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edited by
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THE ORIGINS OF NORTH MESOPOTAMIAN CIVILIZATION:
NINEVITE 5 CHRONOLOGY, ECONOMY, SOCIETY

Subartu
IX

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Ninevite 5 Periods and Processes

Harvey Weiss*

"The temple Emenue - which (is) in the district of Emašmaš, the old temple - which Man-ištušu, son of Sargon, king of Akkad, had built, (that temple) had become dilapidated...I erected the doorframes of that temple, the equal of which for perfection no king had ever built for the goddess Ištar in Nineveh....The monumental inscriptions and clay inscriptions of Man-ištušu I swear I did not remove but restored to their places. I deposited my monumental inscriptions and clay inscriptions beside his monumental inscriptions. Therefore, the goddess Ištar has given me a term of rule which is constantly renewed...." Šamši-Adad I (1813-1782 B.C.) [Grayson 1987: 53].

V. Gordon Childe at Nineveh

During the 1931-32 season of the British Museum excavations at Nineveh, fragmentary inscribed stone cylinders were retrieved within the city's famous Ištar temple (Thompson and Hamilton 1932). Remarkably enough, these inscriptions, excerpted above, proclaimed the Assyrian king Šamši-Adad's rebuilding of a temple constructed 400 years earlier by Man-ištušu (2225-2210 B.C.), son of Sargon of Akkad. What led Man-ištušu, king of Akkad, to build a temple at Nineveh? What generated and determined Akkadian imperial control over northern and southern Mesopotamia, — and what were its effects?

In 1936 V. Gordon Childe incorporated the new data for Akkadian imperial rule at Nineveh into *Man Makes Himself*, his enduring study of the origins of Mesopotamian and Egyptian civilization. After the "origins of agriculture" and "the origins of cities," the new data from Nineveh were used to frame Childe's third archaeological problem: "the diffusion of civilization."

But the diffusion of civilization after its "birth," has since only occasionally attracted the attention of those seeking to understand the evolution of class-based polities in Europe and their distant West Asian progenitors (e.g., Renfrew 1973; Trigger 1989: 333), a process both long-term and steep-sloped. The spatially immediate diffusion problem presented in *Man Makes Himself*, although formally simpler, still remains for archaeological analysis: once established in southern Mesopotamia how were the contiguous ecological zones of northern Mesopotamia, Syria/Palestine, Anatolia, and the Indus transformed into state-controlled landscapes?

Childe explained the diffusion of the urban economy into the "secondary centers" of Mesopotamia, Syria/Palestine and Anatolia as "inevitable" due to the non-random, uneven distribution of natural resources across southwest Asia. Resource poor southern Mesopotamia "required" the resources of adjacent regions. From a higher level of agro-production and political integration, the south was able to retrieve these resources from weaker regions by any of several means.

"The civilizations of the alluvial plain were dependent on the importation from abroad of raw materials; part of their surplus wealth had to be expended upon obtaining the requisite imports. But the coveted materials seldom lay in an uninhabited wilderness. And so communities within whose territory the materials lay could claim a share in the surplus. They must indeed, be persuaded to produce more of their metal, timber, spices, or precious stones than was required for domestic consumption to barter to Egyptians, Sumerians and Indians, or at least lend their sevices to the latter as guides, porters and laborers." (Childe 1957: 136).

Childe's sketch drew from late 19th and early 20th century imperialism in "L'asie française," Côte d'Ivoire, and British India and Egypt. Recent archaeological analyses continue to emphasize the fourth-third millennium southern Mesopotamian acquisition of foreign resources as a key to primary and

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secondary state formation, now framed within core-periphery relations, the geographical transfer of value and, in general, uneven development (Gerschenkron 1966).

Historical variations within the Near Eastern diffusion of civilization provided the basis for Childe's model. One example was third millennium Byblos (then a French colonial excavation) and the Egyptian acquisition of cedar for tombs, boats and furniture. Another example was the import of copper, silver, and lead from the Taurus into southern Mesopotamia and the by-product Anatolian and north Mesopotamian cities and specialized metallurgists. A third example treated secondary state formation through imperial violence, Man-ištušu at Nineveh exemplifying Akkadian conquest and forceful resource acquisition. Childe's view framed resource-poor southern Mesopotamians manipulating resource-rich neighbors to acquire the materials necessary for "civilized life" in the south.

Schilf und Lehm?

Childe's southern Mesopotamia was E. Heinrich's (1934) land of "Schilf und Lehm." Sumer, in this view, was the pristine partner in unequal exchange with adjacent regions. Southern Mesopotamia lacks the metal, stone and timber we associate with domestic and public construction. Hence the hypothesis that, in the fourth and third millennia, Sumerian cities

> *"...must have played the crucial part in organizing the long distance procurement of certain commodities like metals, wood for heavy construction, precious stones, and perhaps even ordinary flint and construction stone as well" (Adams 1981: 80; cf. Gledhill and Larsen 1982: 205-206).*

Earlier, this argument had been extended still further:

> *"To insist as is usually done that the evolution of high cultures is based on the agricultural surplus of intensive irrigation is to systematically avoid the problem that surplus grain cannot be locally transformed into bronze, cloth, palaces (of imported stone), fine jewelry and weapons — hallmarks of the great civilizations. Even stone and wood were imports in the case of Mesopotamia" (Ekholm and Friedman 1979: 43).*

Of course, some explanations for the Late Uruk expansion, at Habuba Kabira, Godin and Hacınebi, focus upon Childe's model (Rothman (ed.) 2001). But neither the Late Uruk collapse nor its early Ninevite 5 successor satisfy the assumptions of Childe's model. Additionally, the model's logic is faulty and its consequences are not commensurate with archaeological and historical scenarios. Fundamentally, the available evidence does not support the model of a resource-poor southern Mesopotamia dependent upon essential foreign imports. The southern Mesopotamians did not "require" foreign imports, neither for agricultural production, nor for domestic or public architecture. Exotic trade goods or booty enhanced pre-existent state power and other production-distribution relationships and their ideological expression. Foreign trade, thereby, served specific state interests: the symbolic representation of prestige and power, including state-controlled metal tool manufacture and arms metallurgy. Whether in the hands of temple or palace agents or independent traders, state-legitimizing interests were served by the acquisition of exotic wood, copper and tin, lapis and carnelian, silver and gold, in fourth and third millennium BC Mesopotamia, north and south.

Timber, Late Uruk collapse, early Ninevite 5

The acquisition of copper by fourth and third millennium southern Mesopotamians still presents intractable archaeological problems. The artifact record is sparse because of tool reuse and because source determination between the region's three mines is not possible (Muhly 1995, 1998). The more formidable issue, however, is the production role of copper tools within the southern irrigation economy. This question has not yet been broached. The acquisition of timber, however, has some clarity. Three sets of data illumine timber use and acquisition in fourth and third millennium southern Mesopotamia:

1. archaeologically retrieved roof beams. These include possible cedar or fir from Temple C of Eanna level IV (Moorey and Postgate 1992) and palm beams from Nippur and Khafajeh (Delougaz 1940: 69-70), the later Uruk Sin-kašid palace, and Irigal (Strommenger 1975). Then, too, there are the "Post-Hole" building's asphalt-lined holes, 50-70 cm deep, and 16 cm wide, for posts "sharpened like pencils" (Jordan 1932: 23).

2. archaeologically retrieved temple and palace building plans that allow estimated construction timber requirements (Margueron 1982, 1992; Tunça 1984; Heinrich 1982, 1984). Roofed, narrow, long rooms and unroofed wide courts, hallmarks of Mesopotamian public architecture, were adaptations to the load-bearing strengths of local tree species. When design required long span halls, brick and sometimes poplar, was used for beam-bearing columns, as at Palace A at Kish, the Inanna temple level VII at Nippur,

and the Temple of Ishtar at Mari (Tunça 1984: 215; Heinrich and Seidel 1968). Exceptionally, as in the oft-noted Temple D court at Warka, exotic timber, with spans greater than 10 meters, may have been required for roofing portions of a room or building (Roaf 1990: 62-65; Heinrich 1982).

Southern Mesopotamia Third Millennium Beam Spans (meters)

	Temple	*Palace*
$\bar{x}$	3.62	6.16
σ	0.76	0.85
n	42	16

source: Heinrich 1982, 1984.

3. third millennium administrative texts that document Sumerian timber cultivation. *Populus euphratica* ($asal_2$), tamrarisk (šinig) and pine ($u\text{-}\check{s}uh_5$), were species grown in garden plantations ($kiri_6$) and canal- and riverbank forests (tir) (Postgate 1992; Powell 1992; Veldhuis 1997). In the late Early Dynastic period these timbers were harvested locally for large (giš til $lu\text{-}ub_2$) and small constructions (Powell 1992: 101). The pioneering work of Steinkeller (1987) previously documented similarly organized, local, ration-labor foresters of the Ur III period who provided the hundreds of poplar timbers and roof beams for palace and other state building projects.

The use of local beams (giš-ùr, *gašuru*) for both domestic and public architecture is well-documented in the southern Mesopotamian record from the third millennium through the first millennium (Postgate and Powell 1992 (eds.)) and, of course, to the present. Hence, for the fourth millennium, it is not necessary to hypothesize the import of Amanus or Taurus timber, nor Euphrates logjams, but for the unique Temple D court at Warka.

Timber was, however, imported in the third millennium. Among the more than 200 pre-Sargonic royal inscriptions across ca. 200 years, there are 13 references to timber including, specifically, white cedar and oak, retrieved for symbolic construction in southern Mesopotamian public buildings (Cooper 1986; Steible 1982; Steible and Behrens 1982). Naram-Sin and Šar-kali-šarri boasted of cutting Amanus cedars for temple constructions at Nineveh and Babylon (Frayne 1993: 140, 192), and Gudea's paean of self-praise (Cylinder A) claimed flotillas of Amanus cedar, spruce, and juniper timbers "endlessly floating down" the Euphrates for construction of Ningirsu's temple (Edzard 1997: 78-79).

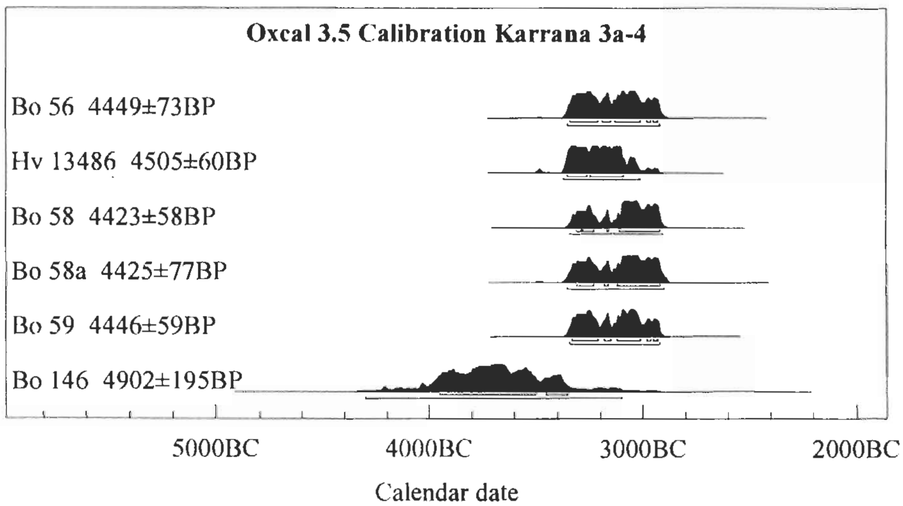
The third millennium exotic wood retrieval *topos*, and its frequency, as with Neo-Assyrian *topos* for cedar use and the literary avoidance of poplar (Postgate 1992), indicate exceptional procurement for the representation and legitimation of state authority. The local cultivation and ready availability of roofing timber indicate that Amanus cedar and other exotics were a royal choice, not a regional dependence.

Childe's understanding of Akkadian imperialism at 2300 B.C. is also, of course, a mistaken analog for southern Uruk expansion at 3300 B.C. Akkadian administrator's recorded grain transport from Nagar (Brak) to Sippar (Abu Habba), the alluvial plain's Sargonic gateway (King 1896: 1, 2; Edzard, Farber and Sollberger 1977: s.v. *Nagar*; Walker 1988). But there are, as yet, neither Akkadian, nor later, receipts for Amanus timber rafted down the Euphrates. Akkadian imperialism was based upon extended grain revenues, not exotic timber harvests.

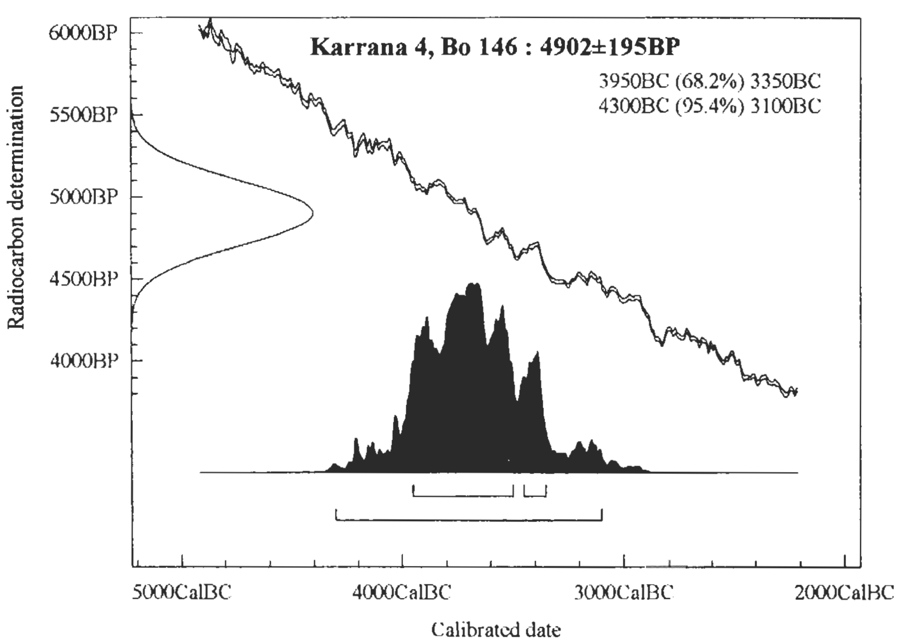
The origins of Ninevite 5

Ninevite 5 culture was born in the Late Uruk period's demographic, political, and economic collapse on the Habur and Assyrian Plains. When, precisely, did this happen? The most useful radiocarbon determinations for terminal Late Uruk settlements are from Arslantepe (Calderoni et al. 1994) and Godin Tepe (Dyson 1987), each of which provides termini ante quem not later than 3000 B.C. The single Godin V numerical notation tablet with a "jar" sign indicates contemporaneity with late Warka IV or Susa Acropolis 17 (Weiss and Young 1975: 8-11).

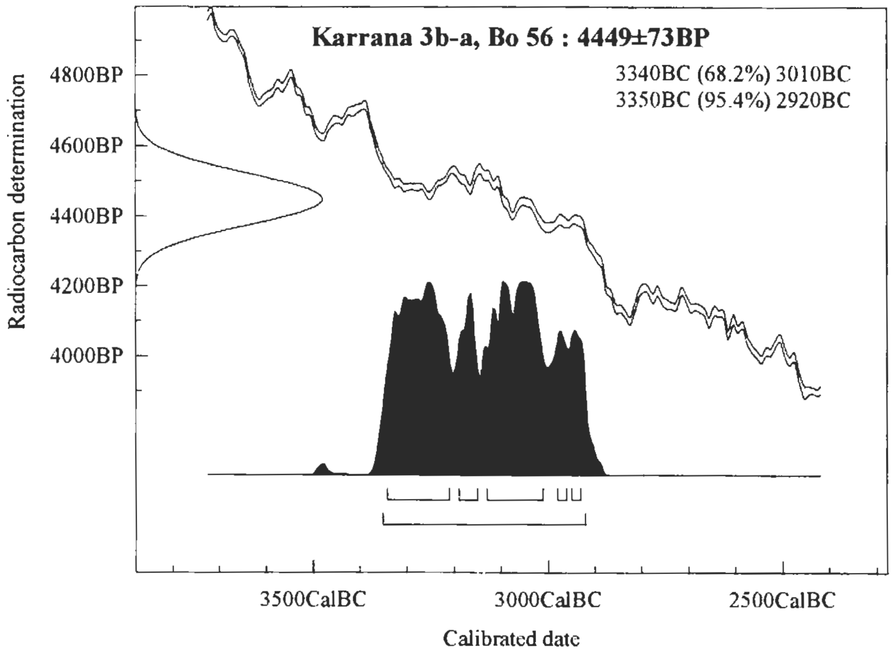
For the Assyrian Plains, the set of radiocarbon dates from Tell Karrana 3 (Wilhelm and Zaccagnini 1993) resolves the dating of the transition from Late Uruk to Ninevite 5 (Fig. 1). One date from Karrana level 4, Bo 146, with a large standard deviation, precludes a post-3000 BC date, and makes it likely that succeeding strata are also earlier than 3000 BC (Fig. 2). One date from Karrana level 3b-a, Bo 56, calibrates to 3350-2920 BC (Fig. 3), and constrains the four consistent dates from Karrana level 3c, Hv 13486, Bo 58, Bo 58a, and Bo 59 (Figs. 4, 5, 6, 7). Hence, there is little chance for Karrana level 3c to be later than 3000 BC, and probably the period terminated earlier still. These dates situate the brief succeeding levels, Karrana 2 and Karrana 1, "Transitional" and "Intermediate," shortly before or after 3000 BC. Karrana 2 and 1 radiocarbon dates would resolve this problem. The present synchronism, therefore, of Ninevite 5 early painted/Leilan IIIa with the Jemdet Nasr period in southern Mesopotamia (Figure 8) suggests that the Brak TW early painted Ninevite 5 appears at the same time (Oates and Oates 1993). Note that both Ii and Rova associate these strata with the Early Dynastic I period. "Early Dynastic I", however, remains an imprecise chrono-marker, as the presence/absence of ceramic types extends across Nippur Inanna 14-12 (Wilson 1986). Quantified ceramic assemblages and AMS dates are needed to refine this problem.



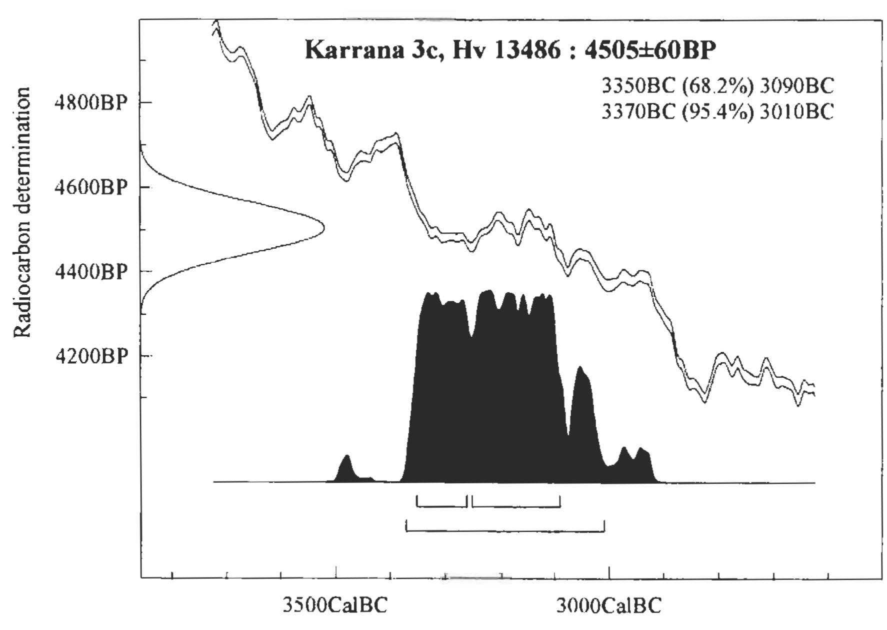
- Fig. 1: Oxcal 3.5 Calibration Karrana 3a-4.



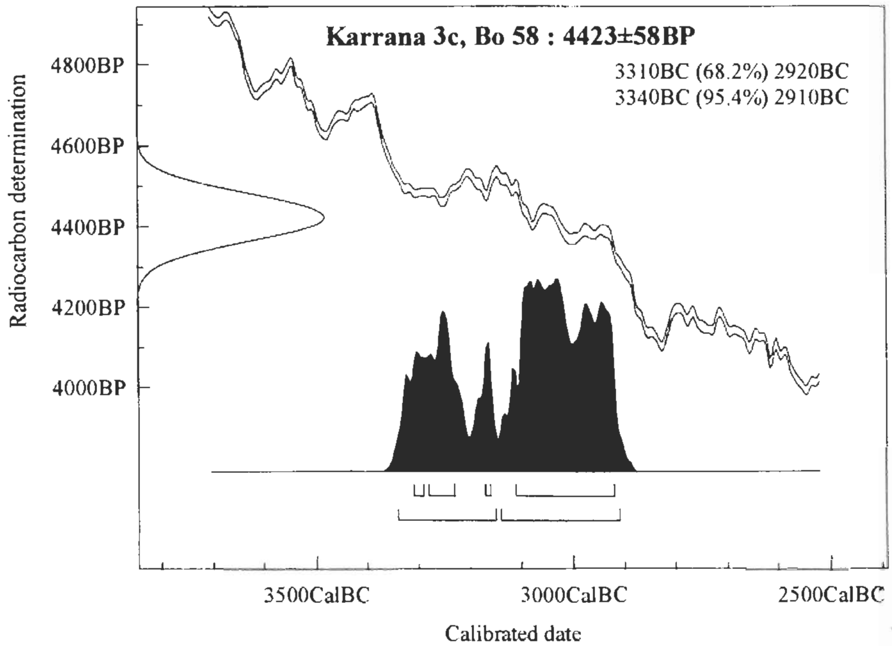
- Fig. 2: Oxcal 3.5 Calibration Karrana 4, Bo 146.



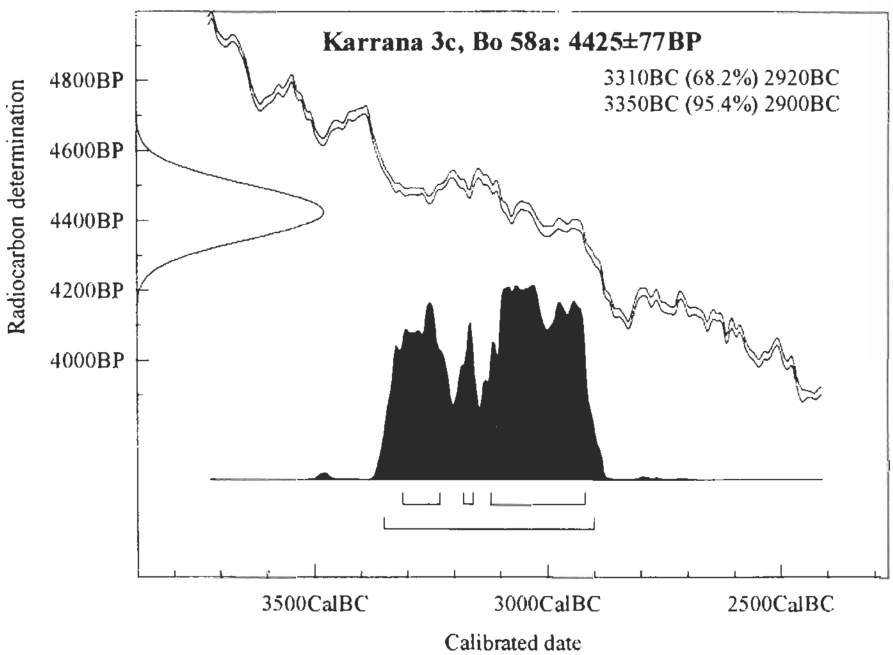
- Fig. 3: Oxcal 3.5 Calibration Karrana 3b-a, Bo 56.



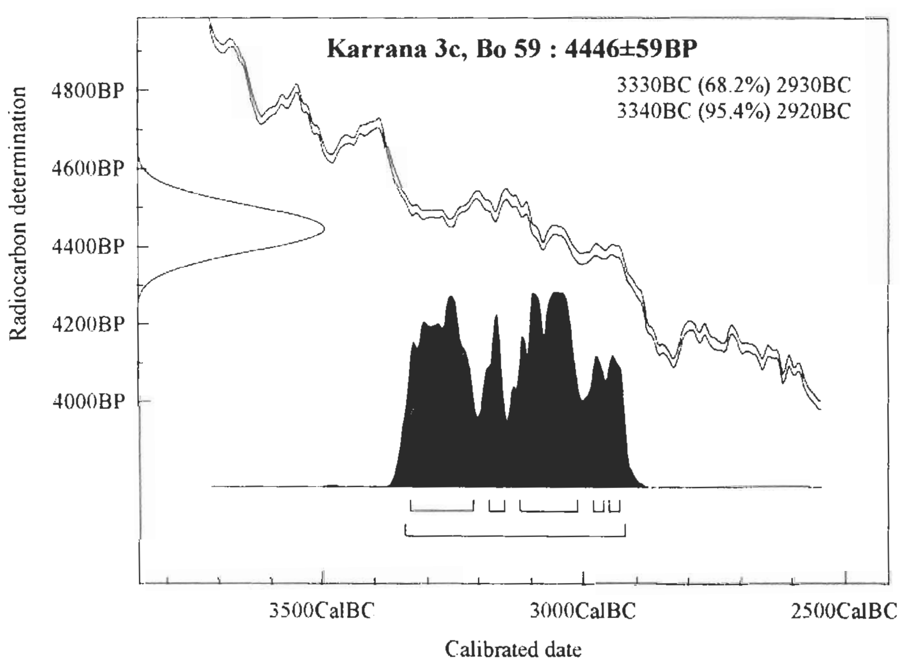
- Fig. 4: Oxcal 3.5 Calibration Karrana 3c, Hv 13486.



- Fig. 5: Oxcal 3.5 Calibration Karrana 3c, Bo 58.



- Fig. 6: Oxcal 3.5 Calibration Karrana 3c, Bo 58a.



- Fig. 7: Oxcal 3.5 Calibration Karrana 3c, Bo 59.

B.C.	HASSEK HÖYÜK	BRAK	RAQA'I	LEILAN ACROP.	TELUL ETH-THALATHAT	MOHAMMED ARAB	KARRANA 3	CERAMIC ASSEMBLAGE
2200								
		CH 3		10*				*Akkadian*
		M- CH 5		*IIb* 11				*"sila-bowl," etc.*
2300				12				
				13				
2400		*L-* CH 6*	2	*IIa* 14*				*Leilan IIa / Brak "ED III"*
2500				15*				
			3*	16				
				IIId 17				N5 *late excised*
2600		*K-*FS		18				
		ER	4	19		A-		
				IIIc 20*		*MA 3* E		
2700						hiatus		
			5	21	I			N5 *incised + excised*
						Cemetery F		
2800		*J-*	6	*IIIb*	II			
				34*				
			7	36	III			
2900						hiatus		
	0	CH9-		37	IV	*MA 2* G-		N5 *painted + early incised*
	1	*H-* 12		*IIIa* 38		K		
3000	2	TW1		39		hiatus	1-2	
	3-4	*G-*		40		L-	3*	*terminal Late Uruk*
	5	TW12		*IV* 44		*MA 1* M	4*	

* = ^{14}C reported

- Fig. 8: Ninevite 5 absolute chronology.

The replacement of the social and economic vacuum left in West Asia with the collapse of Uruk-related settlements varied regionally. On the Iranian and Anatolian plateaus, Yanik/Early Trans-Caucasian/Kura-Araxes settlements spread across the southern and western borders of the Zagros and Taurus arc, eventually reaching both Palestine and the Khorasan Road, in what has become a classic archaeological signature for population movement. The Godin IV and Arslantepe VIB settlements typify this phenomenon. In the Godin case, Early Transcaucasian settlement followed within decades of the still-obscure local Late Uruk retreat (Weiss and Young 1975: 14-15).

On the plains of northern Mesopotamia, the Late Uruk collapse was succeeded by a remnant population producing, briefly, the precursor of early Ninevite 5 pottery. On the Assyrian plains and along the Tigris, the successor Terminal Uruk and Transitional settlements, such as Karrana 3, Mohammed Arab, and Thuwaij, were small in size (one hectare or less) and few in number (see Appendix I). On the Habur Plains, however, these Transitional assemblages have been located only at Tell Brak. It is possible that this ceramic period did not occur there, i.e., there was very little occupation of the Habur Plains during this brief period, or earlier assemblages persisted later, or later assemblages began earlier. In general, scant sedentary population persisted during the brief transition period and the early painted/incised period in the regions that neighbor southern Mesopotamia.

In northern Mesopotamia, the greatly reduced regional population and the disappearance of the Uruk settlers brought removal of both the Late Uruk administrative tool kit borrowed from southern Mesopotamia and the grit-tempered southern Late Uruk ceramic assemblage. In Susiana, a different writing system developed alongside Jemdet Nasr-related ceramics. But population here also plummeted. The surveys around Brak, Leilan, al-Hawa, Warka and Susa define the fundamental population reductions and settlement pattern alterations:

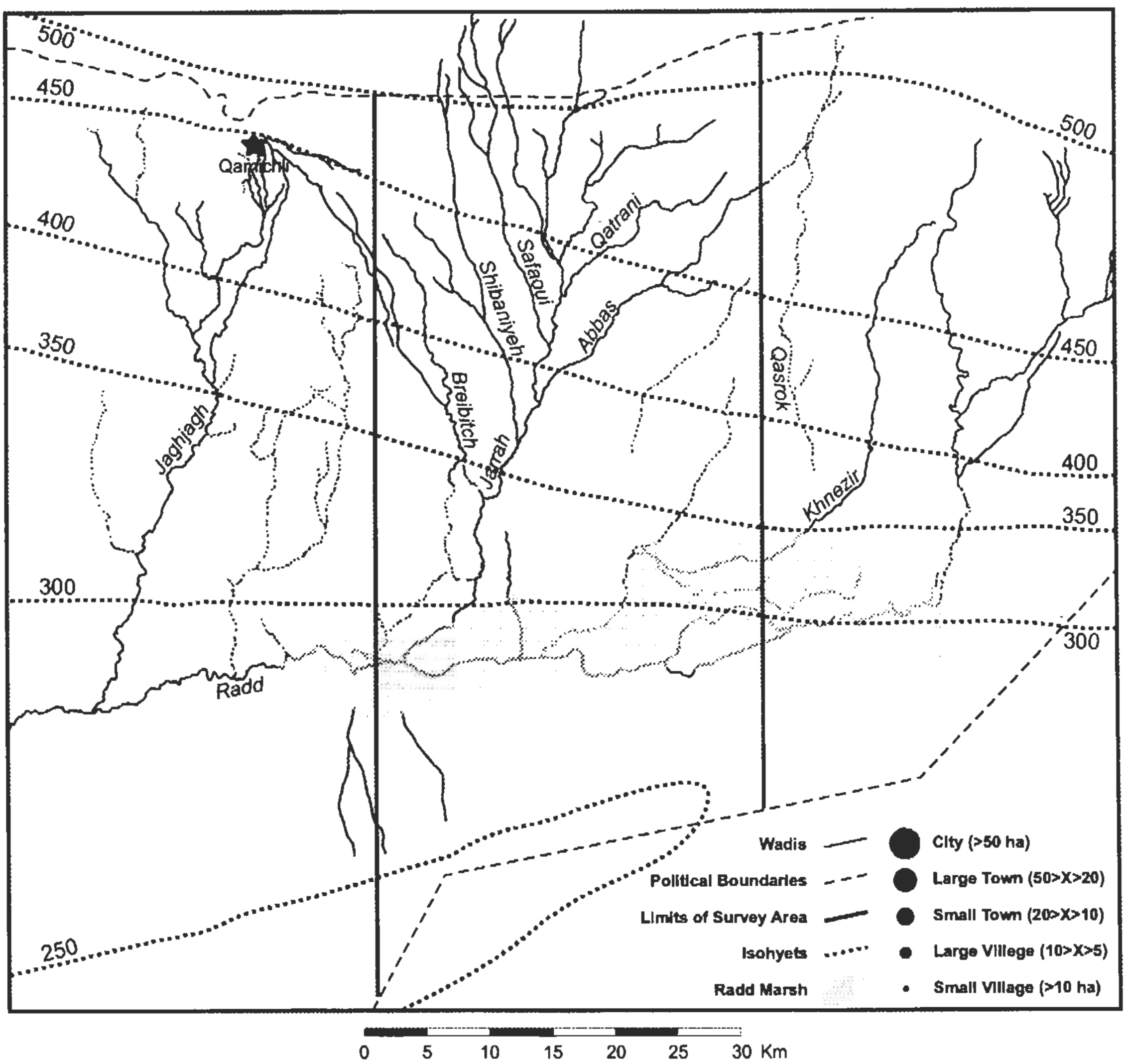
Brak. The ring of satellite mounds situated a half kilometer around Brak used northern, i.e., local, Late Uruk ceramics. These satellite occupations were abandoned upon the intrusion of Late Uruk southern ceramics onto the main mound. That is, the local worker population at Brak, resident in the satellites, and sometimes difficult to locate, moved elsewhere in early Late Uruk times and did not return (Emberling 2001).

Leilan. The Tell Leilan Survey data were collected and preliminarily analyzed in 1995 and 1997 with Elena Rova and Richard MacNeill (Figure 9). They are full coverage regional data retrieved with GPS site recording, total station site mapping, and both LANDSAT and SPOT imagery (Ristvet 2002; Ristvet, Rova, and Weiss in prep.). In their presentation here, these data are displayed with precipitation isohyets derived from the Soreq Cave analyses of M. Bar-Matthews, et al. (1998). Region-wide, including the wadi Radd and areas today below the 250 mm isohyet, the survey data indicate a radical reduction in the frequency and scale of post-Late Uruk/early Ninevite 5 settlement, with little occupation continuing into Leilan IIIa (Figures 10, 11, 12).

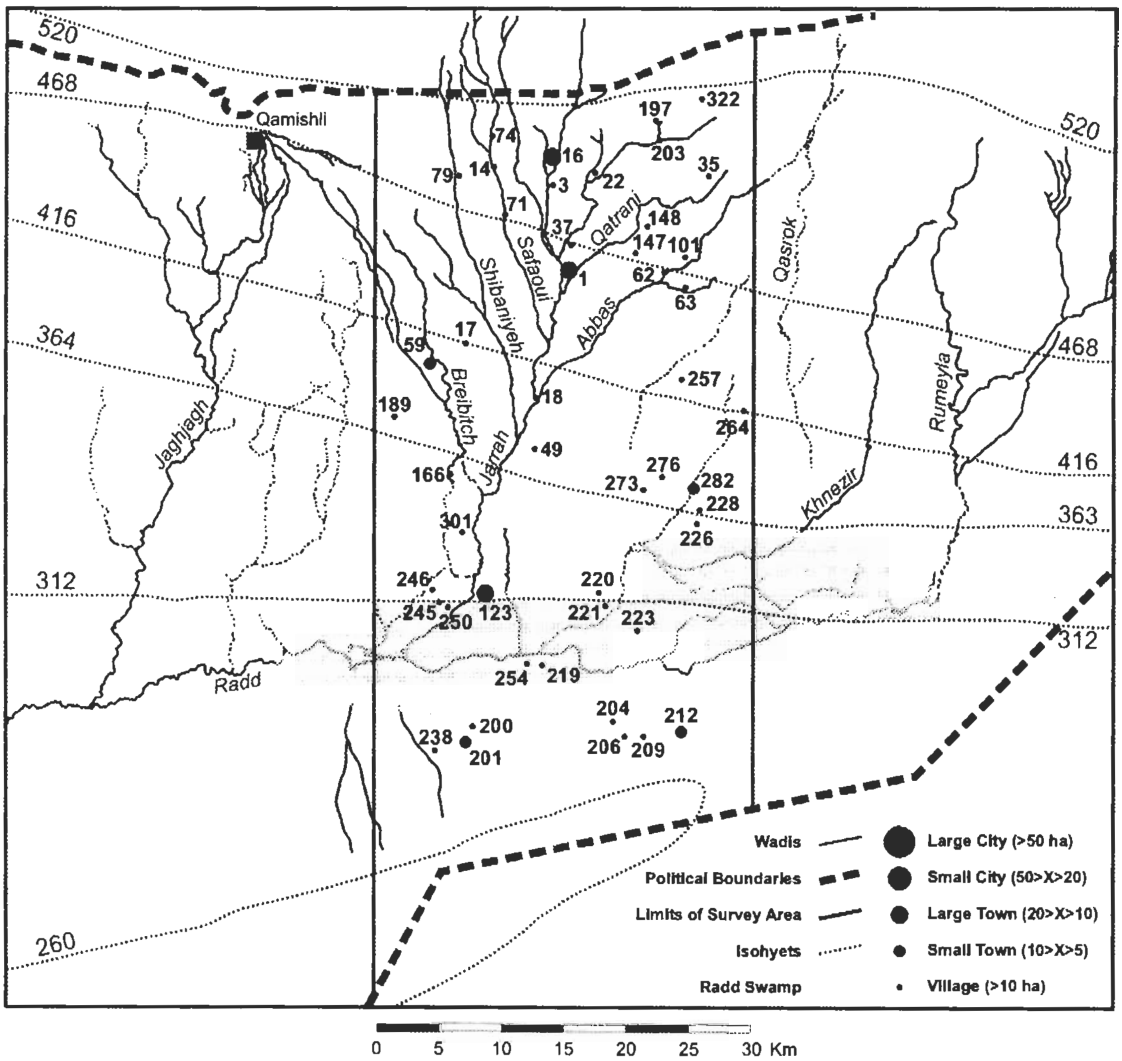
	Leilan IV	*Leilan IIIa*
est. period length	400 years	100 years
number of sites	53 (13 southern)	5 (0 southern)
density (km^2)	1:32	1:336
total occupation (has.)	167	26

Although diagnostic Ninevite 5 early painted sherds are not the major component of IIIa assemblages, sites with them seem as abundant as their representation in excavated assemblages might predict. Such a reduction in settled population and population growth perhaps began in the last half of Period IV that requires subdivision. Habitat-tracking and/or a shift from sedentary cultivation to pastoral nomadism are historically familiar adaptations to extended dry-farming drought (Weiss 2000).

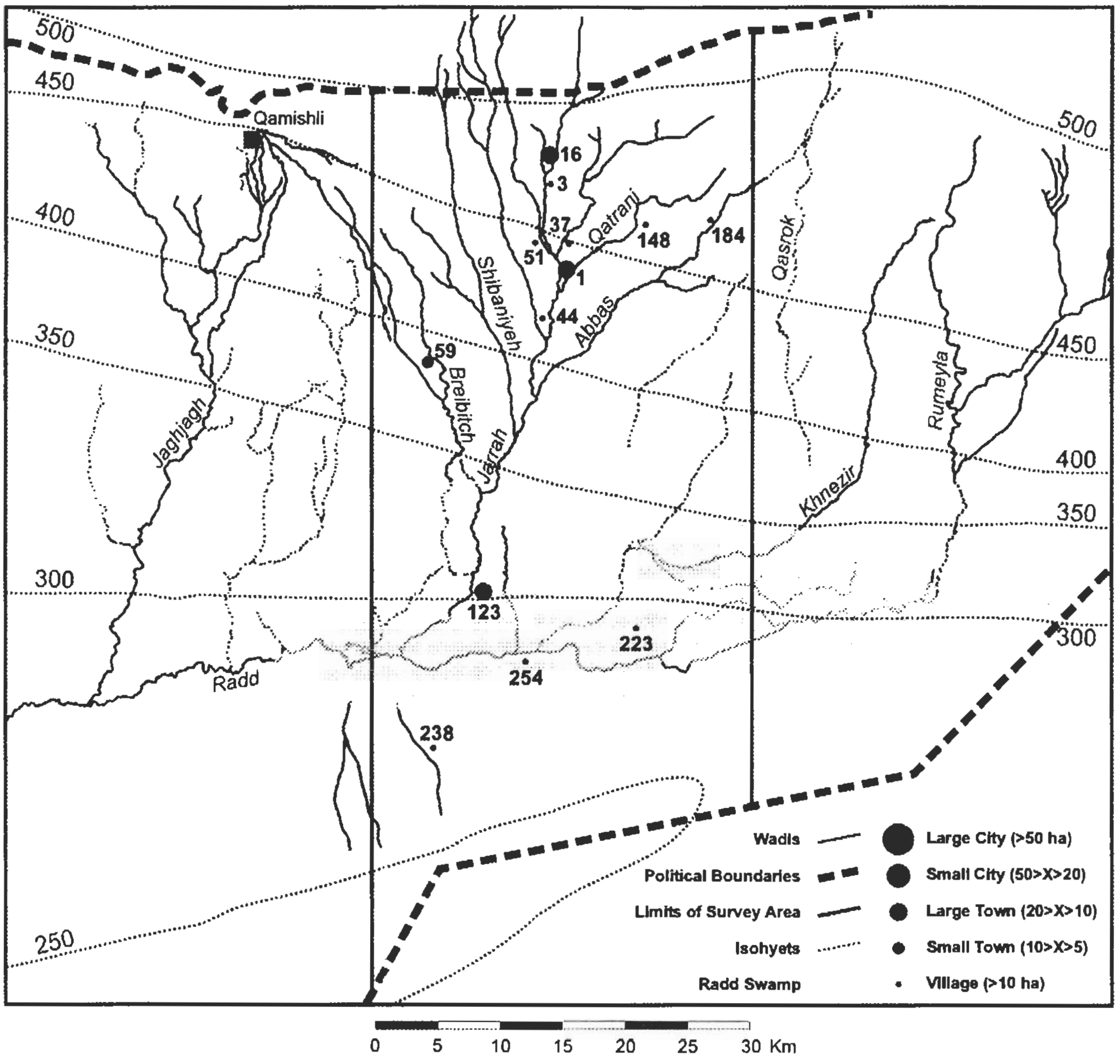
al-Hawa. In northern Iraq, between Leilan and Mosul, the al-Hawa region survey (Wilkinson and Tucker 1995) lumped the successive Ninevite 5 ceramic assemblages into one period of about four hundred years. Hence the picture drawn does not delineate post-Late Uruk/early Ninevite 5 period settlement. In contrast with Late Uruk settlement of more than twenty sites within 475 square kilometers (ca. 1:25 km^2), only four small sites may have been occupied during the early Ninevite 5 painted/early incised period (1:120 km^2).



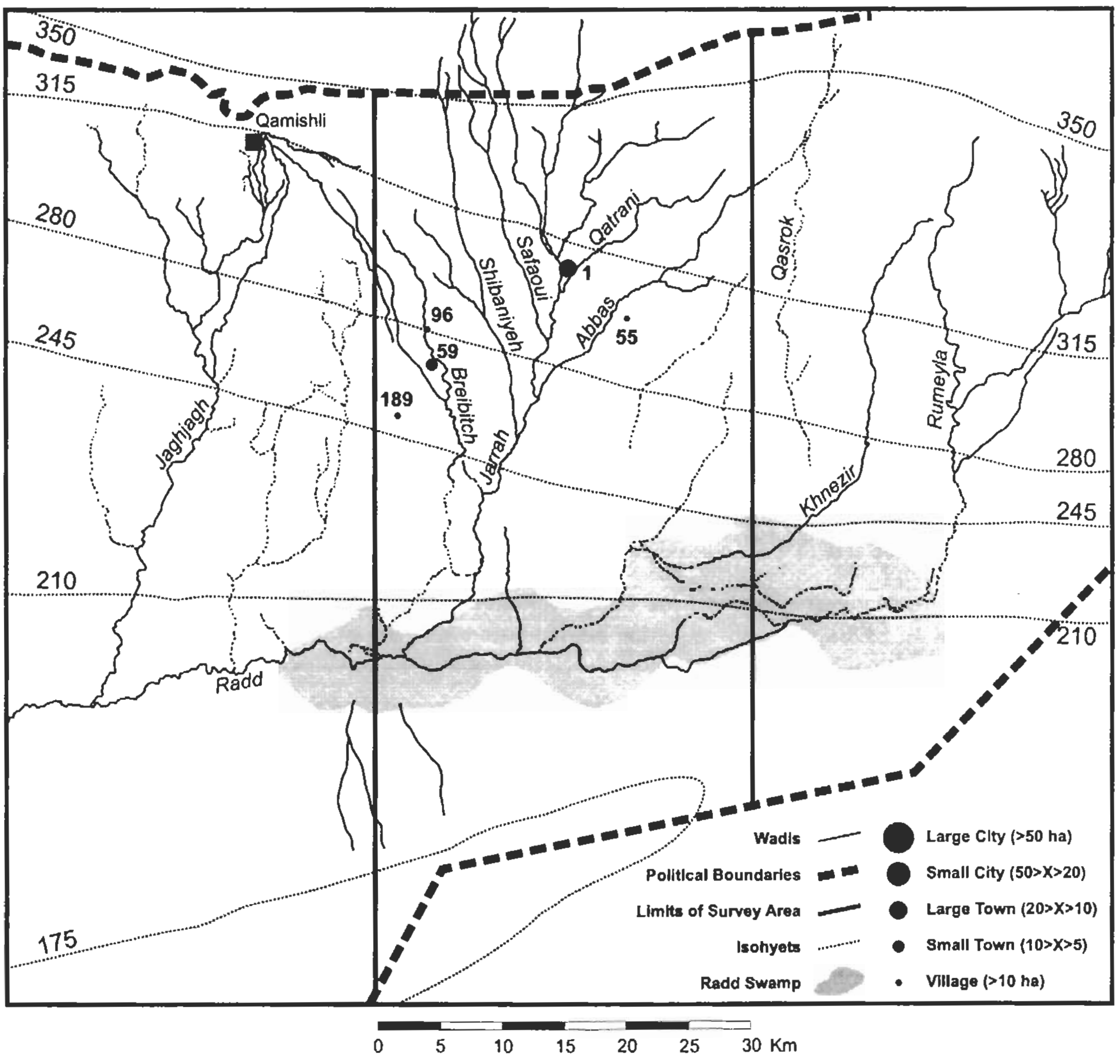
- Fig. 9: Tell Leilan Survey area 1995, 1997; modern precipitation.



- Fig. 10 : Tell Leilan Survey Period IV / LC 5 (ca. 3400-3000 B.C.).
Precipitation isohyets estimated from Bar-Matthews et al. 1999.



- Fig. 11: Tell Leilan Survey Period IV / Southern Uruk (ca. 3400-3000 B.C.). Precipitation isohyets estimated from Bar-Matthews et al. 1999.



- Fig. 12: Tell Leilan Survey Period IIIa (ca. 3000-2900 B.C.). Precipitation isohyets estimated from Bar-Matthews et al. 1999.

Warka and Susiana. Like the Brak satellite collapse, the population collapse in dry-farming Khuzistan occurred during the Late Uruk period. When settlement at Warka more than doubled to 230 hectares (Finkbeiner 1991) the size of adjacent Susiana settlement dropped by ca. 50% (Johnson 1973; Weiss 1977). Subsequently, however, there was "an abandonment of the countryside, accompanied by the encapsulation and transmission of the culture of Uruk IV by a reduced and beleagured urban population" (Postgate 1986: 96). The Dewar (1991) contemporaneity correction reinforces these conclusions (Pollock 2001; Wright 2001).

These Late Uruk/early Ninevite 5 collapse phenomena, components of larger structural and political devolution, have not been explained. The causes, as with all collapse processes, have been sought within the organization and needs, systemic and specific, of Late Uruk society, although dynamic natural forces have yet to be considered in any detail. The Godin IV/Yanik/Early Trans-Caucasian intrusion across the Khorasan Road and the consequent disruption, then redirection, of southern Mesopotamian trade linkages from the Khorasan Road to Behbehan-Marv Dasht-Kerman, has been presented as one, partial, explanation (Weiss and Young 1975). For the Khorasan Road tap, however, Godin Tepe was likely an extension of irrigation agriculture Diyala settlement, as dry-farming Khuzistan was collapsing while Godin scribes were busy with their new ideogram.

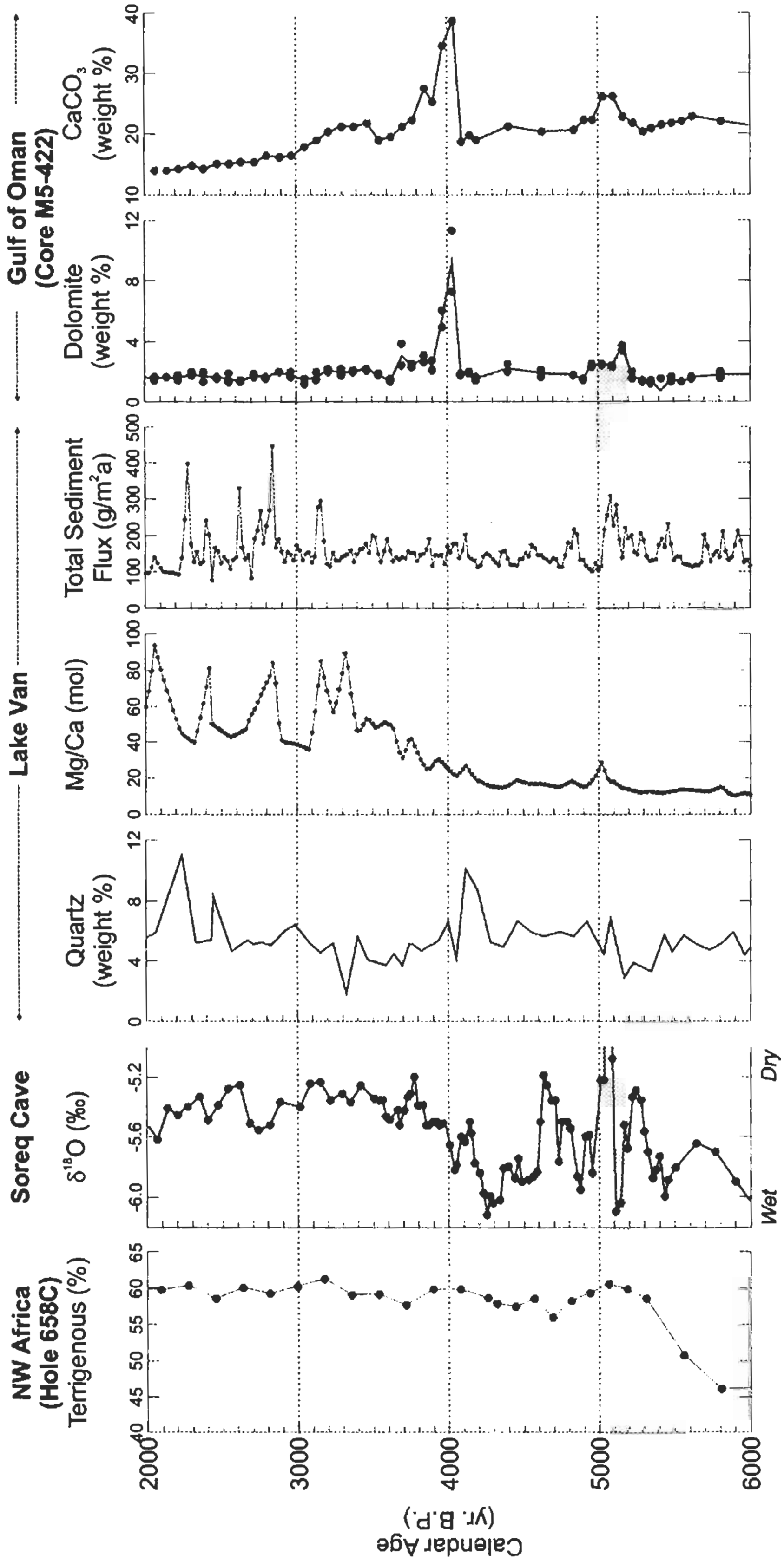
Fundamentally, we do not understand the peculiar constituents of the Uruk colonies' material culture, nor how metallurgy, for example, was transformed into or derived from "wealth." Southern Mesopotamia lacked the copper ores of nearby Oman or more distant Iran and Turkey, but generated incomprehensible irrigation harvest yields with flint and clay sickles and wooden ploughs (Postgate 1984; Hruška 1995). The relationships between long-distance trade, the "colonies," and the Late Uruk collapse yet remain uncertain.

The 5.2 ka BP Abrupt Climate Change Event

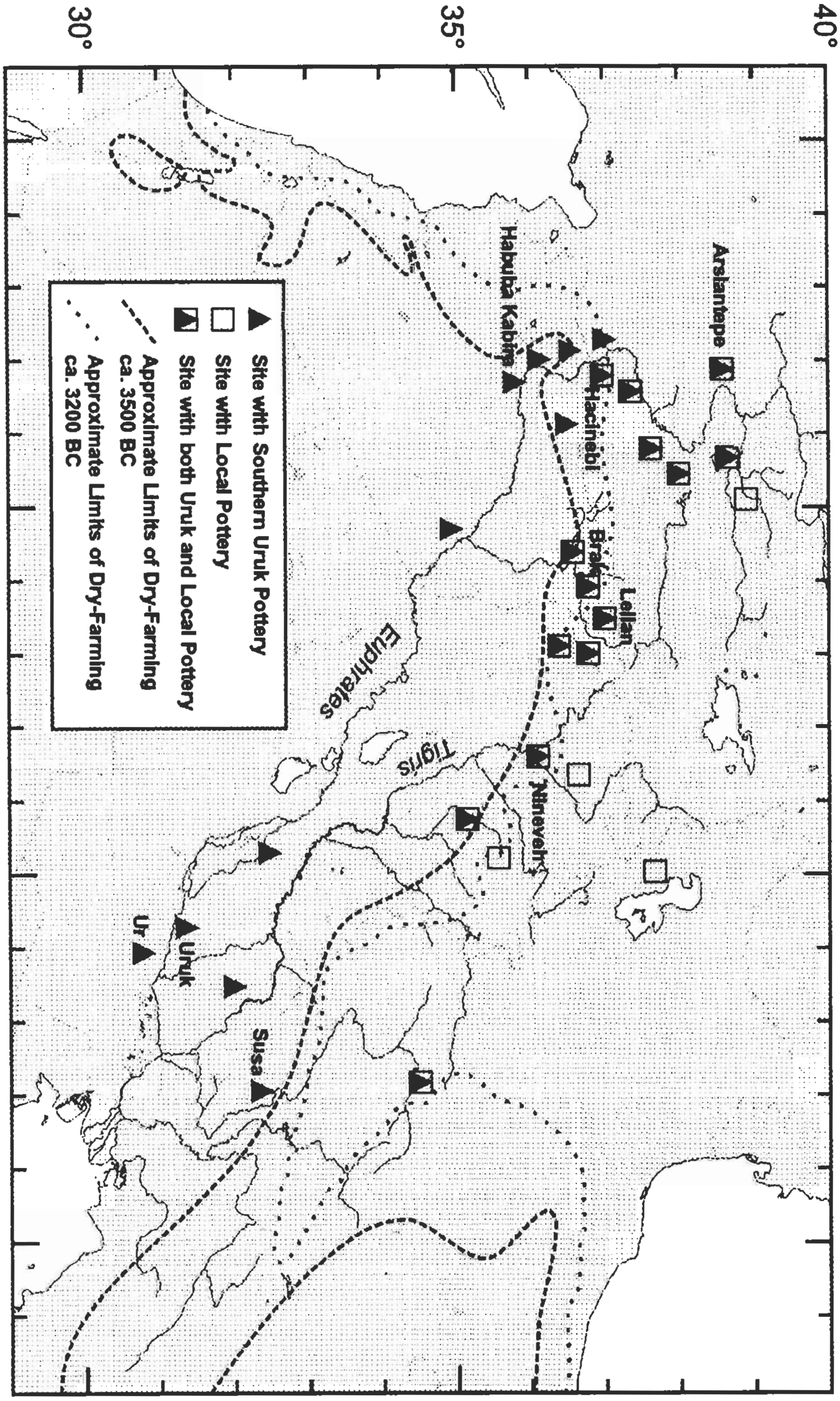
"Some catastrophes are just plain real" (Proctor 2002).

Three high resolution climate proxy records triangulate Greater Mesopotamia across the fifth through second millennia B.C. Two records are proxies for the humid Mediterranean westerlies and one records the dust bearing northwesterly of southern Mesopotamia and the Gulf of Oman. The Lake Van varved sediment core (Wick, Sturm and Lemcke 2003; Lemcke and Sturm 1997) is a record of Anatolian precipitation at the headwaters of the Tigris and Euphrates, and therefore a proxy for both north Mesopotamian precipitation and Tigris-Euphrates streamflow. The Soreq Cave speleothem is a record of the Mediterranean westerlies in the eastern Mediterranean, i.e., the same cyclone paths that are recorded within the Van varves (Bar-Matthews et al. 1999). The Gulf of Oman marine core tracks the Arabian monsoon that skirts southern Mesopotamia while northwesterlies transport deflation southwards (Cullen et al. 2000).

Each high-resolution record identifies an abrupt climate change at 5.2 ka BP/3200 BC that extended for two hundred years (Fig. 13). Bar-Matthews et al. (1999) observe that the $\delta^{18}O$ magnitude of this event in their record was second only to that of the 8.2 ka bp event. Modeling against modern temperature and precipitation values, the estimated precipitation reduction at 3200 B.C. was from 520-460 mm to 380-350 mm, or ca. 27% (Bar-Matthews, Ayalon and Kaufman 1998). At loci along the modern 300-mm isohyet, the reduction to 225 mm was essentially beyond the range of efficient dry farming (Fig. 14). At Lake Van the event is marked by spikes of quartz (heightened aeolian dust), Mg/Ca (salinity as a function of reduced spring melt water), and sediment flux (surface erosion) (Wick, Sturm and Lemcke 2003; Lemcke and Sturm 1997). The Gulf of Oman core shows the event as a sudden dust spike, approximately double background Holocene dust levels, but one-fourth the levels of the 4.2 ka BP event (Cullen et al. 2000).



- Fig. 13: 5.2 ka BP Abrupt Climate Change proxies in lake, marine, speleothem cores. Source: deMenocal et al. 2000; Bar-Matthews et al. 1999; Lemcke and Sturm 1997; Cullen et al. 2000.



- Fig. 14: Late Uruk expansion settlements at 3200-3000 B.C.

No Late Uruk period abandonment sites in northern or southern Mesopotamia have been examined for evidence of alterations in post-occupation deposits, and the southern Mesopotamian excavation samples provide few data. However, the abandoned Uruk period public buildings at Abu Shahrein (Eridu), filled with ca. two meters of aeolian deposits (Thompson 1919: 210-211) suggest the kind of wind-transport and deflation associated with abrupt century-scale aridification.

In Khuzistan, dry farming was abandoned in major areas now below 250 mm annual rainfall and without recourse to irrigation; apart from Susa, irrigation was not used in Khuzistan (Weiss 1986: 79-70; cf. Adams 1962). Of course, reduced precipitation did not affect irrigation agriculturalists in Sumer because Euphrates flow was underutilized, albeit subject episodically to channel straightening. Hence the necessity for Khuzistani migration into southern Iraq as the 20-30% decrease in precipitation reduced dry-farming harvest yields to one-quarter those of the adjacent, irrigation agriculture, Sumerians. The effects of the 5.2 ka BP event remain to be tested, however, at sites where Late Uruk settlements were abandoned (e.g., Jebel Aruda, Habuba, Arslantepe, Godin, Brak), but the villages of the Transitional and Leilan IIIa/early painted and incised Ninevite 5 periods literally did not recover the pre-collapse Late Uruk settlement pattern. The terminal Late Uruk settlement collapse in these regions requires full investigation, as the exquisitely dated Soreq Cave speleothem (Bar-Matthews et al. 1999), and the African cores (Swezey 2001, deMenocal et al. 2000), provide a similar coincidence of abrupt climate change and social crisis in the Levant (Portugali and Gophna 1993).

Leilan IIId and secondary state formation

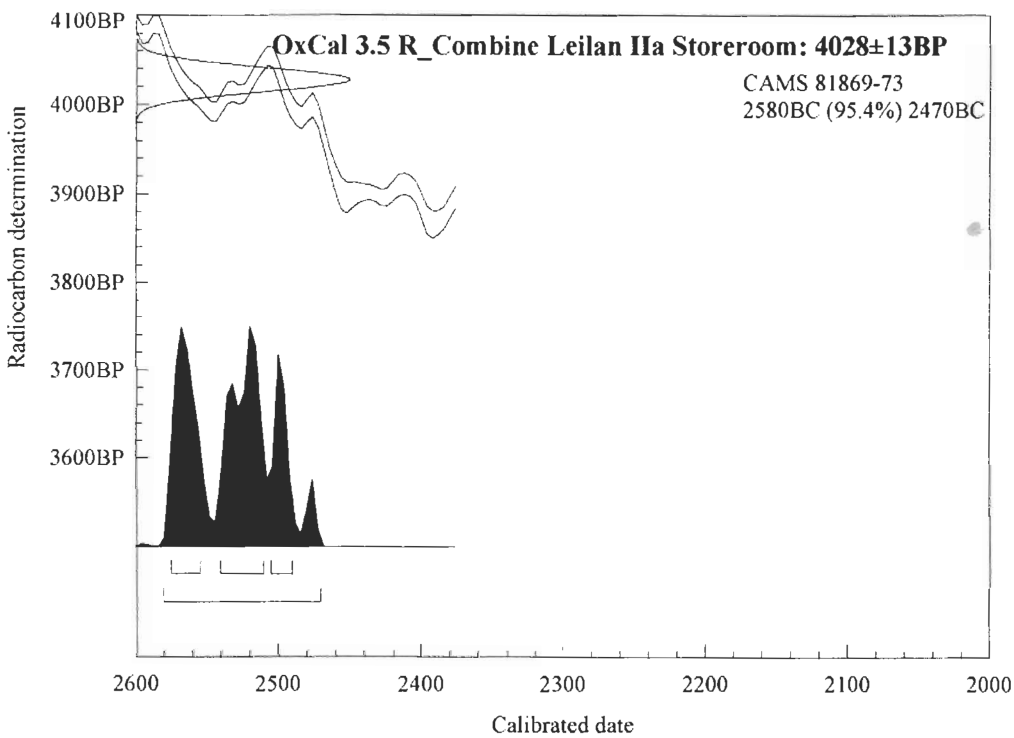
Following the Late Uruk collapse, a three hundred year period of slow regional settlement growth began at about 2900 B.C. in northern Mesopotamia. This was a period of regional isolation, with only loose iconographic linkages between north Mesopotamia and western Iran (Parayre, this volume). The terminus of this period is marked by the Operation 1 stratum 19 burial at Leilan, and possibly contemporary and similar burials in northern Iraq (Green, this volume). The retrieval of stratum 19 burial painted ware at Tell Atij (Fortin et al. 1988), and similarities with "Karababa-like" painted wares (Rova 2000), forces rejection of Roaf's proposal to squeeze stratum 19 and earlier Leilan strata between the hiatuses that define Mohammed Arab G-K.

The date of the terminal IIId period is constrained by the immediately succeeding period IIa strata on the Leilan Acropolis. The early stratum 14 grain storeroom situated adjacent to the IIa cultic platform's western face (see below) contained more than 300 grains of carbonized clean barley in its storage chamber. Thatch, phytoliths, lignified wood, burnt mud plaster and mudbrick collapse was stratified above the grains within the chamber. Five radiocarbon samples, each of six complete barley grains from the storage chamber, were submitted to Thomas Guilderson at the Center for Accelerator Mass Spectrometry at Lawrence Livermore Laboratory, and produced essentially identical dates.

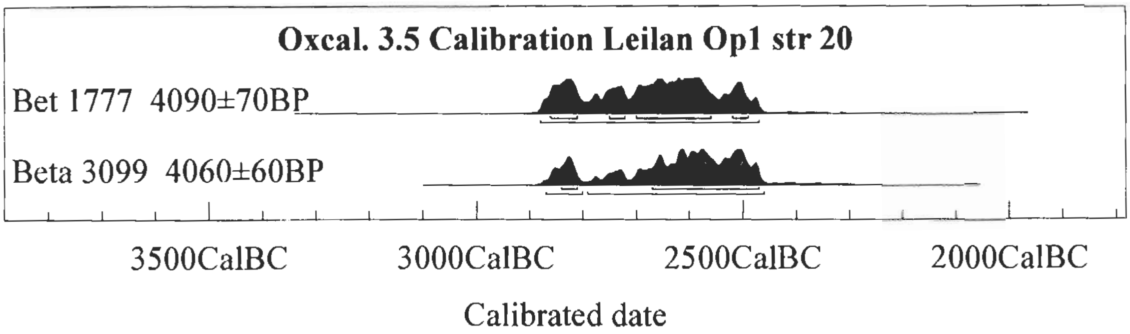
Laboratory number	*Leilan provenience*	*date bp*
CAMS-81869	44W13*15*	4035±30
CAMS-81870	44W13*15*	4025±30
CAMS-81871	44W13*15*	4030±30
CAMS-81872	44W13*15*	4015±30
CAMS-81873	44W13*15*	4035±30

The calibrated weighted average of these one-year harvest event samples is 2580-2470 BC at two standard deviations using R_Combine in OxCal 3.5 (Ramsey 2000) (Fig. 15). These suggest the end of Leilan IIId (stratum 15) not later than 2500 B.C., and its beginning (stratum 18), therefore, at ca. 2600 B.C. A grain sample from Operation 1 stratum 20, split into two samples, provides a calibrated weighted average with a large standard deviation (Figs. 16, 17).

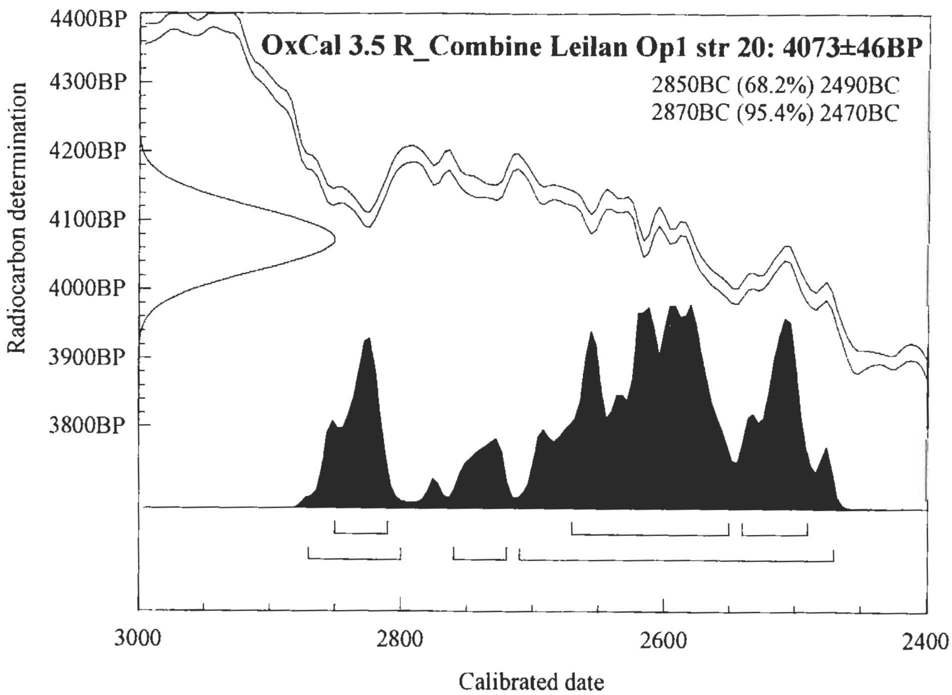
The Leilan IIId and IIa ceramic assemblages quantified here (Calderone and Weiss) were retrieved within the 44W12/X12 two hundred square meter expansion of Leilan Operation 1 in 1987 and 1989. Subsequent Leilan excavation exposed IIId settlement upon virgin soil in the Lower Town South, Operation 5 (Fig. 18) (Weiss 1990), at two test trenches in the Lower Town North at Operations 7 and 8 (Weiss et al. 1993) and at the SW lobe's Operation 6 (Fig. 19). Period IIIc occupation is not known outside of Acropolis Operation 1. Conservative estimates, therefore, would place the size of Leilan at ca. 15 hectares (the Acropolis) in period IIIc, and ca. 90 hectares in period IIId.



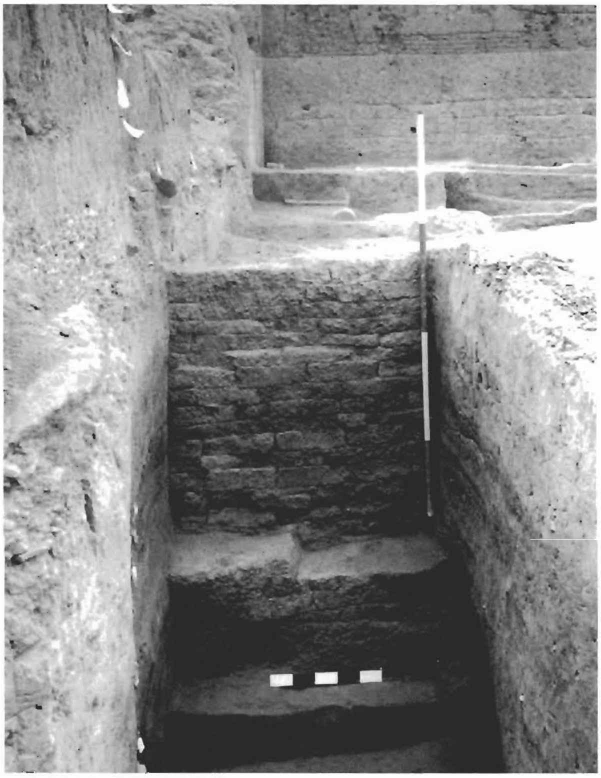
- Fig. 15: Oxcal 3.5 Calibration Tell Leilan IIa 44W13 storeroom weighted average.



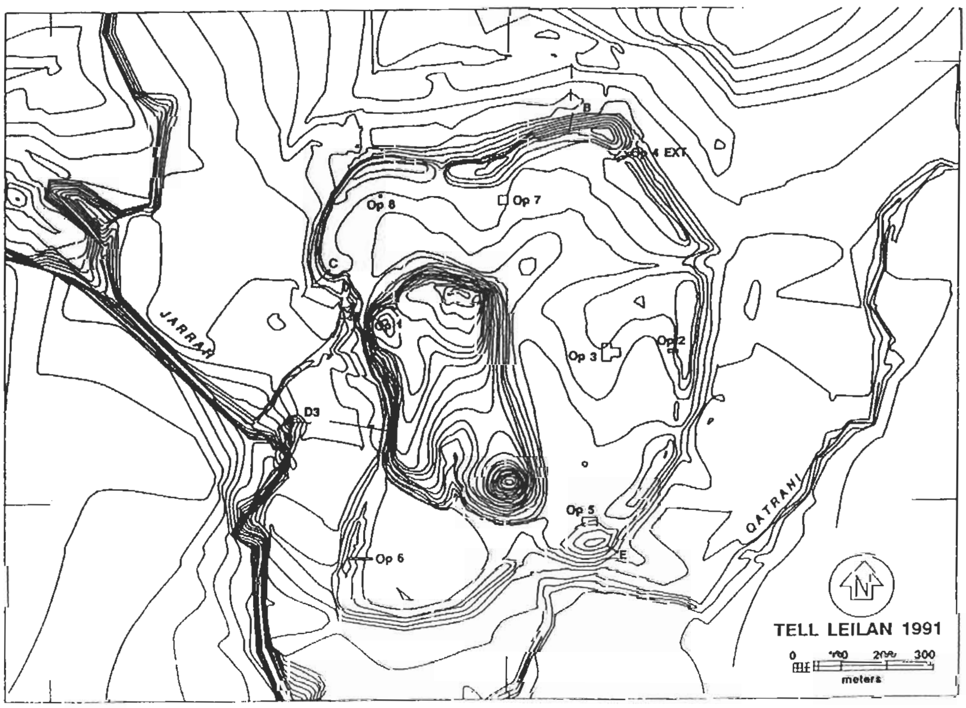
- Fig. 16: Oxcal 3.5 Calibration Tell Leilan Operation 1 stratum 20 samples.



- Fig. 17: Oxcal 3.5 Calibration Tell Leilan Operation 1 stratum 20 weighted average.



- Fig. 18: Tell Leilan 1987 Operation 5, Period IIId street wall and socle built upon virgin soil.



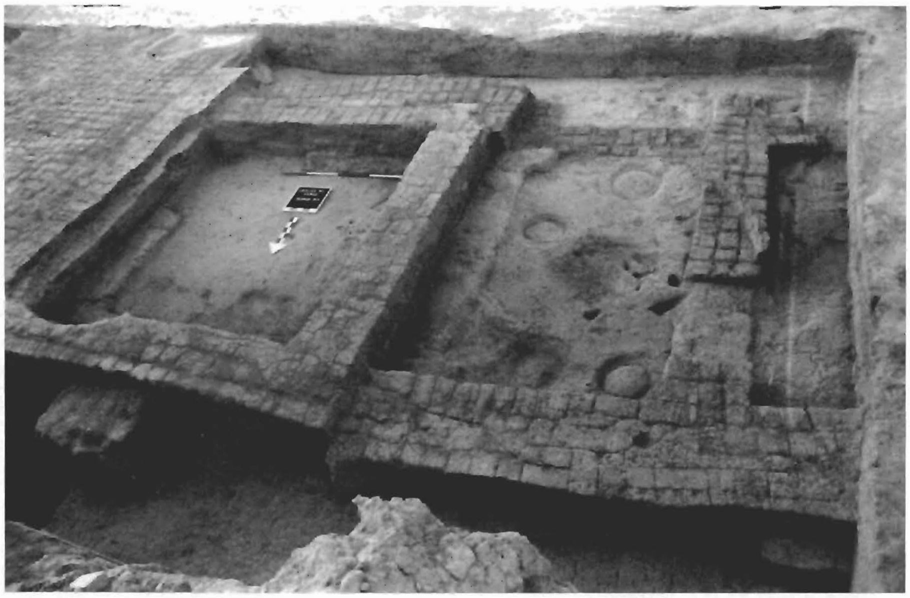
- Fig. 19: Tell Leilan topographic map. Period IIId (ca. 2600-2500 B.C.) excavations: Operations 1, 5, 6, 7, 8.

The expanded Operation 1 excavation, 44W12/X12, comprising 200 square meters, showed initial storeroom construction in stratum 18 (beginning of IIId), with successive rebuilds of the same storerooms and doorways through period IIa stratum 14 (Fig. 20). Horizontal exposure of the stratum 14 storerooms and doorways showed their construction adjacent to, and part of, a large brick platform (Figure 21) with central burnt plaster altar (Figs. 22, 23). The brick platform and adjacent storerooms were first constructed in stratum 18, at the beginning of Leilan IIId.

- Fig. 20: Tell Leilan 1989, 44W12, strata 18-14, Period IIId-IIa (ca. 2600-2300 B.C.).
Rebuildings of storerooms and doors.

- Fig. 21: Tell Leilan 1993, 44W13-15, stratum 15,14,13, Period IIa (ca. 2400-2300 B.C.).
Storerooms, brick cultic platform.

- Fig. 22: Tell Leilan 1993, 44W14, stratum 14, Period IIa (ca. 2400-2300 B.C.). Brick cultic platform, sacrificial altar.



- Fig. 23: Tell Leilan 1993, 44W13, stratum 14, Period IIa (ca. 2400-2300 B.C.). Storerooms adjacent to brick cultic platform.

The Leilan Survey

The IIId Acropolis excavation data are complemented by the preliminary analysis of Leilan Survey data (Figs. 24, 25).

	Preliminary Leilan survey data	
	Leilan IIIc	*Leilan IIId*
period length	200 years	100 years
number of sites	37	30
density (km^2)	1:45	1:56
total has. occupied	147	212

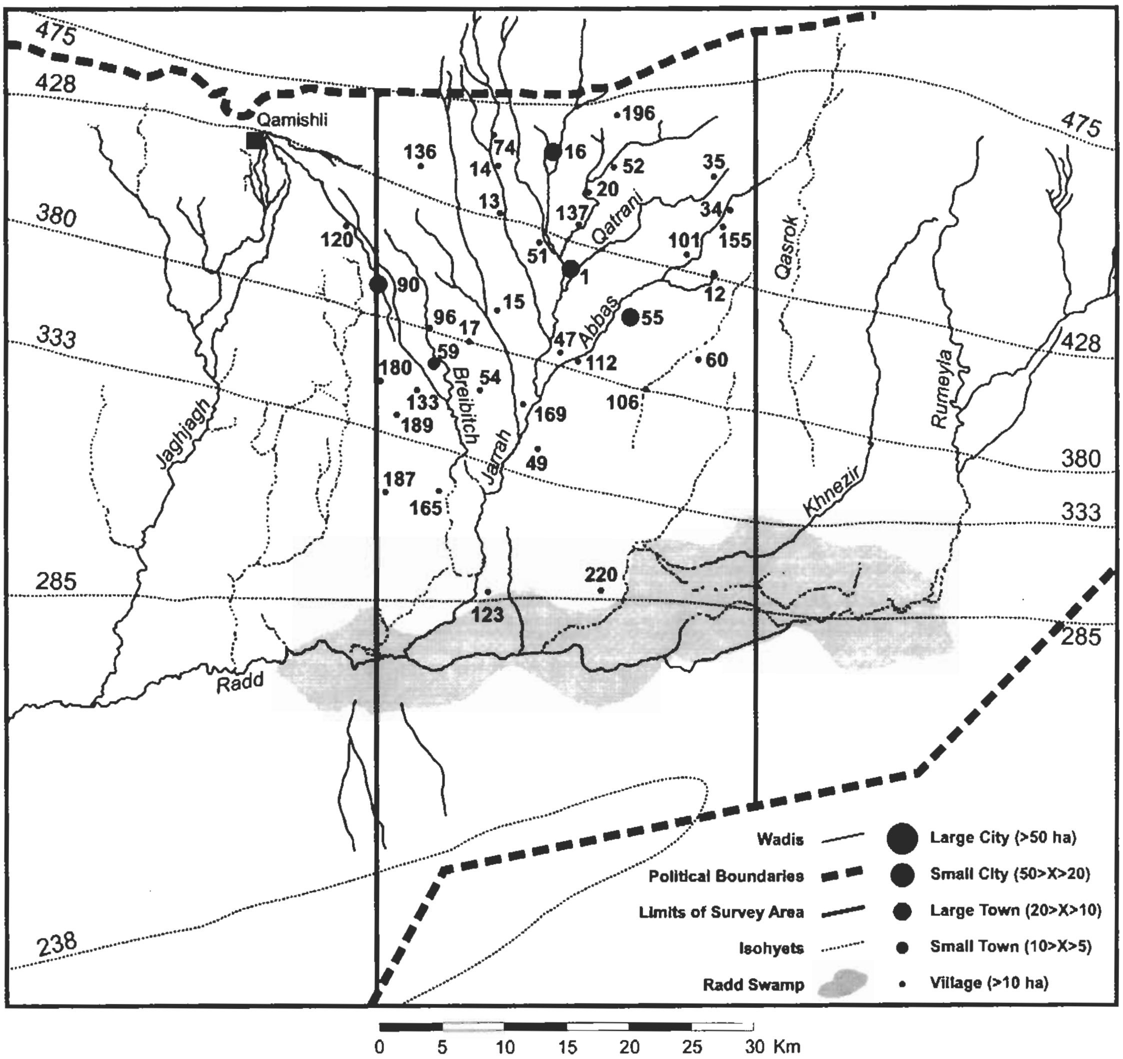
Within the Leilan Survey area, the Leilan IIId period experienced a ca. 40% increase in hectares occupied, of which four sites, Farfara (site no. 186), DoGir (site no. 16), Mohammed Diyab (site no. 63) and Leilan (site no. 1), comprised 69%, and of which one site, Leilan, comprised 42% of total settlement. This is in contrast with period IIIc when 43% of total settlement was comprised of three sites. The features of this urbanization and regional state formation process were, therefore, regional site frequency reduction, population concentration from three centers to one and a 40% increase of hectares occupied. Population densities within urban centers are likely lower than those of villages, hence the 40% increase in hectares occupied might represent a 20-30% increase in population. The magnitude and site-size distribution of this population increase suggests Leilan IIId period migration into the Leilan Survey region from adjacent drainages.

The Ninevite 5 research frontiers

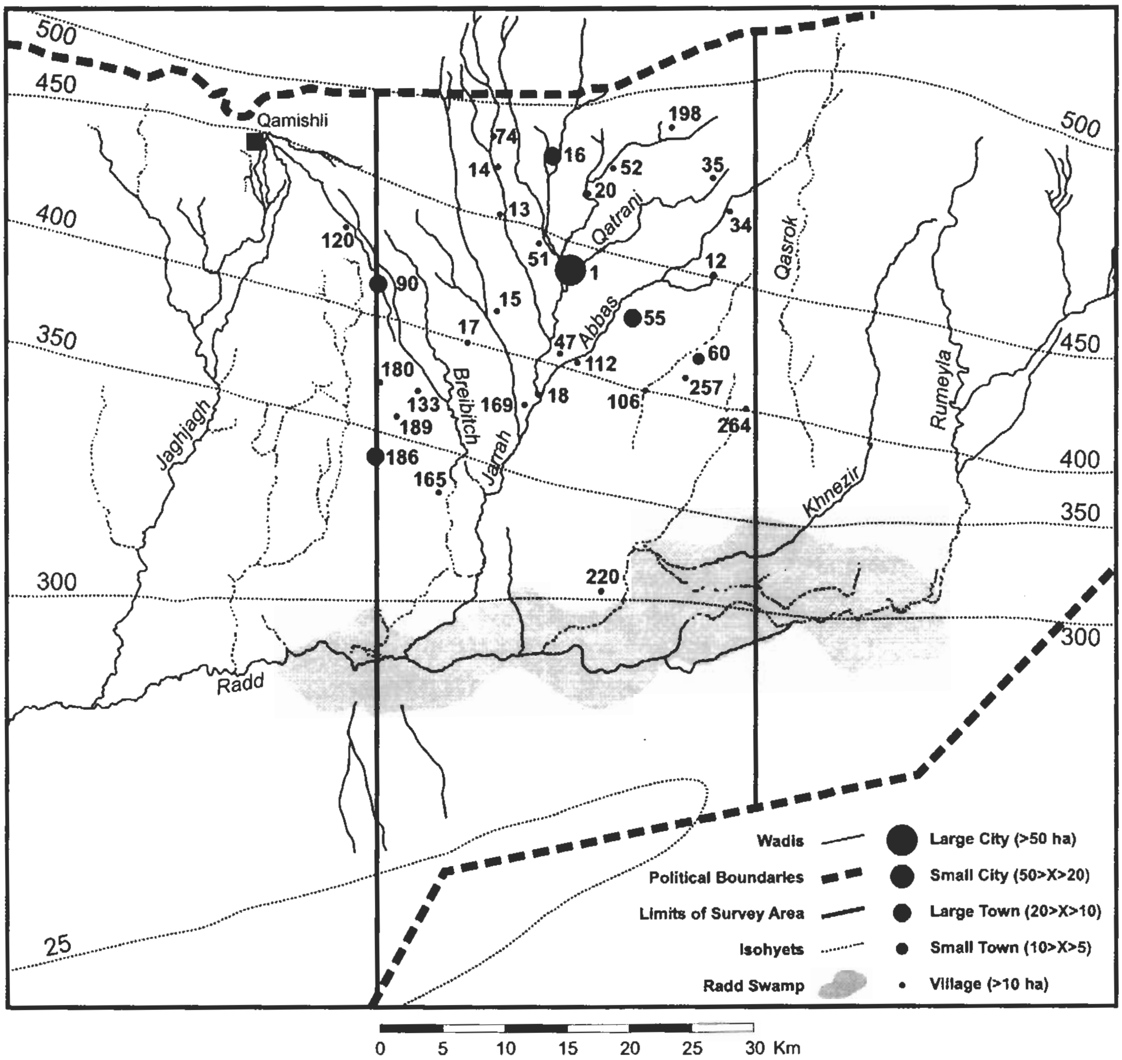
The Leilan IIIa period either followed the Late Uruk collapse, with architectural and stratigraphic continuity across Leilan Operation 1 stratum 40-39 (Mayo and Weiss, this volume), or followed still later (Rova, this volume, Ii, this volume), whenever "ED I" began (Wilson 1986). Intervening within these events is the 5.2 ka BP aridification event. Whether shorter or longer in duration, the Leilan IIIa period was sparsely populated on the Habur Plains. This period initiated the isolation of northern and southern Mesopotamia from each other that extended until 26th century urbanization and secondary state formation. The scales and locations of public-use architecture already indicate variations in site sizes and functions through this period at Mozan and Brak (Matthews 2001; Pfälzner 2001).

Leilan IIId settlement growth occurred in association with a range of urban features: planned Lower Town residential construction and drainage (Weiss 1990), state-controlled agriculture (van Gijn, this volume; Wetterstrom, this volume; Senior and Weiss 1992), construction of the Acropolis cultic platform and grain stores (Weiss et al. in press), and the new iconography of state power (Parayre, this volume) borrowed from southern e_2-gal and e_2-geme production systems (Visicato 1995). During this terminal Ninevite 5 period Brak, Mozan, Leilan, al-Hawa, Nineveh, Taya and other sites became a region-wide network controlling second-level towns and third-level villages. Thereafter, the pre-Akkadian relationships of Beydar (Lebeau (ed.) 1998; Sallaberger 1998) to Brak L, and DoGir and Mohammed Diyab (Lyonnet 1990; Stein and Wattenmaker, this volume) to Leilan IIa, suggest the scale of the urbanized agro-labor landscape that facilitated Akkadian imperialization in Brak M and Leilan IIb (Ristvet 1999).

Deeper understanding of these periods and processes will require considerable effort. Assuredly, however, Childe's provocative hypotheses and the recent research of dozens of archaeologists begin to define the Late Uruk collapse-early Ninevite 5 succession, the middle Ninevite 5 recovery and isolated regional growth, and the terminal Ninevite 5 state emergence. These are fundamental increments to our knowledge of formative Mesopotamia and have extended significantly its research frontiers.



- Fig. 24: Tell Leilan Survey Period IIIc (ca. 2700-2600 B.C.).
Precipitation isohyets estimated from Bar-Matthews et al. 1999.



- Fig. 25: Leilan Survey Period IIId (ca. 2600-2500 B.C.).
Precipitation isohyets estimated from Bar-Matthews et al. 1999.

Appendix 1. Ninevite 5 excavation samples

Periods: LU = Late Uruk, Trm = Terminal Uruk, Trns = Transitional, Int = Intermediate, Pt = early painted/early incised, Inc/Exc = incised/excised, IIId = Leilan IIId; ED= Early Dynastic; *Site size* = hectares; *Exc* m^2 = sample size; *Count* = ceramics quantified; ^{14}C = radiocarbon dates available; *Ref* = this volume, or Bibliography.

Site	*Occupation Periods*	*Site Size*	*Excv.* m^2	*count*	^{14}C	*Ref.*
Abu Dhahir	Pt	3	2			Ball/Wilkinson
Al-Hawa	Inc/Exc	42	6	x		Ball/Wilkinson
Atij	Inc/Exc, IIId	1	1000			Fortin et al. 1988
Brak	LU-Inc/Exc	43	500		x	Oates et al. 2001
ChagarBazar	Pt, Inc/Exc	5	300			Mallowan 1936
Fisna	Trns-Pt	3.6	500			Numoto 1989
Gir Matbakh	Trns-Pt	8	36	x		Ball/Wilkinson 1989
Ǧudeda	Inc/Exc, IIId	0.5	250			Fortin et al. 1988
Jigan	Pt	0.5	20			Ii
Karrana 3	Term, Trns, Int	0.5	575	x	x	Wilhelm and Zaccagnini 1993
Kutan	Pt	6	350			Bachelot
Leilan	LU,Pt-IIId	90	700	x	x	Calderone/Weiss
Moh. Arab	Term,Trns,Inc/Exc	1.2	245	x		Roaf 1983
Nineveh	LU-IIId	30	332			Thompson and Mallowan 1933
Raqai	Pt, Int/Exc, IIId	0.5	5000	x		Fortin/Schwartz
Rijim	Pt	1.8	10			Bielinski
Shelgiyya	LU, Pt, Inc/Exc	5	4			Watkins 1987
Siyana Ulya	Term, Inc/Exc	2	61			Ball 1987
Thalathat	Pt	1	550			Fukai et al. 1974
Thuwaij	Trm-IIId	1	200		x	Numoto 1989
Cf.:						
Arslantepe	LC	4	800	x	x	Frangipane 2001
Farukhabad	LU	2.7	10	x	x	Wright 1981
Godin	LU	15	715	x	x	Weiss/Young 1975
Hassek H.	LC 4-5	2.5	600		x	Behm-Blancke et al. 1981
Warka	LU	250	2000	x		Finkbeiner 1991
Khafajeh	ED	27	30000			Delougaz/Lloyd 1942

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