《論　　文》

Morphological, Anatomical and Statistical Analyses on The Four Ancient Mesopotamian Law Codes Including The Hammurabi Law Code:

—— Part V　Analysis on the fundamental data base of prehistoric Mesopotamian sites ——

Kenji KAMIDE

Contents

Ⅴ-1 Introduction

In the previous sections the four comprehensive analyses were carried out for the four ancient Mesopotamian laws on the following topics ;

Part Ⅰ Size, Contents, and Transfer[1].

Part Ⅱ Social Class and Development of Professions[2].

Part Ⅲ Legal Litigation, Penal Law Code, and Civil Law Code[3].

Part Ⅳ Written Contents and Commercial Laws[4].

We are familiar with some popular overviews on the prehistory of Mesopotamia. Unfortunately, in these overviews the historical evidences are often not indicated or, even at best, only few are shown.

In addition, some simple, but valuable facts discovered at a single and specific spot were occasionally considered to be applicable to deduce a general concept (i.e., erroneous generalization of a specific case). 'The general concept' thus formed was frequently proposed and naturally strong disputes appeared opposite to the above concept.

In Mesopotamian prehistory the most important sources of reliable information can be, almost exclusively, obtained from well-designed

extensive excavations of as many as possible sites.

The royal road, if any, to establish the prehistory of Mesopotamia is, to my opinion, to collect a wide range of various facts discovered in the numerous sites over in the whole Mesopotamian land.

In this paper (as Part Ⅴ of this research project), comprehensive analyses on the fundamental data base of the prehistoric Mesopotamian sites excavated extensively will be attempted. If we could analyze the tables on the fundamental data base, in very systematic manner, the table could be expected to generate new knowledge of extensive usability for far exceeding the original value found in the original writings (on excavation reports). In this paper an overview on the development of Mesopotamian prehistoric community starting from 'hunting and gathering' to 'rain-fed farming' and its dead rock met soon after is briefly described.

The recent advances made the well-known books on prehistoric Mesopotamia a little out-of-date. For example, H. Crawford described in her book 'Sumer and the Sumerians' (1991)[5] that " the assimilation of this new information ,… , means that textbooks need frequent up dating".
It is important to note that including her book, the excellent books published rather recently on the history of Mesopotamia, such as the books written by Van de Mieroop (2004)[6], and Maekawa (ed. by Ohnuki et al.)(1998)[7] do not describe any details (often even its name sometimes) of the site.

Now we know that the fundamental information for prehistory of Mesopotamia is collected thoroughly in an excellent landmark complication by Roger Matthews[8]. Unfortunately, we cannot find any table or figure in his book, which allows further analyses. This might mean that the book is just a preliminary huge data base and not beyond.

Concrete knowledge of prehistory (when, where, what, who, and why) of

the community and its economics is very important to understand how the community and its economics (food production system) of Mesopotamia, at the times of the Ur-Nammu (UN), Lipit-Ishtar (LI), Eshnunna (E) and Hammurabi (H). And this attempt will be greatly helpful, in its wide sense, to evaluate the contents of the above law codes (Part Ⅳ and further). Then, the chapter (V-4) in this paper may be regarded as 'Part 0' of the study. A short chapter of the economic outrage will be, in addition, illustrated for the cases of houses and ships.

Ⅴ-2 Methodology of the study

We employ as the primary materials the legible articles translated, literally from Sumerian or Akkadian to Japanese in the Iijima's works[9] for L Ⅰ [10],E[11], and H [12] law codes, and also in the articles of the Ur ~ Nammu law code, translated by Kobayashi [13]. In addition, if necessary, I referred the reference[14-16].

An attempt will be also made to construct the fundamental data base of the information, including (period, location, altitude, size, and other note on the typical sites, excavated before by many other researchers and commented by Matthews himself to the above sites in the book (cited references amount to 681 articles!). In addition, the data are added, if possible, from other literatures than Matthew's, to increase a value of the tables edited using only his book.

Ⅴ-3 Economical outrage : Houses and ships

Table Ⅴ-1 collects some examples of the tortious act in the cases of troubles encountered on house and ship, which were major real estates of the ordinary people in the old Babylonian period(see, also Table Ⅲ 19)[3]

TableV -1 Some examples of outrage act and its settlement for cases of houses and ships

Article No.	Outrage	Settlement
H232	Property damage to new house	Compensation of equivalent property
H233	Collapse of wall of new house	Reinforcement of the wall
H235	Sea disaster of new ship on the year of its first voyage operation	Reinforcement of the ship at ship-carpenter's expense
H236	Shipwreck or lost of ship by carelessness of boat's man	Compensation of ship
H237	Lost load due to boat man's carelessness	Boatman compensates equivalent load

Ⅴ-4 Analysis on the comprehensive fundamental data base of Mesopotamian prehistory sites

4.1 Ancient sites excavated in prehistory Mesopotamian

4.1.1 Zones of Mesopotamia

Table Ⅴ-2 shows the zones of Mesopotamia. The zone was determined by improving the original proposals by Crawford(1991)[17] and Matthews(2000)[18], who unfortunately did not draw clearly the boundary lines dividing two zones or more.

We can divide roughly the whole Mesopotamia (the Greater Mesopotamia) into the four zones, on the basis of climatology, and geography. The two main factors governing an ancient agriculture are,

undoubtedly, the altitude of land and rainfall. Note that both factors are not independent each other and the latter factor is a complicated function of geography.

Table V -2 Zones of Mesopotamia

Zone	Characteristics
1	the mountainous regions (land over 1500 m) (rain-fall of 400~1200 mm per year)
2	**the plains and foothills, the area of annual rain-fall of above modern 200 mm isohyet.** the northern and eastern plains and foothills ; 300~500 mm isohyet
2'	**the area of annual rain-fall of modern 200 ~300 mm isohyet.**
3	the desert
4	the lower plains and marches : **the area of annual rain-fall below modern 200 mm isohyet.** the flat alluvial plain between the Tigris and the Euphrates rivers (the southern Mesopotamia).

4.1.2 Fundamental data base

Tables V-3a~V3n summarize the information on the eighty- six sites excavated in the Mesopotamia.

Table V-3a Fundamental data base of Mesopotamian sites

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
1	**Shanidar level D**[19-26]	MPp 44,950 BC	Shanidar valley	765	cave 50 by 45 m	
2	**Hazar Merd**	MPp	8 km SW of sulaimaniya		six caves 11 by 12m	
3	**Shanidar level C**	EUPp 24,550BC	Shanidar valley			
4	**Shanidar level B2**	LUPp 24,550BC(top) 10,050BC(bottom)				
5	**Palegawra**	LUPp		990	small cave or rock shelter	
6	**Shanidar level B1**	Post Paldeolithic 8,650 BC				
7	**Zawi Chemi Shanidar**	EH	near to Shanidar valley	425	open site 250 by 270 m	
8	**Karim Shahir**[27-30]		250 km to SE of Shanidar Cave and Zawi Chemi Shanidar	850		◉ no evidence for animal domestication
9	**Gird Chai**	EH	175km to NW of Karim Shahir 75km to SW of Shanidar	300		

Table V-3b

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
10	**M'lefaat**	EH 8,300BC	25km SW of Gird Chai	290	125 by 75m	
11	**Tell Der Hall**	EH	left bank of the Tigris 40km north of Mosul	276		◉ main species; sheep, goat, deer, cattle, all wild
12	**Qermez Dere**	EH 8,000BC	50 km to SW of Tell Der Hall, located beside a deep wadi in an eastern foot hill extension of the Sinjar mountains	300		◉early settlement of the north Mesopotamian plain a time immediately preceding the full development of agriculture and animal husbandry. ◉ a community likely to be permanently settled over a period of centuries in a village format
13	**Nemrik**	EH 8,200~6,550 BC	1.5 km from the left bank of the Tigris	340	1.8ha	
14	**Çayönü**	EN 7,300 to 6,700 BC	SW Anatoria	832	low Oval mound <5m high 250 by 150m> 3ha	◉fully agricultural life with domestication of a wide range of plant and animal species

Table V-3c

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
15	**Jarmo**[31-36]	EN 6,750~6,500 BC (500 years)	in the ChemChemal valley in the central Zagros, close to Karim Shahir	800	1.3 ha 16 levels	◉building of some 60m^2 twenty to thirty houses, with a total population of 150 to 200, existed at any one time at Jarmo ◉gradual and gentle shift from wild to domestic species, (Lower level wild animal 49%→ upper level, wild animal 40%). ◉ plant evidence : wild and domesticated forms of einkorn and emmer wheat and barley
16	**Maghzalia**	EN 6,500 BC (500~700 years)	25km SW of Gird Chai		1~0.45	expansions of human settlement
17	**Gining**	EN	small mound situated on upper Jezria to NW of Maghzaliya		diameter of 800~100m, deposit depth 2.2m	◉ this lies at the junction of highland and plain zones. ◉house was constructed along the river bank. and were surrounded by a defensive wall. ◉ larger multi-roomed houses measuring up to 100m^2

Table 3d

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
18	**Bouqras**	EN 6,400~5,900BC (500 years)	right bank of Syrian Euphrates	205	2.75 ha 180buildings, 750 people or more	◉one of larger structure ; house with 132 m^2 ◉ long and short distance communications and interact- tions (trade)
19	**Riham Ⅲ**	EN	east-central Mesopotamia	107	4 ha	◉Rihan must have been perilously close to the very limits of dry-farming rainfall requirement
20	**Khuzetar**	EN by 6500 BC	Ali Kosh			◉permanent village ◉multi-roomed houses of rough bricks with clay floor over read mats ◉Domesticated sheep and goats ◉very large village
21	**Abu Hureyra**	EN 8,500 BC	on Syrian Euphrates	290	12ha	◉grown up to very large village (seventh millennium BC)
22	**Umm Dabaghiyah**	Hassuna 6,000-5,750 BC a few centuries from around 6,000BC	on very edges of the desert to the south, with rolling treeless plains reaching the Jebel Sinjar (some grown to NW)	200 (modern 200 mm isohyet)	100 by 85m (0.85ha)<4m mound 2.5m height at least 2ha	◉continuing importance of hunting and full range of farming practices ◉specialized seasonally occupied

Table V-3e

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
23	Sotto	Pre-Hassuna (from 6,000BC) and Hassuna				
24	Kül Tepe	Pre-Hassuna	north Mesopotamia Liya plain between Maghzak and Hassuna		60 by 80m (0.48 ha)	
25	Telul	eth-Thalathat Proto-Hassuna (levels XV-XVI) 5,850 BC	the northern edge of the north Mesopotamia plain, 40km to NE of Satto and Kül Tepe	360	100 by 60m (0.6ha)	◉Proto-Hassuna
26	Kashuka-shok Ⅱ	5,930-5,540 BC (level Ⅲ)	Ne Syria		3.92 by 3m	◉In the lowermost level 4 of mound Ⅱ, a bit house had been dug into virgin bedrock
27	Gird Ali-Agha	Proto-Hassuna	along the left bank of the Greater Zab	300m above sea level	80 by 100m	
28	Yarim Tepe Ⅰ	Hassuna 5,600 BC	easternmost of a group of six mounds located along the wadi Ibra			

Table V-3f

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
29	**Hassuna**	Hassuna 5,090 BC (level V)	35km to the south of Mosul	7m in height	2.5ha	◉levels Ⅶ-XV span the Halaf and Ubaid period ◉a large multi-roomed house centered on an open court yard ◉ from levels Ⅵ－Ⅵ the Hassuna and Samarra types are replaced by to Halaf style
30	**al-Khan**	Hassuna	on the west bank of Khazir river just to the south of earlier site of M'leffat and 40km NE of Hassuna			◉ late Hassuna material has been excavated
31	**Jigan**	Hassuna	central northern Mesopotamia			◉the Hassuna occupation in level Ⅵ
32	**Shimshara**	Samarra	on the Rania plain the right bank of the Lesser Zab	519	60(diamete) 19(high)	◉the Hassuna occupation in level Ⅵ rest directly on virgin soil
33	**Matarrah**	5,610BC	southern marsh of northern Mesopotamia	220		
34	**Tell es-Sawwan**	Samarra level Ⅰ:5,506BC levelⅢ:5,349BC -5292 BC	110km north of Bagdad	3.5m	230 by 110m (2.5ha)	◉existence of specialized craft workers ◉during the Samarra period the first experiment in irrigation agriculture had already came to fruit

Table V-3g

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
35	**Samarra**	Samarra	11km to the north of Tell se-Sawwan	on the left of the Tigris	65m	
36	**Tell an-N'aur**	Samarra	12 km north of Tikrit, lies on the left bank of the Tygris	6m high mound		
37	**Baghouz**	Samarra	275 km west of Samarra and Sawwan, on the left bank of the Euphrates	150	2m high 1 ha	◉ rectilinear multi-roomed buildings constructed of mud brick
38	**Songor A**	Samarra	275 km west of Samarra and Sawwan., on the left bank of the Euphrates	90	190 by 140m 3m high	
39	**Rihan** Ⅰ	Samarra	adjacent to the earlier site of Rihan Ⅲ			◉late Samarra type
40	**Chogo Mami**	final stage of Samarra	in the area of Mandali at the western edge of the Zagros foothills on the SE of Hamrin sites on the line of the modern 200m isohyet			

Table V-3h

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
41	**Arpachiyah**	Halaf 4,980, 5,077BC (middle phase)	6km NE of ancient Nineveh in the east of the Tigris river		7.5m of Halaf period deposit (diameter 120m)	
42	**Tepe Gawra**	Halaf	25km to NW of Arpachiyah			◉gradual transition of Halaf to Ubaid at this site
43	**Yarim Tepe Ⅱ**	Halaf 4,840,4,210BC			diameter 120m	
44	**Yarim Tepe Ⅲ**	Halaf remains in addition to Ubaid materials			diameter at least 200m, 11.5m high	◉upper 3.5m are Ubaide date ◉the lower 8m with hints of underlying Hassuna
45	**Nineveh**	Northern Iraq later Halaf and Halaf Ubaid Transitional				
46	**Azzo**	Halaf	SE of Mosul			
47	**Hajjiluk**	Halaf			250m in diameter 2-3m thick Halaf deposit	
48	**Kharabeh Shattani**	Halaf	3km from left bank of the Tigris to the NW of Mosul Saddam Dan rescue area		250 m^2 1m thick	

Table V-3i

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
49	**Khirbet Derak**	Halaf	small site only 4km to SE of Kharabeh Shattani on the left bank of Tigris (Sadam Dam rescue area)		2ha	
50	**Tell Der Hall**	Halaf	on the left bank of Tigris, 10km to NW of Khirbet Devak			◉substantial period of abandonment prior to the Halaf settlement
51	**Chagar Bazar**	Halaf 4,715 BC	50km to NW of Tell Brak		21m height 400 by 300m (12ha)	◉ the site lies within rolling country side in the Khabur riverwaters toward, the northern marches of Mesopotamian plain ◉tauf walling,mud brick
52	**Tell Aqab**	Halaf	6km south of the modern town of Amuda towards Syrian-Turkish border 24 km the north of Chagar Bazan		200 by 150m (3ha) height of 9.5m	◉virgin soil was reached at a depth of 2.3m below the modern plain surface
53	**Tell Halaf**	Halaf 5,620 BC	On the right bank of the Khabur river			

Table V-3j

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
54	**Karana 1**	Halaf	on the left bank of Tigris, 3km to NE of Tell Del Hall			
55	**Jikan**	Halaf				◉Halaf remains lay directly over soil
56	**Sabi Abyad level Ⅱ**	Prehalaf phase: 5,300BC Neolithic Halaf Transitional phase: 5,200-5,100BC Early Halaf phase :5,100-5,000BC	Four mound 2km NE of Hammam et-Turkman (Balkish valey)		largest mound 4.1ha	◉pre-Halaf Neolithic (level 11-7), Neolithic Halaf Transitiona(levels 6-4), Early Halaf (level 3-1)
57	**Damishliyya**		small mound 2km north of Hammam et-Turkman		70 by 60m (0.4ha) 5m high	
58	**Khirbet esh-Shenef**	4,800 BC	3km south of Sabi Abyad			
59	**Mounbateh**	Halaf	15km south of Hammam et-Turkman		15ha	◉Halaf, from Eraly with Samarra influences, to Ubaid Trasitional

Halaf sites are also known along the Upper Middle Euphrates

Table V-3k

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
60	**Shams et-Din Tannir**		on the left bank of the Euphrates 60km NW of the Tabqa Dam	301m above sea level	240 by 220m (3.3ha)	⊙the lowmost Halaf occupation was found on virgin soil
61	**Tell Rifa'at (western Syria)**	Halaf	in the Quoueiq valleys to the north of Alleppo, western most occuren-ce of genuine Halaf complex			
62	**Tell Kurdu**	Halaf	six mounds lie along the Afrin valley The site, a large mound lies 3km east of lake anticoh in the Hatay at 90m above sea level		large mound 450 by 380m (17ha) and 9m high	
63	**Arjoune**	Ubaid	further south on the Orontes from Hama			
64	**Ras Shamra (Syrian Mediter-ranean coast)**	level Ⅵ,approxima-tely 5,250-4,300BC	at the western limits of Halaf influence			

Table V-3l

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
65	**Ard Tlaili**	Halaf	in the Beka's valley of eastern Lebanor, between the head waters of the Orontes and Lotanni rivers.	3m high mound		⊙ And Tlails a strong Halaf element within a local west Syrian context
66	**Sakçe Gözü**	Halaf	at the junction of two streams 35km NW of modern Guziantep in southern Turkey. An extensive Halaf settle-ment		140 by 90m mound (1.3ha)	
67	**Domuz Tepe**		a short distance to the north, in the region south of Kahramanma-ras, lies at the head of an alluvial fan		a very large Halaf site (18ha)	
68	**Mersin**		**(eastern stretch of the Turbish Medit-erranean coast)**			

Table V-3m

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
69	**Turlu**	Halaf 4,400BC	45km east of Gazian tep 50km NW of Yunus and Jarablus in Syria			◉a large tell, 30m high, the mound: seven levels, all of Halaf Levels Ⅴ–Ⅵ; 4,480 BC
70	**Samsat**	Halaf	up stream along the Euphrates toward Advyaman			
71	**Kurban Höyük**	Halaf				
72	**Nevali Çori**	Halaf				
73	**Çavi Tareasi**		60km up stream from Kurban Höyük on the left bank of the Euohrates			◉ Animal bones are 98% domesticated
74	**Tülin Tepe (Anatolia)**	Halaf	in Kebanerea			
75	**Girikihaciyan**	4,515 BC 5,000 BC ┐ 4,855 BC ┘ (Halaf level)	45km NW of modern Diyarbaku		3m high with a diameter of 175m	

Table V-3n

	Site name	Period	Location	Altitude(m)	Size (ha)	Note
76	**Takayn Höyük**	Halaf	Cizre-Silopi plain		12ha , mount has diameter of 55m and rises 6m high	
77	**Tilkitepe**	Halaf 4,904 BC-4,359 BC	northernmost site of Anatolia		diameter 59m 6m high	
78	**Banahilk**	Halaf	in Diana plain to the north of Rowanduz	670m	160 by 100m (1.6ha)	
79	**Kudish Saghir**	Halaf	SW of Kirkuk			
80	**Bagum (eastern Iraq)**	Halaf	a high mound in Shahrizur valley		180 by 130m 23m high	◉of twenty levels, at least ten contained Halaf material
81	**Tell Hassan**	late Halaf and Ubaid Transitional occupation	Jabel Hamrin region of central eastern Iraq		70m in diameter only 2 m high	◉four main levels
82	**Songar B**	Halaf-Upaid	closer to the Diyala river, 10km west of Sa'adiyes		60 by 50m 2m high	◉level Ⅲ-V, Halaf level Ⅱ, Halaf Ubaid transitional .level, Ubaid
83	**Tell el-Queili**	pre-Ubide	southern Mesopotamia			◉pre-Ubide settlement
84	**Ganji**	Dereb	EH (8,450BC)	1350m	20ha	Iranian Zagros
85	**Asiab**		EH (8,450BC)	–	20ha	Iranian Zagros
86	**Mureybet**	EH	8,500-8,200BC	290	12ha	Syrian Euphrates

4.1.3 Periods and altitude of the sites

A. Period and sites

Table V-4 summarizes the period and site number, which belongs to the period.

TableV -4 Various periods in pre-history of Mesopotamia

Period	Site	Number
A Middle Palaeolithic period(MP) (100,000-40,000 BC)	(1),(2)	2
B Upper Palaeolithic period(UP) (40,000-10,000 BC)	(3)-(5)	3
C Early Holocene period (EH) (10,000-7,250 BC)	(6)-(13), (84),(85)	10
D Early Neolithic period (EN) (7,250-6,000 BC)	(14)-(21)	8
E Hassuna period (Hassuna) (6,000-5,000 BC)(5,750-5,250)	(22)-(31)	10
F Samarra period (Samarra) (6,000-5,000 BC)	(32)-(40)	9
G Halaf (Halaf) (5,200-4,500 BC)	(41)-(83)	43
		Total (85)

The sequence of pottery-defined prehistoric cultures in (model) Mesopotamia from 6,000BC are classified in the order*.

proto-Hassuna① → pre-Hassuna②→ (True) Hassuna③→ late Hassuna④→ Hassuna-Samarra transitional⑤→ pre- Samarra⑥ → (fully developed) Samarra⑦→ Late Samarra⑧→Samarra-Halaf Traditional⑨ → pre-Halaf⑩ →(Neolithic Halaf Traditional⑪ → Early Halaf ⑫ → Halaf ⑬→ post Halaf ⑫ → Halaf-Ubaid-Traditional⑮ → Ubaid ⑯

In this article the four periods mean the summation of the following sub-periods.

Hassuna period : ①,②,③,④,⑤ Samarra period : ⑤,⑥,⑦,⑧,⑨

Halaf period : ⑨,⑩,⑪,⑫,⑬,⑭,⑮ Ubaid : ⑯

Note that 'Traditional'(⑤ and ⑨) is accounted twice in the both cultures.

In the Halaf period the number of sites increased dramatically, indicating a rapid increase in population with wide spreading of the dry-farming technology. Not only the total number of sites, but also the gigantic site with area of 10-20ha emerged in the Halaf period. (see, Map 4 and table V-7c)

B. Altitude of the sites

Table V-5 summarizes the location, period , altitude (above sea level) of the sites.

TableV-5 The altitude of the sites

Zone	Site(period)	Altitude*(m)	Note
(Cave	▪Shanidar(A,B,C)	765	
Rock)	▪Hazan Merd (A)	-	
	▪Palegawra (B)	990	▪ Small cave or rock shelter
Open	▪Karimshahir (C)	850	▪ central Zagros
site	▪Çayönü (D)	832	▪Highland zone in SE Anatolia
and	▪Jarmo (D)	800	▪Chemchemde central Zagros
highland	▪Zarri (B)	760	▪
plain	▪Banahilk (G)	674	▪
	▪Shimshara (C-E)	519	▪4km to SW of Shanidar cave
	▪ Zawi Chemi Shanidar (C)	425	
Foothill		**around300**	
	▪Telul ethe-Thalathat (E)	360	▪edge of North Mesopotamia
	▪Nemrik (C)	340	▪northern of Mesopotamia, 1,5 km from the bank of Tigris
	▪Sabi Abyad (G)	320	▪northern Syria
	▪Shams ed-Din Tsnnira (G)	301	▪Upper-middle Euphrates
	▪Qermez Dere (C)	300	▪eastern foothill extension
	▪Gird Chai (C)	300	▪over looking in Greuter zah
	▪Gird AliAgha (D)	300	▪the margins of the Zagros foothill

* above sea level

TableV-5 (continued)

Zone	Site(period)	Altitude*(m)	Note
Lower		**around 200**	**-300**
plain Ⅰ	▪Abu Hureyira (C)	290	▪Syrian an Euphrates lowland zone
	▪M'lefaat (C)	290	▪western Zagros foothills
	▪Mulla Matar (G)	290	
	▪Ziyade (G)	290	▪ on the stretch of the Khabur
	▪Umm Qsteir (G)	290	to the south of the modern
	▪Mashnaqa (G)	290	town of Hassake
	▪Tell Del Hall (C)	270	▪on the left bank of Tigris
	▪Matarrah (E)	220	▪the most important site in EN
	▪Bouqras (D)	205	▪an area of qupsum outcrops
	▪Umm Dabaghiyah(E)	200	on the very edge of the desert
Lower		**around100**	
plain Ⅱ	▪Bouhouz (F)	150	
	▪Choga Mami (F)	135	▪the western edge of the Zagros foothiis
	▪RihanⅢ(D)	107	▪close to the Narun river
	▪Tell Kukurdu(G)	90	▪3km east of lake Antiosh
	▪Songor A (F)	90	
	▪Samarra (F)	65	▪11km to the north of Tell es-Sawwan
	▪Chagar Bazar	21	

* above sea level

Fig 1 shows the plots of the altitude of sites (in Table V- 5) against the period (see Table V-5). In the figure the number means the number of the sites summarized in Table V-3.

Average altitude of sites shown in Fig.1 is estimated to be 875m above sea level (vice versa) (sample number n=2) in the B period, 405m (n=8) in the C period, 410m (n=7) in the D period, 210m (n=2) in the E period, 110m (n=4) in F period, and 315m (n=9) in the G period, respectively. Number in Fig.1 is the number of the site in Table V-3a ~ Table V-3n. In spite of

comparatively small sample numbers (n= 2~9), the tendency of change in the altitude with time coincides with the discussions hitherto for presented. That is, as the time passed over an average altitude of the sites in the period became lower until the Halaf period. Here, an average altitude of the sites in the Halaf period is almost three times larger than that (110m) in the Samarra period. The Halaf farmer moved to the Zagros foothill (Banahilk (**78**)). Farmers at two spots moved to the higher places in the Euphrates up streams (Sabi Abyad (**56**) and Shams et-Din Tannir **(60**)). Two major sites in the Samarra period (Tell es-Sawwan (**34**) and Samarra (**35**)) are located at points some tens km south to the line of rainfall 200mm. Was the dry, rain-fed farming constantly possible at the above sites? If so, the modern 200mm line does not coincide with prehistoric 200mm line. This point will be discussed in more detail in **4.3.2.**

4.1.4 Scattering of sites in the Hassuna-Samurra, and the Halaf periods

(a) Major rivers in the Mesopotamia

Map 1 shows the large rivers in the Mesopotamia. Here, the shadowed area is the mountainous land over 1,500m. In the Map ③ - ⑤ are the branches of the Tigris and ⑥ and ⑦ are the branches of the Euphrates, respectively.

(b). The Paleolithic, Early Holocene, and Early Neolithic periods

Map 2 shows the geographical distribution of the sites in the Paleolithic, Early Holocene, and Early Neolithic periods. Number in the map means the site number as collected in the Table V-3. Note that the site numbers in the Map are not the all listed in the table.

(C). The Hassuna-Samarra and the Halaf periods

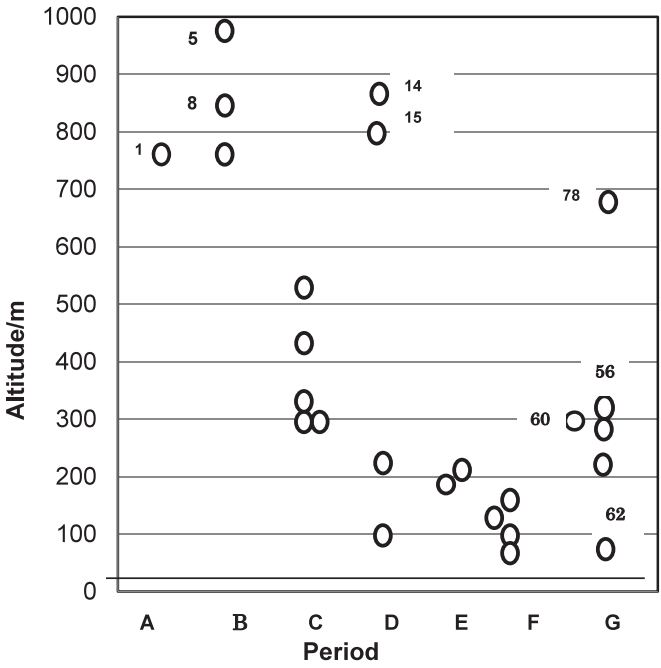
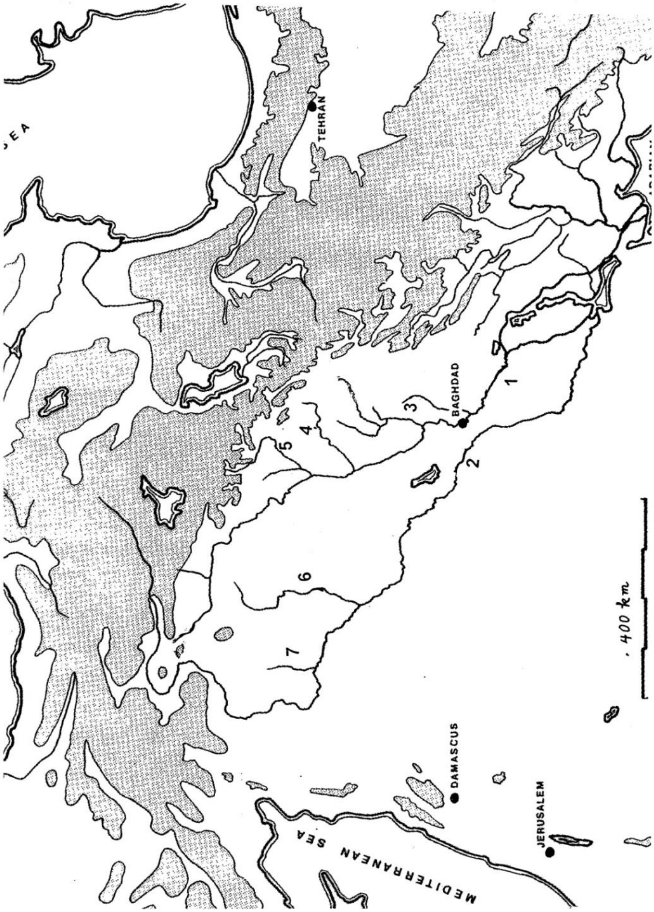


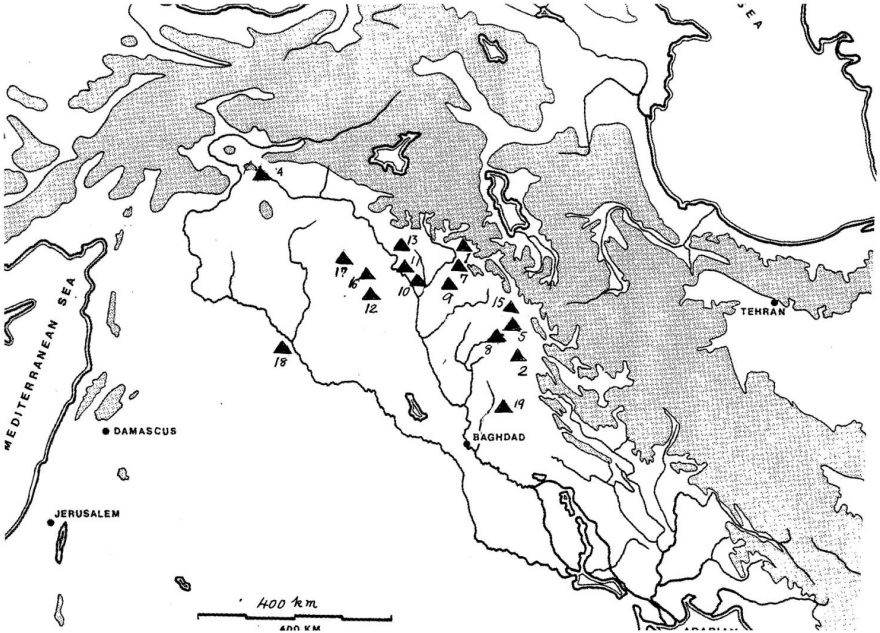
Fig.1 Plots of altitude of the site against its period
(number in the figure is that in Table V-3)

Maps 3 and 4 show the geographical distribution of the sites in the Hassuna-Samurra, and Halaf periods, respectively. In the Maps, giant sites (Table V-7b), new sites (Table V-13). sites located on the bank of the rivers (Table V-6), and the sites on the rain fall of 200mm isohyet (Table V-14) and the modern 200mm isohyet line are shown as dotted line for comparison. The site no.34 (Tell es-Sawwan), and no.37(Songar A) are significantly out side of the modern 200mm isohyet line (i.e. roughly speaking, limiting arable line for dry-farming (see also , Table V-14). Oda showed isohyet line of river of various rainfall values in the whole Mesopotamia area. The figure four in Oda's chapter[64] seems very helpful to understand of the rainfall in Mesopotamia.

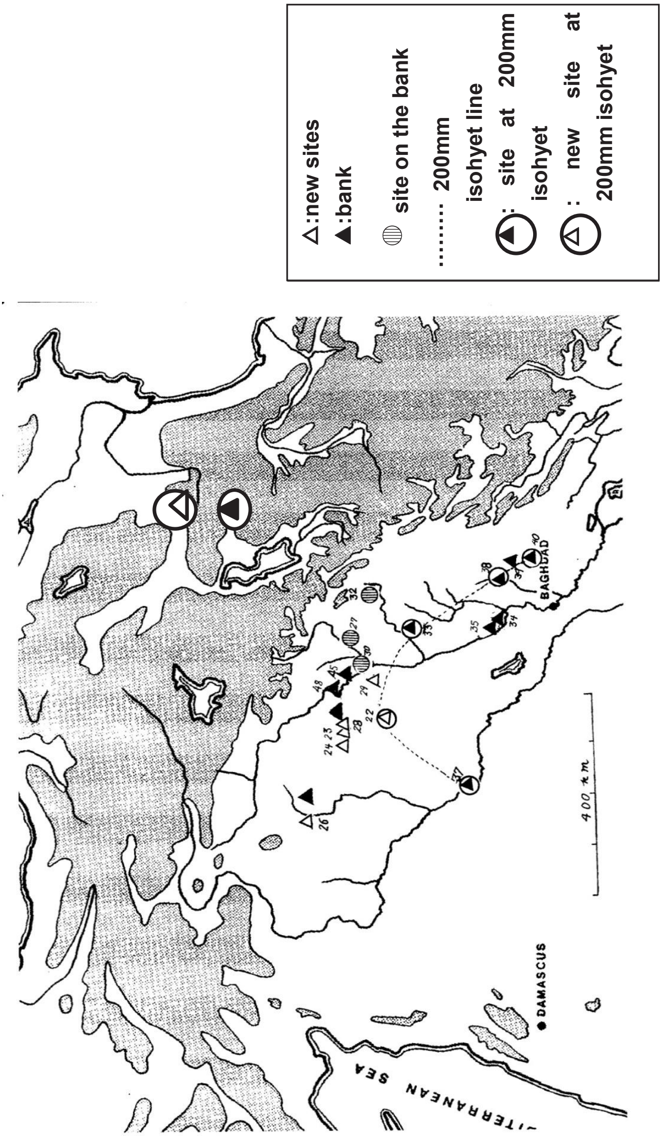
1. Tigris
2. Euphrates
3. Diyala
4. Lesser Zab
5. Greater Zab
6. Kubur
7. Bali



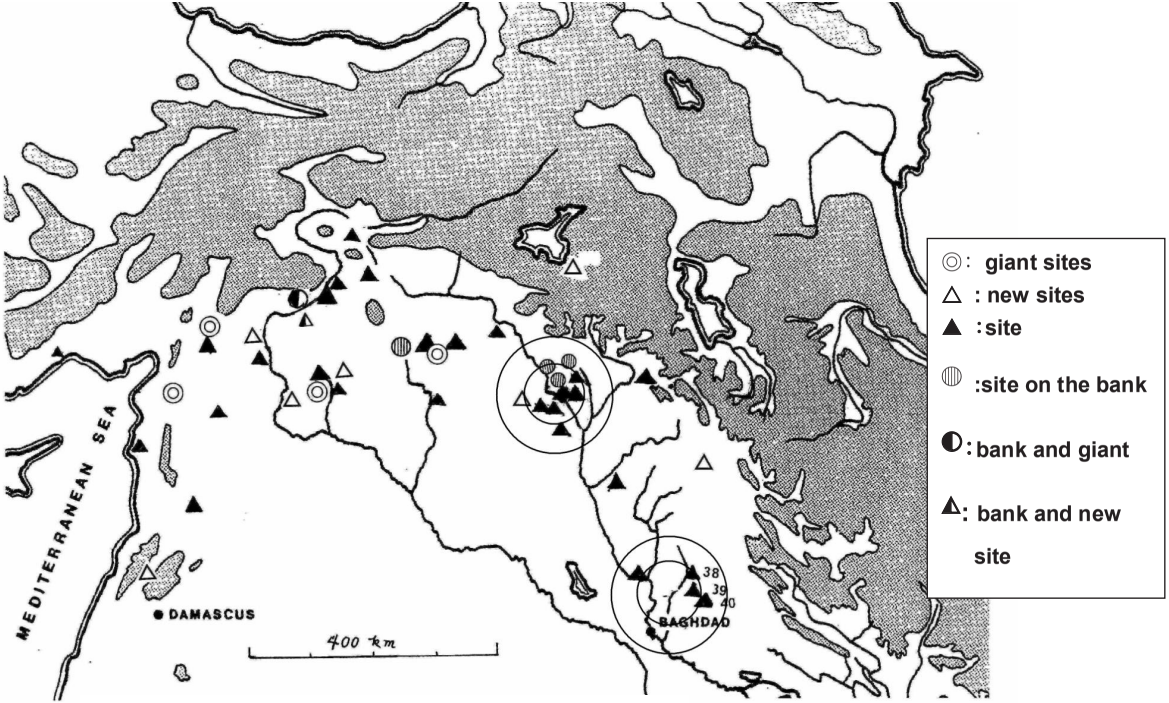
Map 1. Mesopotamian large river



Map 2　Geographical distribution of the sites in Paleolithic period (1~5), Early Holocene(7~13), and Early Neolithic period (14~19)



Map 3 Geographical distribution of the sites in the Hassuna-Samarra Period



Map 4 Geographical distribution of Halaf sites

Hassuna period

The true Hassuna period emerged after pre-and proto Hassuna. The Hassuna culture prevailed (even if comparatively short term). Over the almost whole area of the Mesopotamian area, except the southern low plains, the Hassuna sites were found at that time. Thereafter the eastern part of northern Mesopotamia converted to the Samarra culture. The distinctive separation between the above two areas (Hassuna and Samarra) are practically impossible. Then, usually the term 'Hassuna –Samarra' period is used , if necessary, hereafter. Anyway , the Hassuna culture is older than the Samarra and only Hassuna → Samarra occurred and reverse (Samarra→Hassuna) never happened.

(d). Halaf period

During the Halaf period the number of site increased dramatically , suggesting a rapid increase in population, with wide spreading of the dry-farming agriculture to the west (see also, Table V-13).

Not only the total number of sites, but also the gigantic sites with area of 10-20ha emerged in the Halaf period (see, Map 4 and Table V-7c).

The Halaf period is briefly summarized as follows :

(1) The Halaf sites had already reached to the river side of the Diyala valley in the Hassuna period (see Maps 2 and 3) and the sites continued for the whole Halaf period and since then.

(2) A part of the (eastern) Halaf zone is in the southern central Mesopotamia.

(3) The Halaf sites spread far-reaching from the eastern to the western (see Map 4).

(4) The several sites are nearly located on the banks of the Euphrates (see Table V-6).

(5) Of course, the ex- Hassuna –Samarra region had been converted very continuously and gradually to the Halaf territory (see Maps 3 and 4).

(6) Some sites were built on the Euphrates bank, together with the Tigris. This

suggests the shortage of surplus, in the area of the Tigris and its branches (i.e., central part of the northern Mesopotamia), suitable for traditional dry-farming (Table V-6).

(7) The western border of the ex- Hassuna region extended to the westmost Mesopotamia.

(8)Note that the Euphrates basin was still a not fully developed land until this time.

(9) At the later Halaf period there was , no more, sufficient room for development and the economy of Mesopotamia met a serious difficulty, which seemed not to be easily overcome.

(10) In the Halaf period several gigantic sites were born (see Table V-9d). Needless to say, in the growth process a large number of small sites were absorbed to a larger site and then, another giant site was formed in similar way at some distance. When the site grows its size, based on the mechanism[37], the grown-up size of the sites are approximately the same, which may be the functions of social (security) and natural (rain-fall) factors[37].

(11) In the Halaf period construction of the fence surrounding the houses was made. This indicates seriousness of the secutity problem, which induced accelaration of series of amalgamation of small hamlets with a bigger site, resulting in a gigantic one.

4.1.5 Location of sites

(a) Movement of sites from mountains (via highland plain) to low plains

In extremely wide spun the sites moved from the mountains → highland plain → foothill → lower plain (Fig. V-1) in turn. Dwelling locations rapidly spread during the period (Table V-4), over highland plain, foothill and lower plain. In the Halaf period the sites spread, far beyond the ex- Hassuna- Samarra area, to the westmost area.

(b) Sites which are located on the bank of the rivers

Table V-6 collects the sites on the banks of the rivers.

In the Hassuna –Samarra and the Halaf periods (the E-G periods in the table V-4) the sites were formed on the bank of rivers . In the earlier Hassuna –Samarra period (the E period), some sites were built on the banks of the Greater Zab, the Kahazir river , and the Khabur river (all, the branches of the major rivers) (see map 1). In the Samarra period the Tigris was exclusively utilized (Map 3). In the Halaf period the banks of the Euphrates , as well as the Tigris, were equally employed (Table V-6). This fact may be closely correlated with an expansion of the farming area.

The function of river, at that times, is to supply of water to (1) daily life (as drinking water, face and body washing, and leaning), and (2) simple or proto- irrigation (industrial use). During the Early Holocene period, two sites, which are lying on the bank of the Tigris or the Khazir, were found. In this period the dry-farming was just at the stage of embryo. Then, water demand for irrigation , even though very primitive, is hardly supposed. There were left a large amount of uncultivated arable land and it was not necessary for ex-gatherer (first farmer) to invent any cultivation farming. Two sites in early Holecene period located on the river bank were assumed to be driven by some demand of water for daily life. In the Samarra period the dry forming agriculture spread throughout the Hassuna- Samarra area. After the pre-Hassuna period new demand for water by farmer became more earrest , resulting in expansion of cultivation land with simple or pre-irrigation technology when sufficient water is supplied. Three sites for irrigation, formed in the Samarra period, grew to eleven sites in the Halaf period. If we employ as a parameter, the ratio of (number of sites on the bank)/(total number of sites at a period) we obtain 10 % in the pre-Hassuna, 33 % in the Samarra period, and 35% in the Halaf, respectively. Rapidly growing importance of simple irrigation farming is well recognized in the Hassuna–Samarra period. More detailed historical path, leading to

the cultivation farming agriculture, will be found in Part Ⅵ[38].

Crawford stated, citing Adams estimation, that sites larger than 10 ha lie often quite close together on she major water underlining importance of access to water for irrigation[39]. And she stated that " there is a new cluster of medium sizes settlement all apparently lying on the same waterway, either on old Euphrates channel or a large channel[40]". And also, Crawford described that (in the early Ubaid period) (certainly from the Uruk period onwards) the availability of irrigation was the decision factor in the location of sites[41].

Now, some strong connection of irrigation technology is observed between the Halaf sites and those in the Ubaid period.

Table V-6 The sites located on the banks of the rivers

Period	Tigris	Euphrates	Others
Early Holocene (8,300BC)	Tell Dell Hall (**11**) (270m)		M'lefaat (**10**) (290m) *1
Σ=2	**1**	**0**	**1**
Hassuna	(Hassuna (**29**) *5)		Gird Ali → Agha (**27**) *1 al-Khan (**30**) *2 Shimshara (**32**) *3 (proto-Hassuna) (**27**)
Σ=5	**(1)**	**0**	**4**
Samarra	Tell es Sawwan (**34**) Samarra (**35**) Tell an-Na'ur (**36**)		
Σ=3	**3**	**0**	**0**
Halaf	Kharabeh Shattani (**48**) Khirbet Derak (**49**) Tell Der Hall (**50**) Korana 1 (**54**) Khirbey Hatara (**–**) Jigan (**31**)	Shamsed-Din Tenntra(**60**) Samsat (**70**) KurbanHöyük (**71**) Çavi Tarlasi (**73**)	Tell Halaf (**53**) *4
Σ=11	**6**	**4**	**1**
ΣΣ=21	**Σ=11**	**Σ=4**	**Σ=6**

***1 :** the Khazir ***2 :** the Khzir river
***3 :** the lesser Zab river ***4 :** the Khbur river
***5 :** not far from the right bank of the Tigris, but not just on the right bank of the Tigris

4.1.6 Size of the sites

(a) Size frequency

Table V-7a shows the frequency of the site's size. The size of site varies from less than 1ha to 18ha. In particular there are approximately three categories ; small (<2ha), middle (2-5ha), and large(15-20ha). The gigantic sites were emerged in the Halaf period, except Ganzi Dareh, Asiab, and Abu Hüreya **(21)**, all of which were formed in the EH (early Holocone) periods.

Table V-7a Size of frequency of the sites

Size (ha)	Number of site	Frequency(%)
<1	10	24
1-2	5	12
2-5	19	45
5-10	1	2
10-15	1	2
15-20	6	14
	Σ=42	(100%)

1 ha = 10,000m^2

(b) Heterogeneous scattering of the sites

TableV-7b shows the number of sites located within an circle of 50km radius and within an another circle of 100km radius, both shown in Map 3 of the Hassuna-color area and the Samarra–color area in the Hassuna-Samarra period and the Halaf period, respectively. Interestingly, the number of sites located in the inner circle (50km radius) of the Hassuna-color area is 10 and the number of sites located in the outer circle (100km radius) is 12. These numbers did not change during the Hassuna-Samarra period and the Halaf period. There are only two sites , located between the inner and outer circles for the Hassuna-color area and in addition , there is no site for the Samarra –color area. This suggests that the sites are not homogeneously spread, but are strongly concentrated to the central area of Hassuna and Samarra, respectively. The density of sites is 12.7/10^4 site/km^2 for the inner and 3.8/10^4 site/km^2 for the outer circle in the Hassuna-color area during the Hassuna-Samarra period. The corresponding values in the Halaf period are 6.4/10^4 sites/km^2 in the Hassuna-color area and 1.6/10^4 sites/km^2 in the Samarra-color area. It is now clear that numerous sites are more densely located in the central area of the Hassuna culture and of the Sammara culture and the existence of mutual long distance communication between sites are not certificated.

The comparison of the data between Hassuna-Samarra period and the Halaf period reveals that the traditional area formed during the Hassuna-Samarra reriod is not significantly influenced by emergence of a new culture (the Halaf). Majority of the Halaf cites are newly formed outside the preceding culture.

Table V-7b Centralization of the site

Area(radius) of circle)	Hassuna-Samarra period		Halaf period	
	Hassuna color area	Samarra color area	Hassuna color area	Samarra color area
(a) radius <50km	10	5	10	5
(b)radius <100km	12	5	12	5
(c) 50<r<100km	2	0	2	0

(a) inner circle in Map 4

(b) outer circle in Map 4

(c) Giant sites

Table V-7c collects the giant sites. Five giant sites, which are larger than 12ha in size, are found in the Halaf period. This suggests strongly the progress of the village functions.

Table V-7c Giant sites

No.	Site	Period	Size(ha)
1.	Ganji Dareh (-)	EH (8,450BC)	(≪20)
2.	Asiab (-)	EH	(≪20)
3.	Domuz Tepe (67)	Halaf	18
4.	Tel Kurdu (62)	Halaf	17
5.	Mounbateh (54)	Halaf	15
6.	Samsat (70)	Halaf	15
7.	Abu Hŭreya (21)	EH(8,500BC)	12
8.	Chagar Bazar (51)	Halaf	12

The mounds of site may be considered as the residential and public areas. Around the mound there were probably existed farmland, pasture, hunting ground, and

forest for fuel (fine wood).

The practically dominated area by the site is supposed much larger than the site's mound itself, as invisible border. The distance between the two neighboring sites were determined, considering the above-mentioned factors and natural environment.

(d) Long life sites where people lived long years

Table V-7d illustrates the long life sites where people lived without discontinuity.

Table V-7d Long life sites where people lived long years

No. Site	Period	Lifespan(years)	Altitude(m)
1.Shanidar (1),(3),(4),(6)			765
2. Nemrik (13)	8,200-6,550BC	1,650	340
3. Mureybet (86)	8,500-7,500BC	1,000	
4. Cayönü (14)	7,300-6,700BC	600	832
5. Jarmo (15)	6,750-6,500BC	300-500	800
6. Maghzaliya (16)	center, 6,500BC	500-700	–
7. Kashkashok Ⅱ (26)	5,930-5,540BC	390	–
8. Shinshara (32)	(levels13-9, 5,350-8,080BC)	2730	519
9. Tell es-Sawwan (34)	(level Ⅰ,5,506BC; level Ⅲ, 5,119-5,020BC)	~500	
10. Abu Hureya (21)[42]	9,500-8,200BC[42]	1,300[42]	290[43]

Now it is clear that people lived at some sites for some hundred years ~ one thousand or more long years and the Halaf sites are comparatively short lived.

4.1.7 Evolutions of Houses

(a) House materials

Table V-8a~Table V-8c show a brief history of the housing materials during around

9,000 ~ 4,900BC.

(b) Houses

Table V-9a~Table 9c show a brief history of the houses built in the Mesopotamia during around 9,000~4,900BC.

Table V-8a Evolution of Materials 1

Period	Site	Materials			
		Wall	Floor	Roof	Others
1. 8,920BC	Zawi ChemShanidar	stone slub			entrance
2. 8,000BC	Qarmez Dere				
3. 8000 to 6,550BC	Nemrik	tauf block (covered with play plaster)	sub.		sleeping platform
4. about 8,500BC	Abu Hureyra				
5. 8,500-8,200BC	Mureybet **I A-B**				
6. 8,200-7,500BC	Mureybet **phase II**		clay		
7. 8,000-7,500BC	Mureybet **phase III**				
8. 7,300-6,700BC	Çayönü **level II** **level III** **level VI** **level V**	long curving wall wooden and plaster high stone walls mud brick upper walls	 terrazzo floor air space under floor		 grill stroge of grain
9. 6,750-6,500BC	Jarmo				

Table V-8b Evolution of Materials 2

Period	Site	Materials			
		Wall	**Floor**	**Roof**	**Others**
10. Early Neolithic	Zawi ChemShanidar	gypsum plaster gypsum plaster	stone slabs	bitumen with reed mat	tower entrance
11. 6,400-5,900BC	Bouqras			timber	
12. Early Neolithic	Rihan Ⅲ				
13. later half of eighth millennium	Ganj Dareh				
14. by 6,500BC	Ali Kosh	later floor over reed mat			
15. proto-Hassuna	Umm Dabaghiyah level Ⅲ	common painted wall plaster		access through roof	**heating system**
16. from 6,000BC					
17. Early Hassuna	Kill tepe level 1				
18. 5,90BC	Hassuna	20-50cm thick wet tauf block			
19. 5,350 to 8,080BC (levels 13-9)	Shimshara	mud bricks rather than tauf levels 14-15, stones			

Table V-8c Evolution of Materials 3

Period	Site	Materials			
		Wall	Floor	Roof	Others
20. 5,506 BC (Level 1) 5,119-5,030BC (levelⅢ)	Tell es-Sawwan				
21. Samarra	Baghouz	mud brick			
22. late Samarra	Songor A				
23. 4,896BC	Choga Mami	brick			

All house materials are (locally-made) products. Basically, the above materials are made of soil weeds. Plaster is often used. The Mesopotamian house were made of mud brick painted white at that time.

Table V-9a Evolution of houses 1

Period	Site	House (size, room, shape, functions)
1. 8,920BC	Zawi ChemShanidar	circular
2. 8,000BC	Qarmez Dere	▪semi-substérannean sub-circular house 20-24m^2 ▪permanebt settlement over a period of centuries in a village format
3. 8000 to 6,550BC	Nemrik	▪>5m diameter ▪tauf blocks covered with oval
4. about 8,500BC	Abu Hureyra	▪ 1-8m diameter sun dried cigar shaped bricks ▪semi-permanent structurer
5. 8,500-8,200BC	Mureybet **Ⅰ A-B**	▪round semi-stérannean huts of clay with exterior wooden support
6. 8,200-7,500BC	Mureybet **phase Ⅱ**	▪round house
7. 8,000-7,500BC	Mureybet **phase Ⅲ**	▪rectangular building
8. 7,300-6,700BC	Çayönü **level Ⅱ** **level Ⅲ** **level Ⅵ** **level V**	▪**solid stone foundation** ▪5 by 12m **air circular system** under the floor ▪cell plan stone foundation ▪rectangular structure , 5 by 8m, 2-9 cell-like rooms(for storage)
9. 6,750-6,500BC	Jarmo	▪tauf (pressed lumps of clay or mud) ▪**60m^2** ▪rectilinear, ▪several rooms

Table V-9b Evolution of houses 2

Period	Site	House (size, room, shape, functions)
10. Early Neolithic	Zawi ChemShanidar	▪a line of houses constructed along the river bank surrounded by a **defensive wall** ▪small rectilinear houses ▪longer multi-rooms (8-10rooms)houses, up to **100m^2** ▪area of some 1500m^2
11. 6,400-5,900BC	Bouqras	▪house 12 ; **132m^2** in area
12. Early Neolithic	Rihan Ⅲ	▪round, oval or sub-rectangular ▪3-4 diameter
13. later half of eighth millennium	Ganj Dareh	▪fully fledged village
14. by 6,500BC	Ali Kosh	▪rough brick
15. proto-Hassuna	Umm Dabaghiyah **level Ⅱ** **level Ⅲ**	level Ⅱ:store blocks and domestic houses level Ⅲ: ▪a central corridor between two rows of rooms: over **100 rooms** ▪no doors into individual rooms ▪domestic houses; small, 4-5 small rooms
16. from 6,000BC		level 1; semi-subterranean dwellings. Rectangular-one-roomed houses level 2; <4-5 houses
17. Early Hassuna	Kill tepe level 1	▪a single rectangular dwelling house (14m^2)
18. 5,90BC	Hassuna	▪ level Ⅰb, a single room ; level Ⅰc, multi-roomed rectilinear buildings, level Ⅲ−V_f, more regular and planned attitude; level Ⅲ, a large multi-roomed house centered on an open courtyard

Table V-9c Evolution of houses 3

Period	Site	House (size, room, shape, functions)
19. 5,350 to 8,080BC (levels 13-9)	Shimshara	
20. 5,506 BC (Level 1) 5,119-5,030BC (levelⅢ)	Tell es-Sawwan	▪a large scale settlement of rectangular buildings ▪a complex of religious buildings or shrines with associated infant necropolis ▪Each structure consists of eleven or twelve rooms
21. Samarra	Baghouz	▪rectilinear multi-roomed buildings
22. late Samarra	Songor A	▪fifteen or eighteen rooms in five or six rows of three (buildings)
23. 4,896BC	Choga Mami	▪The house has twelve rooms in the three rows of four ; one with nine rooms in three rows by three ; the others with eight rooms in two rows of four

1. Houses evaluated from the hut , built by digging its pillar into soil or rock, to the house built on the ground stone.⑧.
2. Shape of the house changed in the following ; circular **(1)** or round house → rectilinear house.
3. Room-number ; from single room to multi-roomed house (~ 100 room !).
4. Size of house ; 20m^2 (**(2)** 8,000BC Qarmez Dere) → 60m^2 (**(9)** 6,500BC Jarmo) →130m^2 (**(11)** 6,400-5,900BC Bouqras).
5. House (Çayönü) was equipped with air circular system (for storage of food) and the heating system (for room in winter)

Table V-9d illustrates examples of the giant houses.

Table V-9d Giant houses

Site	Specification
1. Umm Dabaghiyah (22)	large storage blocks containing over 100rooms (ca. 6,000-5,750 BC)
2. Bouqras (18)	House 12 with 132m^2 in oven (6,400-5,900BC)
3. Yamrin-Tepe Ⅰ (28)	level 6 upwards (ca.6,000-5,700BC) ; twelve large domestic buildings, with new rooms added and gypsum plastered. Passages roofed over
4. Hassura (29)	levels Ⅶ -ⅩⅤ (5,090 ∓ 200BC) level Ⅲ; a large multi-roomed house centered on an open court yard
5. Matarrah (33)	operation Ⅵ levels 9-3 ; multi-roomed houses of tauf, operation Ⅸ, level ; T-shaped buildings
6. Tell es-Sawwan (34)	(5,506 ~5,030 BC), levels $Ⅲ_A$, about a dozen buildings are contained in the wall of $Ⅲ_A$. All T-shaped each structure consists of 11~12 rooms.

4.1.8 Number of the peoples living in the sites

Table V-10 shows the number of peoples living in the sites.

Table V-10 The number of peoples living in the sites

Site	Period	Size (ha)	Houses	Population
1. Jarmo (15)	EN*[1] (6,750-6,500BC)	1.3	20-30	150-200
2. Maghzaliya (16)	EN (6,500 BC)	1-0.45	8-10	100-150
3. Bouqras (18)	EN (6,000 BC)	2.75	180	<750
4. Sotto (23)	EN (6,000 BC)	2	>4-5	20-30
5. Sawwan (34)	Samarra	2.5	–	200 or more
Choga Mami (40)		3.5	–	at any one time
6. Chogo Mami (40)		(6)[44]	–	(1,000)[44]
7. Abu Hureya (21)	9,500-8,200BC[45]	12*[46]	–	300-400[45]

*1 Early Neolithic period (Table V-4)

4.2 Domestication of plants and animals.

4.2.1 Domestication

(a) Plants

Without domestication of the wild plants, such as wheat and barley, the farming of the plants, (i.e., agriculture) could not be realized. The wild wheat and barley were harvested by tapping the stem with hands and gathering the basket as they fall off or by uprooting the plant[47]

A more or less ripe ear in the process of shattering and there by shedding the spikelets. The ear ripens from the top down ward[48]. Ripe spikelets disarticulating, and falling to ground as the ripening rachis breaks into its constituent segments. A domesticated ear shatters only when threshed[48]. Ripe spikelets remain in ear. The

ear shatters only when threshed and ear became dense to shorter rachis segments.

Domestication of wheat and barley occurred expectedly by mutation.

Emergence of domesticated cereals enabled farming on a large scale in place of gathering . The chromosome uniformity of domesticated plants has suggested that the domestication of any particular plant species occurred only once at one location in the Near East, rather than many times in many locations.

Careful watching or observation of the wild cereals and quick application of newly born domestic species (emmer wheat, einkorn wheat, barley, and naked barley) opened the road leading to farming food production.

According to Fagan[48], computer simulations showed that the full domestication of wheat and barley will be accomplished within 20 to 30 generations.

(b) Animals

Domestication of animals started from sheep (Ovis arise hollow-horned ruminate). First wild species, Urial next Argali, and last, Mouflon were domesticated, in succession. The chromosome study revealed that Mouflon is an ancestor of the present-day domestic sheep[49].

Identification of ancestor of the present domesticated sheep was target of researchers and finally, Mouflon was certificated as the ancestor. Domestication occurred during 6,000- 5,000BC (see Table V-11). In this case, domestication was accompanied with change of short rigid hair into doubly-coated (bold, short, rigid outer hair and long, soft, wooly under coat)[50]. Domesticated sheeps supply wools for clothings, blanket, upholstery, and flow covering. Domesticated sheep is moderate size easy control and has high adaptability to environment .

4.2.2 Domestication of animals and plants in Mesopotamia

Table V-11 collects the development of domestication of animals and plants in some typical sites.

Table V-11 **Domestication of animal and plants**

Site	Period	Animals							Plants			
		sheep	goat	cow	pig	bear	deer	gazelle	cereal	wheat	barley	lentil
1.Karim Shahir (8)	Upper Paleolithic	×	×	×	×	no evidence						
2.Nemrik (13)	8,200 – 6,500BC	△	△	△		indicated						
3.Asiab (–)	7,805± 85 BC		○							×	×	
4.Abu Hureyra (21)	8,200 - 8,000BC	×	×				×					
5.PPNA		×	×	×	×					×	×	
6.Çayönü (14)	7,300–6,700BC	△	△									
7.Jarmo (15)	6,700–6,500BC			×	△				**eikorn**△	**emmer**△	△**(barley)**	
8.Maghzaliya (16)	6,500BC	△	△	×					△			
9.Ali Kosh (–)	by 6,500BC	○	○	×								
10.Bouqras (18)	6,400–5,900BC											
11.Abu Hureyra(21)	PPNB	△	△	△			△		△	△	△**(hulled)**	
12.Beidha (–)	PPNB	(probably| ○							wild form cultivated ○		○	○
13.Çayönü (14) Jarmo (15)	by 6,500BC	○	○		○							
14.Umm dabaghiyah (22)	6,000-5,750BC	○	○	○	○				◎	◎	◎	
15. Yamrim Tepe Ⅰ (28)	5,600BC	○	○	○	○**Predominant**				○	○	○	**pea**○ ○

×: not domesticated, △: partially domesticated, ○: domesticated, ◎:fully domesticated

From Table V-11 it is obvious that

(1) Sheep and goat were domesticated almost concurrently.
(2) Until PPNA (Pre-Pottery Neolithic A period) no attempt of domestication of animals was made.
(3) Partial domestication of sheep had been carried out at Nemrik, Çayönü, and Maghzalia, during 8,200-6,500BC.
(4) At Ali Kosh domestication of sheep and goat (but, not cow) was succeeded by 6,500BC.
(5) Domestication of lamb had been carried out up to 6,500BC.
(6) Complete domestication of sheep and goat had been made at Ali Kosh by 6,500BC.
(7) Cow (cattle) had been domesticated, at later than sheep and goat.
(8) First domestication was carried out at Abu Hureyra.
(9) At Çayönü domestication of cow (cattle) had been realized by 6,500BC.
(10) The year of 6,500BC is a rough measure for popularization of domestication of sheep, goat and cow.
(11) The domesticated animals are, except dog, herbivorous animals and not carnivorous animals
(12) Note that there were huge steppes, where weeds, which were herbivorous favorite foods, but not for human beings, grew thick.

Table V-12 collects the general view on the location the period and the descended for domesticated animals.

Table V-12 Domestication of animal

Animal	Location	Period	Descended
Sheep	Zawi Chem Shanidar(**7**)	about 9,000 BC	ovis ammon
Goat	roughly the same area as sheep	about same period as sheep	Capna hircus aegragrus
Pig	Çayönü(**14**)	about 7,000BC	sus serofa
Cattle	southern Europe	around 6,500BC	Bos primigenius

Table V-12 was made up by the arranging Matthew's essay[51].

4.3 Limit of dry-farming system

4.3.1 Expansion of dry-farming area

Table V-13 collects newly settled sites in the Hassuna-Samarra and the Halaf periods.

Table V-13 Newly settled sites in the Hassuna–Samarra and the Halaf periods

Newly settled site
Ⅰ Hassuna period (ca,6,000-5,000BC)
1. Umm Dabaghiyah(**22**)(6,000BC)
2. Sotto (**23**)(from 6,000 BC)
3. Kiil Tepe (**24**)(from 6,000BC)
4. Kashashok Ⅱ (**26**) (level 3) (5,930- 5,540 BC)
5. Yarin Tepe 1 (**28**)(round 5,600BC)
6. Hassuna (**29**)(level 4) (5,090 BC)
7. Jigan (**31**)
Ⅱ Halaf period (5,200-4,500 BC)
8. Abu Dhahig (**-**)
9. Sabi Abyad(**56**)(the pre-Halaf phase, 5,300 BC ; Early Halaf phase, 5,100-5,000 BC)
10. Ard Tlaili (**65**) (4,890BC)
11. Turlu (**69**) (4,480BC)
12. Yarim-Tepe Ⅱ (**43**)(4,210BC)
13. Shams ed-Din Tannir (**60**)
14. Kurban Höyük (**71**)(Halaf-Ubaid)
15. Baqum (**80**)
16. Tell Aqab (**52**)(Halaf)
17. Tell Tlaili (**–**)(Halaf-Ubaid)

Some evidences indicating that the site is ‘newly settled site’ (new site) are exemplified as follows :

(1) Umm Dabaghiya[52], Abu Dhahir[53]; Jian[54] ;

“--- rests directly on (scan) virgin soil ”.

(2) Sotto[55],

"--- Was dug into virgin soil ".

(3) Kiil Tepe[56],

"--- as constructed directly onto bedrock".

(4) Kashkashok Ⅱ [57];

"--- ug into virgin bed rock".

(5) Hassuna[58];

"--- dug into soil under the mound lies at the same level at the modern plain".

(6) Turlu[59], Ruban Höyük[60], Tilkitepe[61];

"--- was found on (or up on) virgin soil".

4.3.2 Limit of dry-farming rain-fed agriculture

Table V-14 collects the site lying on the rain limit of modern 200 mm isohyet.

Table V-14 Rainfall limit (modern 200mm isohyet) for rain-fed agriculture

Site	Period	Altitude(m)	Size(ha)
1. Bouqras (18)	**6,400-5,900BC**	**205**	**2.75**
2. Rihan Ⅲ(39)	**Early Neolithic**	**107**	**–**
3. Umm Dabaghiyah(22)	**Proto-Hassuna**	**200**	**0.85**
4. Matarrah (33)	**Hassuna(5,610BC)**	**220**	**–**
5. Chago Mami (40)	**4,896BC (Choga Mami transitional phase)**	**135**	**3.5**

*: (m) above sea level

**:modern 200mm isohyet

The modern 200mm isohyet is often regarded as a kind of the cultivation requisite, which allows the sustainable agriculture of wheat and barley. The absolute isohyet magnitude of the requisite was often discussed before, for example, by Van de Mieroop[62], Crawford[63], Oda[64], Maekawa[65], and Kishimoto[66].

In Map 3, the sites with rainfall of 200mm are shown. A smoothed dotted line (border line) can be drawn through all the sites. Oda[64] showed the isohyet, corresponding to various rainfalls, which are very useful when drawn similar isohyet lines on the Map 3.

The first farmers moved down from the mountain valleys to the Hassuna area and started dry-farming. They further moved to the south of 'supposed fertile and arable land' with some larger rainfall. When the land had a rainfall below the limit, resulting in little or no harvest, they abandoned the barley cultivated land, returning back again to the north, where they could have some harvest. Shortage of the arable land there was still not dissolved and the difficulty of their living was not principally resolved. Then, they had to repeat the trial of cultivation at the south. This kind of attempt is supposed to be repeated some tens or some hundred times. They might not have recognized the physical existence of the rainfall limit. But as a result, they succeeded to settle down on the border (and it's northern area). This border sites was shown on the modern 200mm isohyet. Until now, adequacy of the modern 200mm isohyet had been discussed.

The critical value, above which the sustainability of dry-farming is guaranteed, is roughly estimated to be 200 mm or 400 mm[62], 150 mm per annum[65], 300-500mm (at the growth period of cereals)[64], and 140 mm (in the areas of the riversides of the Tigris and Euphrates)[66]. Note that any grounds for the estimation are not indicated in the literature.

Here all discussions are based on the assumptions, the equation

Modern 200mm rainfall = Prehistorical 200mm rainfall (1)

was assumed a priori to be valid at least for about 8,000 year span. This seems extremely unrealistic premise. Note that the dotted line in Map 3 is drawn on the unignorable historical ground and the next to the best is to measure the average rainfall isohyet on the line.

4.3.3 Attempt of utilization of river-water for cultivation

(a) Transformation of the rain-fed agriculture to the dry-rain-fed agriculture

Positive utilization of the river-water from large rivers for improvement of the dry-farming agriculture was attempted during the Hasunna-Samarra, and the Halaf periods (see, table V-6).

As demonstrated in **4.1.5 (b),** several sites are located on the bank of the rivers. In this article dry –forming is defined as agriculture in which water is not artificially supplied to dry land. 'Rain-fed farming' is the agriculture, in which rainfall is sufficient to support. Agriculture started first by learning the natural cycle of sprouting (in spring), growth, and fruition (in autumn) of plants. Therefore, sowing will be carried out in spring (spring sowing), and harvested in autumn.

Agriculture started in Early Neolithic (7,250-6,000BC) (the D stage in Table V-4) at highland plain (av.410m) and then, people moved down to foot hill, and finally to lower plain in northern Mesopotamia, which was temperate, winter-rain climate. Rain fall was 300~500mm enough to cultivate cereal by rain-fall alone. That is 'rain-fed agriculture' (and not 'dry farming').

Note that in Mesopotamia rainfall varies greatly depending on the seasons ; small rainfall in summer and large rainfall in winter. This variation becomes more remarkable in the case of low (200-300mm) and in this case summer draught became fatal which does not allow farmer to cultivate the plant. So, only winter is season of cultivation. After moving to low plain (Hassuna) the farmer overcame this fatal problem by changing sowing season (from spring to autumn). Thus, autumn sowing-spring harvesting became normal pattern of the cultivation.

Farming could not be continued without pause. Soil of the mountains is not deposit of alluvial, and then not extremely fertile. Fallow system (once a year or two years) was introduced.

In order to compensate a shortage of water in the form of rainfall supplying the

farm simple or proto irrigation was tried at the sites lying on the bank of the rivers(Table V-6). This procedure had presumably been developed to the true irrigation level at the southern Mesopotamia (see Part Ⅵ).

Now, it is evident that irrigation was first tested in the Hassuna-Samarra period. The urgent demand for the practical usage of irrigation technology was more serious (earnest) in particular, for examples, at Tell es-Sawwan (19) and Samarra (21) than other sites. 'Dry farming ' was practically used in the first agriculture (spring sowing + autumn harvesting), but the highland farmer was forced to abandon the above procedure and, invented an alternative method(irrigation method), compatible to the sever environment (scanty rainfall in hot summer and winter rain). Wide inhabited arable land was comparatively easily found in the Hassuna-Samarra area (see Map 3). Detailed discussion of the irrigation system will be made at Part Ⅵ of this study. The role, played by the Halaf farmers, is not very clarified. Repeatedly, Samarra or Halaf farmers supposed to be the direct ancestor of Sumer farmers.

On the first evidence of irrigation there are some essays[67-74].

(b) The first site, Tell el'Oueili, immigrated by the Samarra or Halaf farmers

Map 5 illustrates Tell el'Oueili[75-77], together with some typical and well-known Sumerian cities emerged later. The map shows that the first site is just located in the middle of the Sumerian and Babylonian cities, lying on an alluvium plain in the southern Mesopotamia. For examples, the distance from Tell el'Oueili to the following cities are estimated roughly as : 4km (Larsa), 17km (Ubaid), 20km (Ur), 24km (Eridu), and 62km (Nippur), respectively.

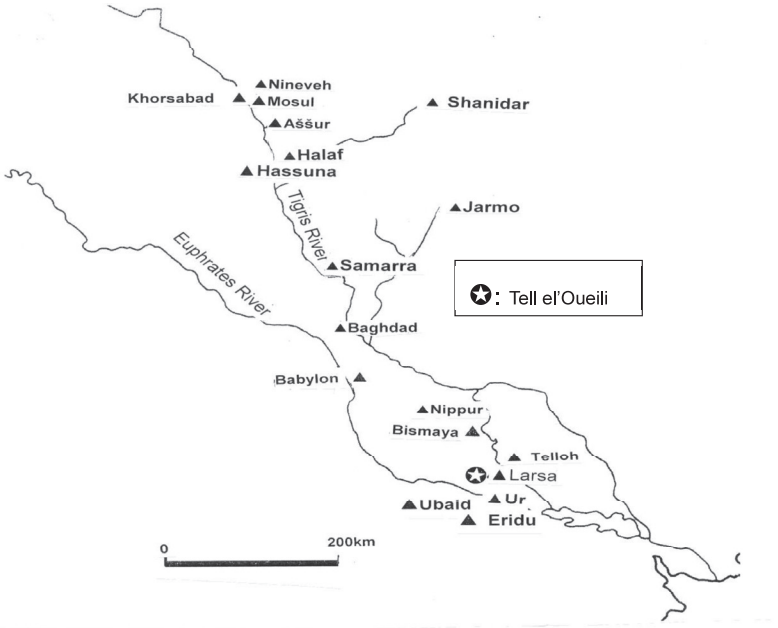
Tell el'Oueili, Ubaid O levels showed the similarity of buildings with Samarra and of pottery with Samarra (Choga Mami, Baghouz) and with true Hassuna, all indicating that Tell el'Oueili had strong cultural relations to Samarra. Then,

Tell el'Oueili, can be regarded as the first (for now) Samarra's settlement.

In addition to the cultural similarity, we will not be surprised to know that the first immigrants to the southern Mesopotamian alluvium fan were probably Samarra people, on the following ground ;

(1) They had the most serious dissatisfaction to the status quo at that time. Fateful shortage of rainfall, in particular, in summer and as a result, shortage of foods for living. Experimental attempt of simple irrigation seemed not to be very successful and of course, 'pray for rain ' was ended in good –for nothing.

(2) The river traffic between the above two sites can be considered to be rather convenient for some hundreds km sail at down stream of the Tigris and Euphrates in late summer season when the stream (water level) is the lowest. The Tigris and Euphrates flowing on the extremely flat alluvium plains in the southern Mesopotamia, had less water fall (Euphrates) and rapid stream (Tigris).



Map 5 The first settlement (Tell el'Oueili) in the southern Mesopotamia transferred in the late Halaf period from the Halaf area

Table V-15 shows summary of the prehistory Mesopotamia agriculture.

Table V-15 Summary of prehistoric Mesopotamia agriculture

Zone (Table V-2)	Space of arable land	New colony	Fertile-ness	Rain-fall	Dry-farming	Irrigation	Communi-cation	Flood	Period	Population
1	○*1	△	△	◎*8	○*12	–*17	△	×*23		~10
2	○→*2 ○	○*5	○→*7 ○	○*9	○*13→△*14	×→○*18	○*21	○*24	Hassuna Samarra Halaf	~10^2 ↓ < 10^3
2'				○	◎	○*18				
3	×*3		×	×*10	×*15	×*19	△	×*23		
4	◎*4	◎*6		×*11	×*16	◎*20	◎*22	◎*25	late Half→Ubide	

*1. very small
*2. development
*3. nothing
*4. huge(if irrigated)
*5.new site
*6. southern area
*7. manuring
*8. ~500m
*9. ~200m
*10. zero rainfall
*11. 50~150mm
*12. possible
*13. possible
*14. summer draught
*15. impossible
*16. impossible
*17. not necessary
*18. simple irrigation
*19. impossible
*20. very important
*21. village
*22. co-operation for irrigation
*23. no-occurrence
*24. moderate flood
*25. disaster

V-5. Conclusion

An attempt was made to construct the fundamental data base of the information, including (period, location, altitude, size, and other note on the typical sites, excavated before by many other researchers

(1). In the Maps, giant sites (Table V-7b), new sites (Table V-13). sites located on the bank of the rivers (Table V-6), and the sites on the rainfall of 200mm isohyet (Table V-14) and the modern 200mm isohyet line (dotted line) are shown for comparison.

(2) The sites had already reached to the riverside of the Diyala valley in the Hassuna period and the sites continued for the whole Halaf period and since then.

(3) The Halaf sites spread far-reaching from the eastern to the western (see Map4).

(4) The several sites are nearly located on the banks of the Euphrates (see Table V-6).

(5) Of course, the ex- Hassuna –Samarra region was converted very continuously and gradually to the Halaf territory.

(6) The Euphrates basin was still a not-fully developed land until this time.

(7) At the later Halaf period there was , no more, sufficient room for development and the economy of Mesopotamia met a critical difficulty, which seemed not to be easily overcome.

(8) In the grown process a large number of small sites were absorbed into larger site and then, emerging another giant site.

(9) In an extremely wide spun the sites moved from the mountains → highland plain→ foothill → low plain (Fig. V-1).

(10) In the Halaf period the sites spread, far beyond the ex- Hassuna- Samarra area, to the westmost area.

(11) In the Halaf period the banks of the Euphrates , as well as the Tigris, were

equally employed (Table V-6).

(12) The size of site varies from less than 1ha to 18ha.

(13) The gigantic sites emerged in the Halaf period, except Ganzi Dareh, Asiab, and Abu Hüreya (21), all of which were formed in the EH (Early Holocone) periods.

(14) Five giant sites with space larger than 12ha are found in the Halaf period.

(15) Now it is clear that people lived at some sites for some hundred years ~ one thousand or more long years.

(16) All house materials are locally-made products. Basically, the above materials are made of soil, and weeds. Plaster is often used to paint the wall. The Mesopotamian houses were made of mud brick painted white at that time.

(17) Houses evaluated from the hut, built by digging its pillar into soil or rock, to the house built on the ground stone..

(18) Shape of the house changed in the following ; circular or round house → rectilinear house.

(19) Room-number ; from single room to multi-roomed house (~ 100 room !).

(20) House (Çayönü) was equipped with air circular system (for storage of food) and the heating system (for room in winter).

(21) Domestication of wheat and barley occurred, as expectedly by mutation. Emergence of domesticated cereals enabled farming on a large scale in place of gathering .

(22) Careful watching or observation of the wild cereals and quick application of newly born domestic species opened the road leading to farming food production.

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