon. However, the abandonment was certainly related to a neo-tectonic movement, perhaps combined with a climatic change.

A sudden increase in the altitude gradient and increased irregularity of the annual rainfall led to a breakdown in the sedimentary equilibrium of the valleys that, for a thousand years or more, had guaranteed easy and cheap agricultural production for the protohistorical populations of the A'rūš. The increased erosive power of the waters cut through the alluvial deposits, breaking down the

(<sup>14</sup>) J. Zarins, N. Whalen et al., Preliminary Report on the Central and Southwestern Provinces Survey, Atlal, 4 (1980), pp. 20 sgg.; 5 (1981), p. 22.

(<sup>15</sup>) M. Gilmore, et al., Preliminary Report on the Northwestern and Northern Region Survey, 1981, Atlal, 6 (1982), p. 14. impermeability of the clay layers, and the *widiān* beds quickly became the path through which the moisture and the fertile surface sediments were lost.

At one site on the Wādī Niğād (NIGi) (fig. 6d) a dam had actually been erected in an attempt to curb the devastating force of the sudden floods and to somehow prevent the precious sediments being washed down the valley (fig. 16d). However, the dam seems to have burst, perhaps thus definitively marking the end of this culture. This probably came about after a much larger dam had been built further downstream in the same catchment area, i.e. that of Mā'rib, which would have been the only one capable of containing and evening out a hydrological regime that had become chaotic and impetuous. This new dam was used to recover and redistribute, in the form of moist fertile silt, the same sediments that had supported such a flourishing culture for so many centuries before.