

**INFECTIOUS DISEASE IN THE SUMERIAN AND INDUS VALLEY
CIVILISATIONS AND 18th DYNASTY EGYPT -
AN ALTERNATIVE MEDICAL HISTORY PERSPECTIVE OF
ANCIENT HISTORY**

BY

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A thesis submitted in fulfilment of the requirements for the degree of

MASTER OF PHILOSOPHY (Med)

Department of Infectious Diseases and Microbiology

School of Medicine

Western Sydney University

2021

DEDICATION

This thesis is dedicated to the many people, forgotten by history, who died from the epidemics that helped end the Sumerian and Indus Valley Civilisations.

and

the late Prof. Bryan Harle Gandevia -
my original medical history mentor

“Medical History documents mankind’s struggle against extinction.”

Dr. Philip Norrie

“Because contagions, such as bubonic plague or dysentery, leave few edifaces or easily documented traces, historians have underestimated their devastating effect on ancient civilisations.”

Thomas Gottlieb, Clinical Associate Professor of Microbiology, University of Sydney

ACKNOWLEDGEMENTS

I would like to thank the following people for helping me research and write this thesis.

A/Prof. Slade Jensen, Microbiology Department, School of Medicine, WSU, my Supervisor, for his guidance and help.

Prof. Greg Barton, Prof. of History, School of Humanities and Communication Arts, WSU, my Co-Supervisor, for his input.

Dr A. Narayana, Director, National Institute of Indian Medical Heritage and his team of researchers for their help researching ancient Indian medical facts.

Prof. Nancy Lovell, Professor Emeritus of Anthropology, University of Alberta, Edmonton, Alberta, Canada for her help with Harappan Skeletal pathology.

Prof. Dong Hoon Shin, Professor of Bioanthropology and Paleopathology, Department of Anatomy, Institute of Forensic Medicine, Seoul National University College of Medicine, Seoul, Korea for his help with Harappan Skeletal pathology.

Prof. Vasant Shinde, Professor of Archaeology at Deccan College, Pune, India for his help with Harappan Skeletal pathology.

Mrs. Kerry Norrie, my sister-in-law, for her translation of all French material.


Mr. Peter Dzubieli, a kind patient of mine, for his translation of all German material.

Mrs Michelle Catterick, a good friend, for her editorial and computer skills morphing this thesis into its final form.

The many expert people with whom I corresponded - they are listed at the end of the Bibliography.


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CHRONOLOGY

<u>DATE</u> (in BCE)	<u>INDUS VALLEY</u>	<u>SUMER</u>	<u>EGYPT</u>	<u>ELAM</u>	<u>MARI</u>
7000	EARLY FOOD PRODUCING ERA				
5500	REGIONALISATION ERA				
3500		BEGINNING			
3300	EARLY HARAPPAN PHASE				
3100			EARLY DYNASTIC PERIOD		
3000 to 2900					CITY 1
2700			OLD KINGDOM	BEGINNING	
2650					CITY 1 ENDS
2600	MATURE HARAPPAN PHASE				
2500 to 2290					CITY 2
2266					CITY 3
2000		DECLINE			
1900	LATE HARAPPAN PHASE				
1850					SHAKKANAKKU DYNASTY ENDS
1761 to 1759					CITY 3 ENDS
1575			NEW KINGDOM		
1450				HAFT TEPPEH MASS GRAVE	
1380			MALKATA BUILT		
1346			AMARNA BUILT CHILD MASS GRAVES		
1332			AMARNA ABANDONED		
1322			EGYPTIAN POW INTRODUCE PLAGUE INTO HITITTE EMPIRE		
1300	HARAPPA ENDS				
1200 to 1150			END OF BRONZE AGE IN NEAR EAST		

ABSTRACT

One of the great mysteries of ancient history is why the Indus Valley Civilisation, the largest of the five original ancient civilisation regions declined. The aim of this thesis is to document the role of infectious disease on the decline of the Indus Valley Civilisation c. 1900 – 1300 BCE. This is the first time this has been done. There have been many theories about possible causes for the end of the Indus Valley Civilisation such as climate change, shift of the monsoon eastwards from the Indus River basin to the Ganges River basin, tectonic forces changing the course of the Indus River to variously cause drought or flooding and finally Aryan invasion. The hypothesis of this thesis is that infectious diseases may have contributed to the decline of the Indus Valley Civilisation.

This thesis will also show that an infectious disease epidemic, most likely pneumonic plague, may have helped in the decline of the Sumerian Civilisation c.2000 BCE. This epidemic could have come from what is today Russia or China via the Zagros Mountains or from the Indus Valley Civilisation onboard boats used in their mutual sea trade. Conversely the Sumerian epidemic could also have gone in the opposite direction and infected the Indus Valley Civilisation instead.

Both the Sumerian and Indus Valley Civilisations did not end abruptly but instead slowly declined with, most importantly, their ideas, beliefs, language, writing methods, mathematics and moral values being absorbed into subsequent civilisations.

This thesis will use mainly an historiographic approach to propose that up to twelve different infectious diseases which existed in ancient times were possible major causes or co-factors in the decline of the Sumerian and Indus Valley Civilisations. These diseases include five that are so lethal that they have been used as biological warfare agents, namely smallpox, plague, tularemia, shigella dysentery and anthrax. The other seven diseases are leprosy, poliomyelitis, tuberculosis, malaria, measles, haemorrhagic fevers and influenza.

Another thing this thesis will show is that the “massacre” in the major Harappan city of Mohenjo-daro was not a massacre but most likely its citizens dying during an infectious disease epidemic and being dumped or buried in a haphazard manner. It is difficult to understand why historians have clung to this myth for so long given that there was no real evidence to support the idea.

The final thing that this thesis will show is that archaeologists need to look harder to find evidence of infectious disease when they excavate. They need to not only do ancient DNA analysis on all skeletons but also engage a paleoentomologist to look for evidence of rodents or fleas to eliminate or confirm the presence of bubonic plague for example. They also need to engage a paleoparasitologist to look for eggs of parasites which had infected the deceased and get specialist forensic paleoanthropologists to scientifically and medically examine all the bodies found. As Professor Gottlieb points out, “Because contagions, such as bubonic plague or dysentery, leave few edifices or easily documented traces, historians have underestimated their devastating effect on ancient civilisations.”¹

Thus ancient historians and archaeologists need to change their mindset and always factor in the possibility of infectious diseases being present and playing a role in the decline or demise of whatever civilisation they were studying. If they do not factor in the possibility of infectious diseases being present then their research is incomplete and thus their resultant history and conclusions could be flawed.

¹ Prof. Thomas Gottlieb, Microbiologist, University of Sydney

INTRODUCTION

“Historians find war exciting and pestilence dull; they exaggerate the effects of the former and play down the latter” (Alfred Grove & Oliver Rackman 2001²)

When one thinks of ancient history one thinks of ancient historians, archaeologists and anthropologists for example – in other words all “Arts” based disciplines. One does not think of doctors or medical historians. But one should, because most major changes in the ancient world were precipitated by an infectious disease epidemic of some type such as the end of the Mycenaean Palatial Empires, the end of the Hittite Empire, the end of the Bronze Age in the Near East and Egypt’s retreat from the Levant c. 1200 - 1150 BCE; the fall of Athens; the end of Carthage; the end of the Western Roman Empire; the invasion of Islamic forces into Europe during the latter half of the Plague of Justinian and maybe even the decline of the Sumerian Civilisation and the Indus Valley Civilisation. Micro-organisms, whether they be viruses or bacteria or **fungi** or protozoa, are the true enemy of mankind – always have been and always will be. Medical historians investigate and document the struggle of mankind against these natural assassins.

This thesis will examine the role of infectious diseases on the decline of the Sumerian Civilisation c. 2000 BCE and the Indus Valley Civilisation c. 1900 – 1300 BCE; to help find out why did one of the earliest empires and the largest empire of the ancient world respectively, end. Infectious diseases have killed more people than all wars. “More lethal than any firearms, viruses and bacteria have accompanied soldiers and traders around the world, and the epidemics they caused have changed the course of history” (1). The demise of the Indus Valley Civilisation may be multifactorial because of its large size. Hence, the climate based cause that applies to one region, such as drought or flooding, may not apply to another region many hundreds of

² Alfred Thomas Grove, geographer and climatologist from Cambridge University and Oliver Rackman, botanist and ecological historian from Cambridge University, 2001. “The Nature of Mediterranean Europe. An Ecological History”. New Haven and London: Yale University Press, 2001.

kilometres away; but infectious disease can cover all areas rapidly. Even though infectious disease may be only one of many possible causes for the decline of the Indus Valley Civilisation, it at least should be recognised as a possible cause and factored in and not ignored, as is the current situation.

Medical history will be helped by this thesis to take its place at the forefront of modern historical thinking by showing how important and relevant it is within the wider field of history. “Historians study change” (2) and causation is the key to this change. In other words what factors were involved to make things turn out the way they did or “how chains of interaction become pathways of historical development” (3). Diseases in their various forms are ‘causation’ links in these chains.

The term infectious disease refers to the full spectrum of all forms of infectious disease, which manifest as plagues and epidemics. Because this thesis will be looking at infectious diseases 4,000 years ago it may not be possible to identify the exact infectious cause, but this thesis will try. Another problem studying disease in the Indus Valley Civilisation is that, as yet, nobody has been able to understand or read their writing, hence there is no written record or text that scholars can consult. By contrast, the Sumerians invented writing using cuneiform symbols impressed into clay tablets. Thousands of these tablets have now been examined by scholars and it is from these translations that this thesis obtained its information; as currently there are no Sumerian skeletons c. 2000 BCE in existence to be examined by ancient DNA analysis to find infective agents. Indus Valley Civilisation period skeletons, mainly from Mohenjo-daro exist and have been examined, but no ancient DNA analysis has been done on these skeletons so far.

The late Roy Porter (1946-2002) was the Professor of Social History of Medicine at the Wellcome Institute in London. When he wrote his book “The Greatest Benefit to Mankind” [which is what Samuel Johnson, the inventor of the dictionary, thought about medicine] he wrote the following – “Writing this book has brought home the collective and largely irremediable ignorance of historians about the medical history of

mankind.....The historical record is like the night sky; we see a few stars and group them into mystic constellations. But what is chiefly visible is the darkness.” (4)

This thesis will try to reduce the darkness by investigating the role of infectious disease on the decline of the Sumerian and Indus Valley Civilisations, something ancient historians seem to have ignored thus far. Infectious diseases are neutral and indiscriminate killers – they will kill anyone from king to commoner. An empire cannot survive if its inhabitants are dying during an epidemic because there would be no farmers to grow food, no administrators to govern, no sailors and merchants to do the trading and no soldiers to fight and defend the empire.

Roy Porter also wrote that “Medicine has played a major and growing role in human societies and for that reason its history needs to be explained so that its place and powers can be understood.” (5). This is yet another appeal by medical historians for non-medical historians to take medical history seriously.

There are several good examples of mistakes in ancient history being made by ignoring the possibility of disease causing the deaths of people and thus contributing to the end of a civilisation. Firstly in ancient Egyptian times, mid 1300s BCE – why did Amenhotep III (ruled c.1391-1353 BCE) move his well established court from Karnak to the new ‘virgin soil’ site at Malkata and why did his son Akhenaten (ruled c.1353-1336 BCE) do the same thing by moving his court to the new ‘virgin soil’ site of Amarna? Egyptologists will talk about power struggles between the Pharaoh and the priests as being the cause; but an alternative hypothesis is that a plague epidemic was also present and these Pharaohs were trying to escape from its effects by going to new ‘virgin soil’ plague free sites.

The second example is the cause of the deaths of the Indus Valley Civilisation Mohenjo-daro Bronze Age skeletons. For decades ancient historians said the cause of their deaths was due to trauma from the Aryan invasion and subsequent massacre of the inhabitants of the city of Mohenjo-daro. But examination of these skeletons by Professor K.A.K. Kennedy, Professor of Physical Anthropology at Cornell University, in the 1970s proved the ancient historians wrong by showing that there were no signs of

trauma on the skeletons and he stated that they died from other causes such as disease. (6) The opening paragraph of this article sets the tone of his scathing criticism of ancient historians:

“Over the course of the past fifty years of archaeological investigations of Harappan settlements, a thesis has persisted which concerns a massacre of a number of individuals some four millennia ago at Mohenjo-daro, the large urban centre on the Indus. It is ironic that this preoccupation with a traumatic demise of these Harappan citizens, or their aggressors, has been based upon the mode of disorderly disposal of the dead at Mohenjo-daro – essentially an archaeological datum – rather than upon the skeletal evidence of the trauma: the critical biological datum.” (7). Because his research was done before the era of ancient DNA he was not able to do any further analysis of the skeletons. If he did, the author of this thesis believes he may have found plague (*Yersinia pestis*) in the ancient DNA. Hence plague may have contributed to the end of the Indus Valley Civilisation.

The third important example of ignoring the possibility of an infectious disease epidemic being present comes from the archaeological dig at Haft Tepeh in Iran (ancient Elam) being done by the Archaeology Department at Mainz University in Germany. This dig is being led by Dr. Behzad Mofidi-Nasrabadi and again trauma has been blamed for the deaths of an estimated 300 men, women and children whose skeletons were found dumped behind a brick wall. A bulletin put out by Mainz University stated that the skeletons had been slaughtered (8), but so far no signs of trauma have been found on the skeletons. If ancient DNA analysis was done on these skeletons the author of this thesis suspects plague (*Yersinia pestis*) may again be found. Hence plague could have been a factor in the demise of this city. Is the same thing happening with Sumer – are ancient historians closing their eyes to the possibility of an infectious disease epidemic such as plague being present and contributing to its demise ?

The findings of this thesis will be presented in Section 3 as the following outlines:

Section 3.1 will present a brief history of the five original ancient civilisations founded along river systems, namely Pharaonic Egypt along the Nile River; Mesopotamia, with Sumer, along the Tygris and Euphrates Rivers; ancient China along the Yellow River, the Nazca Civilisation along the Rio Grande de Nazca and finally, by far the largest of them all, the Indus Valley Civilisation along the Indus River.

Section 3.2 will present a background historic summary of the Sumerian Civilisation from its beginning as far back as c. 5500 BCE; but most ancient scholars agree with c. 3500 BCE as the beginning of the real Sumerian Civilisation; until its decline in c. 2000 BCE.

Section 3.3 will present a summary of the currently accepted theories for the decline of the Sumerian Civilisation including environmental degradation and drought.

Section 3.4 will present an outline of infectious disease in Sumer and the sources of this evidence

Section 3.5 will present a background historic summary of the Indus Valley Civilisation from its beginning in c.3300 BCE until its slow demise from 1900 – 1300 BCE.

Section 3.6 will present a summary of the currently accepted theories for the end of the Indus Valley Civilisation including climate change, monsoonal shift, tectonic uplifts and even invasion by Aryians.

Section 3.7 will present a summary of the eleven infectious diseases present at the time of the decline of the Sumerian Civilisation and the slow demise of the Indus Valley Civilisation; five of which are so potent that they have been used as biological warfare agents.

Section 3.8 will present an analysis of the currently known Indus Valley Civilisation skeletal material.

Section 3.9 will present an analysis of the currently known Sumerian Civilisation skeletal material.

Section 3.10 summarises the most likely infectious diseases that contributed to the decline of the Sumerian Civilisation and slow demise of the Indus Valley Civilisation.

Section 3.11 looks at the role of Climate Change on the spread of the plague.

Finally the Conclusion will summarise the case for including infectious diseases in the list of possible causes for the decline of the Sumerian and Indus Valley Civilisations. It will also show the significance of infectious diseases as causal factors and why they should be given more recognition and focus in the future by historians.

Ancient history scholars have not given the possibility of infectious diseases in ancient times enough weight in their research. Infectious disease would have been a constant threat to the whole population, from the ruling class to the pauper class. In ancient times it would have been a daily struggle for survival either avoiding or fighting against infectious diseases such as sepsis from staphylococcus aureus or tetanus from a scratch; or the childhood diseases such as whooping cough, diphtheria and measles; the infections from contaminated food and water; let alone major infections such as leprosy, tuberculosis or malaria. Then came the 'big two' mass killers, namely smallpox and plague which are highly refined mass murderers, perfected by nature to kill populations 'en masse' in epidemics that would totally devastate an empire. There would have been nothing that could be done to stop them. The Italian writer Giovanni Boccaccio, when writing about the Black Death in the 1330s, said that the victims "... ate lunch with their friends and dinner with their ancestors in paradise." (9) to show how quickly people died from plague.

The medical historian Robert Arnott from Oxford University has stated: "Many such scholars are completely unaware of the social effects of disease and the major consequences that ensued whenever contacts across disease boundaries allowed a new infection to invade a population that lacked any acquired immunity." He then went on to paint a very bleak picture for the ordinary man in ancient times. "...the harsh reality of a society where life was hard, death and disease were everyday occurrences and the day to day ambition of those who lived outside the palaces was simply

survival.” (10) In ancient times, when there would have been little resistance to infections because of lack of previous exposure; epidemics would have come with the full fury of the epidemic killing most people. There was no such thing as “a touch of ” plague or smallpox, like one can have a “touch of flu” today. It would have been total devastation, like an Ebola outbreak today.

Hence the need to factor in infectious disease at all times as a possible sole factor, such as in the case of plague or smallpox, or a significant co-factor as in the case of leprosy, tuberculosis, malaria or dysentery; in the demise of any ancient civilisation being studied. Infectious disease is a crucial explanatory variable that should not be missed by ancient historians in future.

1. LITERATURE REVIEW

The purpose of this literature review is to examine the current literature for any reference to disease being a cause or co-factor for the decline of the Sumerian and Indus Valley [Harappan] Civilisations.

1.1 Indus Valley Civilisation

Much has been written about other possible causes for the end of the Indus Valley Civilisation, but after an exhaustive examination of the literature it is apparent that no scholars have ever suggested that infectious diseases could have been a cause or co-factor for the decline of the Indus Valley Civilisation. Also, very little has been written about any disease during the time of the Indus Valley Civilisation, hence the need and reason for this thesis.

This literature review will now examine publications that do mention disease and the Indus Valley Civilisation. Unfortunately there are only a handful of such publications.

(A) BOOKS

The first such book is 'Frontiers of the Indus Civilization: Sir Mortimer Wheeler commemoration volume'. (1) This 545 page book was a collection of articles written by Indus Valley Civilisation experts in 1984 to celebrate the life of Sir Mortimer Wheeler, the Director-General of the Archaeological Survey of India from 1944 to 1948 and a great advocate for more research into the Indus Valley Civilisation. Pages 425 to 436 contained an article by the forensic paleoanthropologist from Cornell University, Prof. K.A.R. Kennedy, titled 'Trauma and Disease in the Ancient Harappans' which gave an excellent review about current knowledge, or lack of knowledge, about the Harappan skeletons. He stated that there was an underlying rate of 25% for malaria just in the skeletons; which means it would have been even higher in the live Harappan population. Kennedy's article did not mention any other disease, nor the possibility that

an infectious disease could have contributed to the decline of the Indus Valley Civilisation.

The next book which mentions infectious disease was 'The Indus Civilization' (2) written by Prof. Gregory Possehl, Professor of Anthropology at the University of Pennsylvania. This book of 276 pages had a half page section titled 'Disease and Sickness among the Harappans'. This shows the importance this topic has for the author. Well, at least he gave the topic some coverage, which is more than can be said for most Indus Valley Civilisation scholars. Possehl only mentions the research by Prof. Kennedy and his theory of malaria in the Harappans. No other diseases are mentioned and there is no connection between disease and its possible contribution to the decline of the Indus Valley Civilisation.

Dr. Jane McIntosh gained her PhD in archaeology from Cambridge University and has done extensive field work in Iraq, Cyprus, India and Britain and is now writes archaeology books. Her book about the Indus Valley Civilisation is titled 'The Ancient Indus Valley – New Perspectives' (3). Hers is the third and final book to mention disease during the time of the Indus Valley Civilisation. In the 441 page book, one third of a page is devoted to "Health" on page 396 in the section titled "Indus Collapse". In this "Health" piece McIntosh mentions the Mohenjo-daro "massacre" skeletons and says that they most likely died from malaria or cholera.

The next three books about the Indus Valley Civilisation do not mention disease at all. The earliest is Sir Mortimer Wheeler's landmark 144 page history of the Indus Valley Civilisation simply called "The Indus Civilization" (4). Then there is the 260 page authoritative work by Prof. Jonathan Kenoyer, a Professor of Anthropology from the University of Wisconsin plus a Co-Director and Field Director of the Harappa Archaeological Research Project. His book is titled "Ancient Cities of the Indus Valley Civilisation" (5) and focuses on the archaeology of the major Harappan cities, but not disease, unfortunately. The final major book about the Indus Valley Civilisation that does not mention disease is "The Ancient Indus – Urbanism, Economy and Society."

(6) It was written by Prof. Rita Wright, who is an Associate Professor of Anthropology at

New York University and part of the Harappa Archaeological Research Project team of scholars. It is a very detailed 396 page book that covers every aspect of Harappan society except disease.

The Bibliography, at the end of this thesis, lists over 42 books about medical history and over 35 general ancient history reference books; none of which mentions disease and the Indus Valley Civilisation – in fact most do not even mention the Indus Valley Civilisation at all.

(B) ARTICLES

As with books about disease in the Indus Valley Civilisation era; there are very few articles or papers about disease during the Indus Valley Civilisation era and certainly no articles suggesting that infectious disease may have contributed to the decline of the Indus Valley Civilisation.

Prof. Nancy Lovell is the Professor Emeritus of Anthropology at the University of Alberta, Canada and was taught by Prof. K.A.R. Kennedy when she was at Cornell University. She has done extensive fieldwork and has written several articles about disease in the Indus Valley Civilisation. Her article written with Prof. Kennedy titled 'Society and Disease in Prehistoric South Asia' (7) mentions malaria, which will be discussed in detail later. This was followed by her analysis of anaemia, which became 'Anaemia in the Ancient Indus Valley' (8). In this article Prof. Lovell discussed the possibility of bowel parasites, lack of iron in the diet and haematological genetic defects causing anaemia; but the incidence was low and not relevant here as anaemia is not an infectious disease, nor would it be bad enough to cause the decline of the Indus Valley Civilisation. Her latest article examined the remains of 92 individuals excavated from Harappa in 1987 and 1988 (9). The article did not show any major diseases other than arthritis plus some trauma; but no signs of a major infectious disease.

Prof. Gwen Robbins, later Robbins Schug, is a Professor of Anthropology at Appalachian State University at Boone in North Carolina, USA. She too has done extensive fieldwork at Indus Valley Civilisation sites. Her focus has become leprosy and tuberculosis during the time of the Indus Valley Civilisation, because that is what the skeletal remains she examined showed. 'Ancient Skeletal Evidence for Leprosy in India (2000 B.C.)' (10), discusses the findings from the examination of a skeleton from Balathal which showed signs of leprosy. Of more interest though, is the article's discussion about the possibility that the leprosy was introduced into ancient India from the west coast of Africa, thus opening up the possibility of trade between ancient Egypt and the Indus Valley Civilisation. She then published a more detailed article about leprosy and tuberculosis in Harappan skeletons (11), and also this article discussed the change in health/disease patterns from mature Harappan times to late Harappan times, showing a general decline. Infectious diseases may have contributed to this decline.

The latest expert to examine Harappan skeletons and discuss disease is Prof. Dong Hoon Shin, who is the Professor at the Bioanthropology and Paleopathology Laboratory in the Department of Anatomy at the Institute of Forensic Medicine at the Seoul National University in Seoul, Korea. He has been working in conjunction with archaeologists from Deccan College in Pune, India, led by Prof. Vasant Shinde. The result of this collaboration has produced several articles so far, the first one being 'Human Skeletal Remains from Ancient Burial Sites in India: With Special Reference to Harappan Civilization' (12). This article discusses various Harappan burial sites and how the skeletons appeared but it does not discuss any diseases or associate disease with the demise of the Harappan Civilisation.

Their latest article 'Archaeological and anthropological studies on the Harappan cemetery of Rakhigarhi' (13) discusses the results of their fieldwork excavating the cemetery for three seasons from 2013 to 2016. There were no mass graves present; only single skeleton occupied graves and no ancient DNA analysis of the skeletons looking for any infectious disease has been done so far.

1.2 Sumerian Civilisation

Again much has been written about the Sumerian Civilisation and its decline but only one article has been written to suggest that an infectious disease epidemic could have been implicated in the decline of the Sumerian Civilisation. The usual causes for the decline of the Sumerian Civilisation discussed by scholars are the salination of the farmlands due to centuries of irrigation from the Tigris and Euphrates Rivers leading to famine; drought and invasion by the Amorites in the north and the Elamites in the south. They do not comment on the fact that drought and resultant famine makes the population weak and thus more prone to infectious disease and that a population dying from an infectious disease epidemic is not able to defend itself against invasion from its neighbours such as the Amorites and the Elamites.

The books and articles talk about material medica with lists of plant, herb and animal medicines, recipes for medicines, the role of the gods in causing illness, the role of magic in curing illness, anatomy, surgical procedures and how to diagnose certain illnesses; but nothing about actual epidemics or that infectious disease epidemics helped in the decline of Sumer.

This literature review will now examine publications that do mention disease and the Sumerian Civilisation.

(A) BOOKS

The following are books about disease and medicine in Sumer, Babylonia and Mesopotamia, but none of them describes any epidemics or says or even suggests that disease was a contributing factor in the demise of the Sumerian Civilisation. 'Disease in Babylonia (Cuneiform Monographs)' (14) by Irving Finkel, an expert in cuneiform tablets from the Department of the Ancient Near East at the British Museum and Markham Geller, an expert in Sumerian medical literature and the Professor of Semitic Studies at University College London. This book is a compilation of the 13 papers presented at a conference on "Concepts of Disease in Ancient Babylonia" held

in 1996 at the Wellcome Institute in London. It deals mainly with text from the First Millennium BCE, hence is a thousand years later than the time frame of this thesis. Subjects covered include fevers, women's health, epilepsy, demons and magic; but no mention of disease contributing to the decline of Sumer c. 2000 BCE.

'Epilepsy in Babylonia' (15) by Marten Stol, an expert in Old Babylonian Period of 1900 – 1500 BCE and Babylonian Medicine. He was also the Professor of Assyriology at Vrije University in Amsterdam from 1983 – 2005. As the title suggests, the book covers the subject of epilepsy along with its relationship to the gods and magic. It does not cover infectious diseases, nor does it relate disease to the decline of the Sumerian Civilisation. 'Magico-Medical Means of Treating Ghost-Induced Illness in ancient Mesopotamia' (16) is similar in that it explores the relationship between medicine and magic in ancient Mesopotamia. This is important because the ancients believed that disease was caused by the gods as punishment for their wrong doing and that magic could also cure them of their disease. It was written by Dr JoAnn Scurlock who gained her PhD in Assyriology from the University of Chicago and now teaches history at Elmhurst College. She also wrote 'Sourcebook for Ancient Mesopotamian Medicine' (17); which is a very thorough and detailed summary of the diseases written in the ancient cuneiform texts, but it does not associate any of these diseases with the decline of Sumer, nor does it mention any specific epidemics.

Next are books which examine the practice of medicine in Ancient Mesopotamia; as distinct from discussing the diseases found in Mesopotamia. Again these books do not suggest that infectious disease epidemics caused the decline of the Sumerian Civilisation or refer to any specific infectious disease epidemic. 'Diagnoses in Assyrian and Babylonian Medicine' (18) by JoAnn Scurlock and Burton R. Anderson, who is the Professor of Medicine and Microbiology at the University of Illinois in Chicago and 'Ancient Babylonian Medicine: Theory and Practice' (19) by Markham Geller are good examples.

There are many general history books written about Mesopotamia, Sumer and Babylon such as 'The Babylonians' (20) by H.W.F. Saggs, an English Assyriologist

and Professor of Semitic Languages at University College, Cardiff; but none of them mention disease let alone associate an infectious disease epidemic as a cause for the decline of the Sumerian Civilisation.

(B) ARTICLES

Just like there are very few books mentioning disease in ancient Sumer; so there are very few articles that mention disease in ancient Sumer. An article titled 'Reasons for Decline of Mesopotamia' (21) mentions overcrowding, pollution, war and environmental changes such as high salt content in the soil from constant irrigation and soil erosion from draining the irrigation waters. It also mentions "Lack of indoor toilets and ineffective garbage collection led to contaminated water supplies and frequent epidemics such as Typhus." (22). But, again it did not associate this with the decline of Sumer

In an article titled 'Sumer' (23) by Prof. Joshua J. Mark from Marist College in New York says in the section under 'Sumer's Decline and Legacy' that "...a severe famine resulting from climate change and overuse of the land..." (24) had contributed to Sumer's end. Famine predisposes the population to subsequent infectious disease; but this was not mentioned. A similar theme was voiced by Tia Ghose, Staff Writer for Live Science journal in her article titled 'Drought May Have Killed Sumerian Language' (25). Again disease was not mentioned.

The Department of Economics at the San Jose State University in an article titled 'Sumer' (26) states that: "The Sumerians disappeared from history about 2000 B.C. as a result of military domination by various Semitic peoples." (27). There was no mention of disease, and also note that the article says that the "Sumerians disappeared" instead of using the word "declined", which is preferred by Sumerian ancient history scholars.

Prof. Robert D. Biggs is an Assyriologist who received his PhD from John Hopkins University and was an editor of the Journal of Near Eastern Studies. He has written many articles about Mesopotamian medicine including 'Medicine, Surgery, and Public

Health in Ancient Mesopotamia' (28); but none mention any infectious disease contributing to the demise of the Sumerian Civilisation.

The two articles that present a case for an infectious disease contributing to the end of the Sumerian Civilisation were written by **Prof. H.L.J. Vanstiphout** titled '**Death in Mesopotamia**' (29) and by Prof. Amjad Daoud Niazi titled 'Plague Epidemic in Sumerian Empire, Mesopotamia, 4000 years ago' (30). **Prof. Vanstiphout** is a Dutch Sumerologist and when he presented his hypothesis in 1974 it was thought to be provocative and was criticised for being based solely on the City Laments with no nonliterary evidence. The same would apply to the stories in the Bible, as no one has found the body of Jesus Christ; or to the stories in Homer's 'Iliad', until Heinrich Schliemann backed his hunch and found the real Troy. Prof. Niazi is the Emeritus Professor of Community Medicine from the University of Babylon and the winner of the WHO Dr. A.T. Shousha Foundation Prize in 2011. Prof. Niazi gained his PhD from the London School of Tropical Medicine in 1980. For this article he studied the many Sumerian clay tablets now translated and available from Oxford University. He presents a very good case for an epidemic of plague not only being present at the end of the Sumerian Civilisation c.2000 BCE, but also contributing to this end. This thesis will expand on his work by referring to the five original Sumerian City Laments and will also argue that this plague infection was then transferred to the Indus Valley Civilisation via sea trade between the two civilisations. This idea of plague being present in the Near East is supported by an article by Mario Fales (31), but it was much later referring to the 14th century BCE.

An article has been written about viral haemorrhagic fevers being present in Mesopotamia (32), but again it did not specify any actual epidemics or that they aided in the decline of the Sumerian Empire.

1.3 Mari Civilisation

(A) BOOKS

The situation concerning books about Mari is the same as for Sumer – none talk about actual infectious disease epidemics in Mari or the possibility that infectious disease epidemics may have contributed to the demise of Mari. The French archaeologist Jean-Claude Margueron is the main authority on Mari because he was in charge of the digging there from 1979 to 2004. His recent book - *Mari: Capital of Northern Mesopotamia in the Third Millennium. The Archaeology of Tell Hariri on the Euphrates*. (33) is the main reference work on the subject. It deals with the archaeology of Mari in detail and there is also a history of Mari – but no mention of epidemics.

Similarly – *Mari and the Early Israelite Experience* (34) gives a good history of Mari – but no mention of any epidemics. Another book - *Letters to the King of Mari: A New Translation, with Historical Introduction, Notes, and Commentary* (35) gives a detailed history of the reign of Zimri-Lim, the last King of Mari. He ruled Mari until he was defeated by Hammurabi of Babylon in c.1761 BCE. Assyriologist Jack Sasson wrote – *From the Mari Archives, an anthology of old Babylonian letters* (36) which gives a very detailed coverage of these letters divided into various categories of Kingship, Administration, Warfare, Society, Religion and Culture. Unfortunately, yet again, there is no mention of infectious disease epidemics in either of these books.

A more obscure book about Mari is – *Pastoral Nomadism in the Mari Kingdom* (37) which, as the title suggests, deals with nomadic herding in Mari ; but again there is no mention of infectious disease epidemics.

(B) ARTICLES

The only article that mentions infectious disease in Mari is – *The Earliest Document of a Case of Contagious Disease in Mesopotamia (Mari Tablet ARM X,129)* (38). It discusses a woman who had an infectious disease and who was quarantined

because she was contagious. The medical people back then understood that due to her symptoms and signs she needed to be isolated or other people would end up with her condition; despite not knowing that it was an infectious disease. The tablet was from the 18th century BCE and the author is describing it as the earliest documented case of a contagious disease. This thesis will show that there was documented infectious disease in Sumer two hundred years or even earlier than this.

This article was only about this woman and her contagious disease – it did not mention any epidemic or the fact that this contagious infectious disease could play a role in the decline of the Kingdom of Mari.

2. RESEARCH METHODOLOGY

2.1 Approach

This thesis will use a multiple methods approach using qualitative research methods. As opposed to the quantitative research using numerical methods, a qualitative analysis is used to explore causes and reasons by examining in depth cases and experiences. This is necessary because, in order to cover the full scope of this thesis' subject, several qualitative research methods such as historiography, case study and biographical methods have to be used.

Qualitative research is interdisciplinary and transdisciplinary covering the humanities and the social and physical sciences. "It is multi paradigmatic in focus. Its practitioners are sensitive to the value of the multi-method approach." (1) According to Nelson "The choice of research practices depends upon the questions that are asked, and the questions depend on their context." (2) and according to Brewer and Hunter: "Qualitative research is inherently multi-method in focus." (3) reflecting on attempts and desires to find an in-depth understanding of the question.

Historical Method according to Koenig is "the study of events, processes, institutions of past civilizations, for the purpose of finding the origins or antecedents of contemporary social life and thus of understanding its nature of workings.' (4) This thesis will examine the histories of various entities that influenced history such as infectious diseases and civilisations. As well as famous individuals who influenced history such as Pharaohs.

Case Study Method uses documents and life histories, for example, to gain a profile of the person or event that is being studied. According to Robert Stake, the case is a unique "functioning specific" (5), while Louis Smith describes it as a "bounded system" (6) that results in a product that may be called a "case record" more so than a case study according to Lawrence Stenhouse. (7).

Finally Biographical Method involves the “written record of the life of an individual”, according to the Oxford English Dictionary. (8) While Leon Edel in his 1984 work “Writing Lives” described it as “Biographers write lives.” (9) and Thomas Carlyle said in 1839 “History is the essence of innumerable biographies.” (10) Biographical Method also requires analysis, interpretation and explanation of the subject in question.

2.2 Scope

The time period covered by this thesis begins with the beginning of the decline of the Sumer c.2300 BCE and until the end of the decline of the Indus Valley Civilisation c.1300 BCE. This thousand year time period covers the 300 year long drought which marked the beginning of the decline of Sumer and the latter days and final fall of the Indus Valley Civilisation and has not been examined properly from a medical perspective so far by ancient historians or medical historians.

2.3 Sources

Various sources were used researching this thesis both online, in print format plus direct contact and consultation with relevant experts .

Online Search Engines used to research this thesis included Google, Google Scholar, Nestor from the Department of Classics at the University of Cincinnati, Internet History Sourcebooks from the Fordham University – the Jesuit University of New York, JSTOR, L’Annee Philologique, Bryn Mawr Classical Review and Buscopio. Key search words used included ‘end of the Sumerian Civilisation’ and ‘end of the Indus Valley Civilisation’ with either ‘disease’ or ‘plague’ or ‘bubonic plague’ or ‘smallpox’ or ‘leprosy’ or ‘tuberculosis’ or ‘malaria’ or ‘epidemic’ or ‘infection’ attached. The Online Websites used to research Sumerian cuneiform tablets included ‘ePSD’ [the Pennsylvania Sumerian Dictionary from the University of Pennsylvania], ‘ETCSL’ [The Electronic Text Corpus of Sumerian Literature from Oxford University], ‘CDLI [The Cuneiform Digital Library Initiative from the University of California, Los Angeles], ‘BDTNS’ [The Data Base

of Neo-Sumerian Texts which links Sumerian tablets from all museums around the world], 'Sumerian.org' and 'allmesopotamia'

Papers were found from leading medical journals such as the British Medical Journal, the Lancet, the New England Journal of Medicine, Epidemiology and various medical history journals, such as the Journal of Medical Biography, which were reviewed along with leading scientific journals such as Nature and those published by The Royal Society. Also examined were articles published by leading medical research institutions such as the Centers for Disease Control and Prevention in the USA and the Wellcome Institute in the UK, to give valid scientific facts and data, as necessary. Various historical and archaeological journals such as Antiquity, the Journal of Archaeological Science and the Journal of Biogeography were also examined.

Experts consulted included Prof. Naguib Kanawati, Prof. Kathryn Bard and Dr. Alice Stevenson for Pharaonic Egypt; Prof. Daniel Potts, Prof. Nathan Wasserman, Dr. Irving Finkel, Prof. Jack Sasson, Prof. Markham Geller and Dr. JoAnn Scurlock for Ancient Sumer; Prof. Nancy Lovell and Prof. Vasant Shinde for Indus Valley Civilisation. Dr. A. Narayana for Ancient Indian medical history; Prof. Dong Hoon Shin, Prof. Mark Thomas, Prof. Johannes Krause, Prof. Eske Willerslev and Prof. Ian Barnes for forensic ancient DNA analysis of skeletons and finally Mr. Gunnar Myhlmann for ancient **carnelian** beads.

3. FINDINGS

3.1 The Five Original Major Civilisation Centres in Ancient Times Based Along Rivers – A Brief History

3.1.1 The Nile River

The Egyptian Empire was one of the great empires of the ancient world, if not the greatest, extending along the course of the Nile River initially and then later into the Levant. Its dynastic system of Pharaohs gave it a stability of Divine Rulers that allowed it to flourish for thousands of years.

Egyptian history usually begins with the Early Dynastic Period [Dynasties One and Two] beginning c. 3100 BCE [+/- 150 years] with the reign of Menes, according to the classification by the Egyptian priest Manetho. Prior to this time were the Pre Dynastic Kings, of which little is known.

After the Early Dynastic Period came the Old Kingdom [Dynasties Three to Seven] from c. 2700, then the First Intermediate Period [Dynasties Eight to Ten], followed by the Middle Kingdom [Dynasties Eleven and Twelve] from c. 2134 BCE and then the Second Intermediate Period [Dynasties Thirteen to Seventeen].

The New Kingdom [Dynasties Eighteen to Twenty] began c. 1575 BCE and was followed by the final period – the Late Dynastic Period [Dynasties Twenty One to Thirty One] from c. 1087 BCE until the end of the Egyptian Empire in 332 BCE when it was conquered by Alexander the Great. During this time it consolidated the kingdoms of the Upper and Lower Nile plus expanded once again into the Levant [Palestine and Syria which it had done before during the late Bronze Age or Eighteenth Dynasty period]. (1)

3.1.2 The Tigris – Euphrates Rivers

The Tigris and Euphrates rivers supported ancient Mesopotamia, which included over the centuries several empires such as Sumer in the south, Akkad and then Babylon in the middle and Assyria, Mari and Ebla to the north. These empires were made up of many powerful City-States such as Kish, Uruk, Lagash and Ur.(2) The history of ancient Sumer will be discussed in detail later in Section 3.2

3.1.3 The Yellow River

The Yellow River or Kwang Ho River stretches for 5,464 Km across the northern regions of China, beginning in the Bayan Har Mountains, a branch of the huge Kunlun Mountain chain, crossing Mongolia and ending in the Pacific Ocean. It is the sixth longest river in the world. Along its banks developed the first great civilisation of ancient China c. 5000 BCE. Development along China's two other major rivers, the Yangtze River in the middle of China and the Pearl River in southern China, came later. The Yellow River Valley differed from these two river systems because it grew mainly millet as its staple crop whereas the Yangtze and Pearl River Valleys grew rice as their main cereal crop.

Jiahu is the oldest Neolithic archaeological site in China, dating from about 12,000 years ago, and is located in the valley in the middle of the course of the Yellow River.

The Yellow River Valley is the cradle of Chinese civilisation and is referred to as the 'Mother River' of the Chinese nation; fostering initially the Yangshao Culture from 5000 BCE to 3000 BCE, then the Longshan Culture from 3000 BCE until 2100 BCE. This was followed by the Xia Dynasty from 2100 BCE to 1600 BCE, the Shang Dynasty from 1600 BCE to 1046 BCE and eventually the Zhou Dynasty from 1045 BCE until 256 BCE.

From this base or core in the Yellow River Valley the Chinese Nation developed continuously for the next 7,000 years developing such things as gunpowder, paper, grape wine, noodles, pottery, the compass and printing. (3)

3.1.4 The Indus River

The Indus Valley Civilisation was the largest of the five original ancient civilisations occupying today's western India, Pakistan and eastern Afghanistan, based along the Indus River and its tributaries. It began c. 5500 BCE and ended c. 1300 BCE. Its history will be discussed in detail in section 3.4.

3.1.5 The Rio Grande de Nazca

Traditionally ancient historians have thought that there were only four original ancient civilisations as listed above; but now, after years of excavation we can add another ancient civilisation to this list – Nazca. The Nazca Civilisation was also based along a great river namely the Rio Grande de Nazca in the Ica Valley in southern Peru. It flourished 4,000 years ago with a complex system of irrigation using aqueducts called 'puquios' to support lush fields adjacent to a great desert. The Rio Grande de Nazca eventually dried up and the lush fields were incorporated into the desert.

Analysis of its mummies, preserved by the dry desert, showed that its doctors practiced trephination (cutting holes into the skull to release evil spirits) successfully and people had their skulls bound to produce elongated skulls to show their different ethnic identity.

The Nazca are also famous for producing the 'Nazca Lines' which are various drawings and lines on the ground that are so large that they can be seen from high flying aeroplanes. There have been many explanations for these huge drawings and lines including communicating with aliens and alien spaceship runways. The current explanation is that they are either ethnic or clan identity markings or they were done to praise the gods.

3.2 The Sumerian Civilisation – A Background History

Mesopotamia means 'the land between the two rivers', namely the Tigris River and the Euphrates River in the Middle East. It is known as the 'Cradle of Civilisation' by the Western World, because the first civilisations began there, and it included the 'Fertile Crescent' between the Mediterranean Sea and the Zagros Mountains, which as the name implies, was a very fertile agricultural area which supported many civilisations over the centuries.

Bronze Age Mesopotamia [c. 3300 – 1200 BCE] saw the coming and going of many empires including the Sumerian, Akkadian, Assyrian, Babylonian and Kassite Empires over the centuries. Powerful City-States to the south such as Kish, Uruk, Ur and Lagash were another feature of the Mesopotamian region.

It saw the invention of the first form of writing – a wedge shaped writing on clay tablets called cuneiform writing. It also saw the invention of the wheel – one of man's great inventions; plus irrigation from the two rivers which allowed large food surpluses to be amassed. This allowed empires to flourish because there was abundant food to feed the large population. Agriculture was introduced into the region between 10,000 - 8700 BCE. This was followed by the domestication of animals from 8700 – 6800 BCE.

The Sumerian Empire was well established by the middle of the 4th millennium BCE and occupied southern Mesopotamia. It was followed by the Akkadian Empire in c.2270 when Sargon the Great of Akkad conquered Sumer. The Sumerian language and writing died out and the Sumerian people were incorporated into the new Akkadian Empire. Sargon the Great then went on to conquer an empire stretching from the Persian Gulf to modern day Syria, After the Guti, from the Zagros Mountains, conquered the Akkadians, came the Uruk and other southern City-States.

The Assyrians ruled northern Mesopotamia from 2500 BCE until 605 BCE, while Babylon, in the middle of Mesopotamia, was founded by the Amorite chieftain named Sumuabum in 1894 BCE. Hammurabi (ruled from 1792 to 1750 BCE), the Amorite ruler of Babylon made Babylon a major power in the region. He introduced his famous law

code and kept large amounts of records, which archaeologists have found. The Hittite King Mursilis II conquered Babylon and they in turn were conquered by the Kassites.

In 550 BCE, under the Persian King Cyrus the Great, Mesopotamia became part of the Persian Empire, which in turn was conquered by Alexander the Great in 331 BCE when he defeated the Persian King Darius III, and continued to be part of the Greek Empire for the next two centuries.

The most important thing about Sumer was that intangible things such as its ideas and beliefs continued on after its decline and were incorporated into the next civilisation. Things such as its language, writing, mathematics, astrology, medicine, religious beliefs, military formations, legal system and government were very important and needed to be preserved for the future generations.

3.3 Currently Accepted Theories For The Decline Of The Sumerian Civilisation

3.3.1 Introduction

There have been only a few theories about the decline of the Sumerian Civilisation and only two involving infectious disease. Prof. Amjad D. Niazi has proposed in his article 'Plague Epidemic in Sumerian Empire, Mesopotamia, 4000 years ago' (1) that plague helped end Sumer c.2000 BCE. Prof. H.L.J. Vanstiphout made a similar proposal in 1974. This thesis will explore and expand on this hypothesis later.

3.3.2 Environmental Degradation

The Tigris and Euphrates rivers were the lifeblood of Mesopotamia. Over the centuries these two rivers supplied the irrigation water to keep the agricultural fields from ending up the same as the surrounding desert. This intensive irrigation over hundreds of years went hand in hand with intense evaporation of the water in the hot desert climate resulting in salt build up in the soil. This salination of the fields later caused a significant drop off in food production which in turn caused famine. (2) Later new crops which were more saline tolerant, such as barley, had to be found to cope with this soil salination.

3.3.3 Drought

An alternative theory, to that stated above, has been proposed by Harvey Weiss from Yale University. In his article 'The Genesis and Collapse of Third Millennium North Mesopotamian Civilization' (3) Weiss used a pollen based record of agriculture in the region and proposed that there was a three hundred year drought in northern Mesopotamia starting from c.2200 BCE. This extensive drought caused famine and resultant mass migration of the population out of the region.

3.3.4 Warfare

The final theory for the decline of the Sumerian Empire was that after existing for so long it eventually went into decline and was invaded by its neighbours such as the Amorites to the north and the Elamites to the south. But this is more of a consequence of its decline and not a cause of its decline. What was the thing or things that caused Sumer to go into decline; and once weakened it was vulnerable to invasion by its neighbours? This thesis will argue that drought and salination of the fields caused famine which weakened the population. This weakened population then migrated south into Sumer and were packed into now crowded cities thus setting up a situation that predisposed it to infectious disease which was the final blow or "***coup de grace***". This weakened and diseased population would not be fit enough to defend itself against neighbouring invaders.

3.4 Infectious Diseases in Sumer – an outline

- “ place that had been touched” -

The Mesopotamians had a very sophisticated medical knowledge and system. The vast number of collections of medical texts written in cuneiform on clay tablets that have been found by archaeologists attests to this fact. These texts describe in detail human anatomy, signs and symptoms for the diagnosis of different diseases, surgical procedures and all manner of treatments which included a large corpus of ‘materia medica’ using mainly plants and herbs, but also animal and mineral components.

One misconception about Mesopotamian medicine is that it was all based on the ‘supernatural’; that you had a disease because you had offended the gods “The god’s hand was heavy upon me, I could not bear it.” (1); or that someone had put a curse or spell on you or that a demon “...caused by the grip, Akkadian sibtu, of a certain demon.” (2), ghost or witch wanted to harm you. The ghost may have been a relative who was neglected by the family or someone who had died from unnatural causes such as by trauma or drowning. So the diagnosis of the “hand of a ghost” is a relatively frequent cause for the patient’s illness (3). The patient also may have broken one of the many ‘taboos’ and so needed to be punished.

They also recognised that there could also be ‘natural’ causes for a patient’s disease or illness such as trauma, contaminated food and water, consuming excess alcohol or other foods and drinks, poisoning; plus some contagious diseases described as “ place that had been touched” (4) and fevers.

The Mesopotamians recognised many different types of fevers. It is interesting to study the different types of fever in detail because fever was a common symptom in infectious disease epidemics. Firstly there was ‘isatu’, meaning ‘fire’ which was used as a metaphor for ‘feverish heat’ (5). Then came ‘ummu’, which meant ‘repeatedly fever’ (6). This could be used for ‘relapsing fevers’ or ‘remittent fevers’. Next was ‘li’bu’ which was used for fever with an infectious disease. The fourth type was ‘di’u’ which was “an epidemic disease, is seasonal, and that it may include malaria.” (7). So this is pointing

to a seasonal epidemic infectious disease which may be malaria; but why couldn't it also be another seasonal epidemic infectious disease such as influenza or typhus or dysentery – all of which are capable of causing very high death rates in a virgin population which had never been exposed to such infections before? The fifth type of fever is 'suruppu' or 'shivering fever' or 'chills'. Today we would call this 'rigors' which is present in bad infections. The sixth type of fever is 'hamatu' which stood for 'to be inflamed' and was used in the context of skin problems such as inflamed skin (8). Next there is 'himtu' meaning to 'burn', again in a skin context. Finally there is 'huntu' which is Assyrian for 'fever'. So all of this shows that the Mesopotamians were aware of various types of fevers which one gets when one is in the grip of an infectious disease; which would include various epidemics.

Because of this dichotomy between the 'supernatural' and the 'natural' causes for disease the Mesopotamians had two types of healers or medical practitioners who would treat the patient individually; and sometimes they would work together to effect a cure. The "Asuu" were the physicians and the "Aszipu" were the magicians. The Asuu were the therapeutic healers who gave the patient physical help such as oral medicines or topical medicines such as salves and paints. By contrast the Aszipu used magical omens, chants, charms and incantations to drive the 'evil' from the patient. Asuu could be either male or female, but Aszipu were always male.

The Mesopotamian medical practitioners had no concept of a contagious disease being an infectious disease caused by bacteria, viruses, fungi or protozoa; so they used metaphors from the heavens such as 'evil wind' or 'dark storm' or 'violent gale' to explain this occurrence. This will be covered in much more detail later in the thesis.

Medical texts from ancient times were either written on clay tablets, animal skins or papyrus rolls. If the clay tablets had been subjected to fire, such as when the library they were stored in was destroyed by fire either by accident or by warfare; the clay tablet was baked hard so it was preserved forever. Animal skins and papyrus rolls deteriorated and decomposed over the centuries. That is why there are more

Mesopotamian medical texts to research because they used clay tablets; than from ancient Egypt, Greece or Rome where they used animal skins or papyrus to write on.

The Mesopotamian physicians had a comprehensive pharmacopeia of medicines to help them treat patients if needed. This pharmacopeia consisted of plant or herbal extracts, animal components and minerals; which were mixed into a menstruum or solvent made up of either water, honey, oil, fat, milk, alcohol, beer, vinegar or the most popular – wine. An **example** of an ancient prescription for a facial injury reads:” If a man is sick with a blow on the cheek, pound together fir-turpentine, pine-turpentine, tamarisk, daisy, flour of Inninnu; mix in milk and beer in a small copper pan; spread on skin, bind on him, and he shall recover.” (9).

The first person to examine the Mesopotamian medical texts seriously was Englishman Reginald Campbell Thompson, Fellow of Merton College, Oxford. In 1923 he published his landmark book ‘Assyrian Medical Texts’. For his book Thompson analysed the 660 cuneiform clay tablets from the library of Ashurbanipal. This vast library was established by King Ashurbanipal of Assyria who reigned from 668 to 627 BCE. He was one of the few kings who had been trained in cuneiform writing known as the ‘scribal arts’. Because of this interest he collected an estimated 30,000 tablets for his huge library.

The next major contribution to the analysis of Mesopotamian medical texts was made by Frenchman Rene Labat who in 1951 published his book ‘ Treatise of Medical Diagnoses and Prognoses’. The latest contribution has been made by two Americans; Assyriologist and cuneiformologist JoAnn Scurlock and her colleague physician and medical historian Burton R. Anderson. Their book ‘Diagnoses in Assyrian and Babylonian Medicine’ published in 2005 is the culmination of all the research done by scholars over the past 150 years.

Other scholars have now joined the above group. These include, in alphabetical order: P.B. Adamson, R.D. Biggs, B. Bock, W. Farber, I.L. Finkel, M.J. Geller, N.P. Heebel, M.Stol, and N. Wasserman.

3.4.1 Sources of Evidence

3.4.1.1 Literary Texts

There are several Literary Texts available to Sumerian and Marian medical researchers which include;

A] ARM or the Publication des Archives Royales de Mari - which is written in French and deals mainly with the last 50 years of the Kingdom of Mari before it was defeated by Hammurabi of Babylon in c.1761 BCE

B] EbDA or Ebla Digital Archives. Ebla was the neighbour of Mari to the north-west

C] Books such as – Letters to the King of Mari (Heimpel 2003) dealing with the reign of the last king of Mari.

D] CDLI or the Cuneiform Digital Library Initiative – a joint project mainly of the University of California, Los Angeles, Oxford University and the Max Planck Institute for the History of Science

E] ETCSL or the Electronic Text Corpus of Sumerian Literature from Oxford University

F] CAD – Chicago Assyrian Dictionary

G] Yale University Babylonian Collection including the J. Pierpont Morgan Collection

H] AWOL or the Ancient World Online

The Oxford University based ETCSL was the main source for information as it is very comprehensive, easily accessible, accurately translated as one would expect from Oxford University classics research with copies of the original Sumerian text and the English translation being readily available together; plus it contained all the City Laments which were the major Sumerian texts mentioning actual infectious disease epidemics.

The ETCSL corpus contains a 'Catalogue of all available compositions and translations by category' at the beginning; which as the title says - lists everything available by category. Under the category 'Compositions with a historical background'; in other words they are genuine descriptions and not made up stories or fables; there are two sections. The first Section deals with 'King lists and other compositions' while

the second Section deals with 'City Laments'. Thus the only relevant section from an historic point of view is the one dealing with City Laments because they are going to lament about and describe how a city ended or was destroyed either by warfare or by infectious disease. The warfare or being conquered may also be after the infectious disease had fatally weakened the defending city population so they could not defend themselves or their city from invasion by neighbours. So the City Laments were the major source of literary evidence.

3.4.1.2 Medical Texts

Medical Texts available to Sumerian and Mesopotamian Medical Researchers include:

A] JMC - the Sumerian medical history journal – Le Journal des Medecines

Cuneiformes

B] CDLI as described above

C] ETCSL as described above

D] AMT – Assyrian Medical Texts written by R. Campbell Thompson in 1923 in London.

E] Various books written by Sumerian medical experts such as Biggs, Finkel, Geller, Scurlock and Stol - all of which have been mentioned earlier in this thesis.

F] AWOL as described above

Medical texts can be divided into several themes. They can be “scientific” or “diagnostic” oriented; versus being “practical” or “therapeutic” orientated. In other words they can be texts about making the scientific diagnosis; or they can be texts about practical treatments/therapies for the problem. The texts can also be divided into “magic” orientated texts, because the Sumerians believed disease could be due to the wrath of the gods with spells and magic involved; versus more “science based” orientated texts.

Also some texts are purely prognostic. They would say that if a person has the following symptoms and signs then their prognosis is “such and such” and nothing more – no mention of treatment, only prognosis. Texts are usually arranged anatomically, by body parts, starting with the head and going down sequentially to the feet.

These primary sources will be used as the basis of the analysis of this thesis.

3.5 The Indus Valley Civilisation – A Background History

The Indus Valley Civilisation is a mystery for several reasons. Firstly, it remained hidden and unknown until it was initially excavated in 1920, thus making it the last of the five original civilisations to be discovered. Secondly, nobody can read its writing or pictograms, hence there is no written record about the Indus Valley Civilisation that can be consulted. Until someone finds an Indus Valley Civilisation equivalent of the Rosetta Stone and then is able to unravel the writing mystery, ancient historians will be kept in the dark about its full history. The final and biggest mystery is – why did the largest of the original five ancient civilisations, the size of Western Europe, encompassing western India, Pakistan and eastern Afghanistan, end? This thesis will try to help solve this last mystery.

The Indus Valley Civilisation was based in the river basin of the Indus and Ghaggar-Hakra Rivers. It is also known as the Harappan Civilisation after Harappa, the first city of this civilisation to be excavated. Other major cities include Mehrgarh, Mohenjo-daro, Rakhigarhi, Ganweriwala, Dholavira and the port city of Lothal. At its height its population is estimated to have been over five million people.

Periodisation of the Indus Valley Civilisation is based on the dates from the excavations at Harappa [the first large city to be excavated] and Mehrgarh [the earliest known agricultural place]. Hence it starts with the Early Food Producing Era also known as Mehrgarh I (ceramic Neolithic) from 7000 – 5500 BCE. Next comes the Regionalisation Era which starts with Mehrgarh II – VI (ceramic Neolithic) from 5500 – 3300 BCE and finishes with Early Harappan Phase from 3300 – 2600 BCE. Then comes the Integration Era or Mature Harappan Phase which is the time of the real Indus Valley Civilisation from 2600 – 1900 BCE. Finally comes the Localisation Era or Late Harappan Phase from 1900 – 1300 BCE. After this time the remains of the Harappan Civilisation broke up into smaller separated regions and cities. The beginning of the decline of the Harappan Civilisation had occurred by c.1900 BCE and continued until the final end c.1300 BCE.

Unlike Egypt with its pyramids, temples and large statues, the Harappans built no large monuments or structures that have endured. Cities were based around a central citadel and show signs of advanced urban planning. The houses contained the first known urban sewerage drainage and water supply systems. Houses were made of baked bricks that opened into a central inner courtyard and had a bathing room where the waste water was taken away via covered drains, which ran down main roads. They built large granaries, warehouses, brick platforms and protective walls which may have been more to protect the city from flooding than from invaders. The large dock at Lothal is recognised as one of the major maritime structures of the ancient world, having advanced engineering to allow up to sixty ships to berth there on the tide, at any one time. Lothal also had a very large warehouse to cater for the goods imported and to be exported via this large dock. Mohenjo-daro contains the Great Bath and the Great Granary, which are very large and advanced structures. Extensive canal irrigation systems were also used by the Harappans.

Harappan technology was also advanced. The Gujarat region was famous for its carnelian stone products, especially its beads. It had developed a string bow drilling mechanism so that holes could be drilled through the carnelian stone to make their famous beads, Thus they became the 'Bead Capital' of the ancient world, and, no doubt, these beads were exported to all parts of the ancient world via the docks at Lothal. The Harappans also made carved seals from shells and were well versed in metallurgy using copper, tin, bronze and lead. The Harappans were among the first in the ancient world to develop a uniform system of weights and measures and had the smallest division of any measuring system in the Bronze Age being 1.704mm long. This measuring device was made of ivory and found in Lothal. Excavation sites have revealed sophisticated sculptures, anatomically correct detailed figurines, pottery, ceramics, gold jewellery, seals, a harp-like musical instrument and figures in dancing poses [so there must have been some form of dancing]; all of which indicates an advanced and sophisticated civilisation.

A recent find has shown how advanced Harappan technology had become. Copper plates have been found that are larger and stronger than the known usual Harappan copper plates used as seals. These plates also differ significantly from the usual copper plate seals in another important way because they are “inscribed with mirrored characters. One of the plates bears 34 characters, which is the longest known single Indus script inscription.” (1) The conclusion is that these plates, which have been dated as c.2200 BCE, were used for printing. This means that they predate the earliest known printing, by the Chinese using wood-blocks c. 700 BCE, by 1500 years.

The ancient city of Harappa was well known to the local people hence its ruins were first mentioned in the book “Narrative of Various Journeys in Balochistan, Afghanistan, and the Panjab”, written by Charles Masson and published in 1842. (2) In 1856 the baked bricks of the Indus Valley Civilisation city of Brahminabad, plus another such city, were used by the British as ballast during the construction of the Karachi to Lahore railway line. General Alexander Cunningham was the Director of the Archaeological Survey of Northern India. In 1872 he published the first Harappan seal and in 1912 J. Fleet discovered more Harappan seals. This led to the initial formal excavations of Harappa in 1921-22 by Sir John Hubert Marshall. Since then well over a thousand Harappan sites have been discovered from as far west as Balochistan to Uttar Pradesh in the east and from north-eastern Afghanistan in the north and Mararashtra in the south.(3)

The Harappan writing system consisted of symbols or pictograms which so far have remained resistant to deciphering. Because of this there are no written texts that can be referred to by historians for a written history of the Harappans to tell us about their religion, form of government, royal families [if they had any], medicine, army [if they had one] and educational system, for example. This writing system is very similar to that found on Easter Island called Rongorongo. So far no monumental temples, palaces or army barracks have been found. The Harappans seem to have been an egalitarian society that traded widely, with no real standing army to protect them.

After the collapse of the Indus Valley Civilisation c.1900 BCE regional cultural centres developed. In Harappa it was called the Cemetery H Culture from c.1700 BCE, while in Rajasthan it was the Ochre Coloured Pottery Culture, which expanded into the Ganges River basin. The common Hindu practice of cremation of the dead had its earliest manifestation in the Cemetery H Culture. The Cemetery H Culture and the Ochre Coloured Pottery Culture, along with the Gandhara Grave Culture, which emerged from Gandhara c.1600 BCE; most likely formed the beginnings of the Vedic Civilisation.

The Indus Valley Civilisation did not hand over to its descendants, the Vedic Civilisation, tangible things such as large buildings and monuments; but more important intangible things such as beliefs, religion, culture and an advanced medical knowledge including things such as early yoga.

3.6 Currently Accepted Theories For The Demise Of The Indus Valley Civilisation

3.6.1 Introduction

There are many theories for the end of the Indus Valley Civilisation, but no scholars have proposed that infectious disease epidemics could have been one of the causes or a significant co-factor in the end of the Indus Valley Civilisation; until now.

The Indus Valley Civilisation was the biggest of the five ancient civilisations and covered the area equivalent to today's Western Europe. Because of its large size there may have been several causes for the end of the Indus Valley Civilisation such as drought in one province and flooding in another, which may have been hundreds of kilometres away. So the end may have been multifactorial, with many possible causes in many different areas; but the possibility of an infectious disease as a cause should never be ignored. Prof. Rita Wright is an Associate Professor of Anthropology at New York University and an Assistant Director of the Harappan Archaeological Research Project. In her book 'The Ancient Indus' she refers to "general" and "local" causes for the "collapse" of civilisations (1); and the Indus Valley Civilisation is an excellent example of this principle. Climate changes, for example, would be a "general" cause affecting the whole civilisation, while deterioration of public works, such as sanitation in a city, due to a breakdown of civic authority leading to an infectious disease outbreak would be a "local" cause. But that "local" infectious disease outbreak could become a more widespread "general" infectious disease epidemic, which could affect the whole of the civilisation eventually.

Another two factors to consider when discussing the end of the Indus Valley Civilisation are: firstly, did it end suddenly or did it go into a slow decline and secondly, when? Both questions are still open to debate. The Mature Harappan era was from 2600 – 1900 BCE and this was followed by the Late Harappan era. There is debate about whether it ended by 1900 BCE or went into a decline after 1900 BCE. The

answer will turn out to be – it depends upon which area, Provence or city **one is talking about**. To help answer this question the research by Hirofumi Teramura and Takao Uno from the International Research Centre for Japanese Studies in Kyoto, Japan should be consulted. Their research into the Harappan Civilisation involved using Geographical Information Systems (GIS) to conduct “spatial analyses that locate settlements on a digital elevation model (DEM) according to the three phases of early, mature and late.” (2) The research for the article showed that the Harappan Civilisation went into a decline after c.1900 BCE or Stage 6 of their seven stage model; when the population moved from west to east into the upper greater Ganges Valley Basin. “In addition, the number of sites in the upper Indus River basin including the site of Harappa decreased while many sites in Gujarat continued.” (3).

So as the western part of the civilisation declined; the eastern part continued on in Gujarat with its port of Lothal. This western decline and eastern continuance would be repeated again two thousand four hundred years later when the Roman Empire slowly declined over many centuries with the Western Roman Empire eventually being overrun by various tribal groups and the Eastern Roman Empire continuing on as the Byzantine Empire. The Indus Valley Civilisation continued on in Gujarat in places like Lothal, for example, until 1300 BCE; which is the recognised end of the Late Harappan/Harapan 5 era and the beginning of the Iron Age with the Painted Gray Ware and Northern Black Polished Ware Cultures taking over. The Harappan expert, Prof. J.M. Kenoyer states “...the decline of the Indus cities (1900 to 1300 B.C.)” (4) So the Indus Valley Civilisation went into a decline which lasted from 1900 BCE until 1300 BCE; but these dates would vary from region to region, depending upon which cause/causes were applicable.

The question is – why the movement of population from west to east and the final decline? Was it due to climate change or were the people “pushed” from their homelands by infectious disease and “pulled” by the prospect of infectious disease free lands to the east?

3.6.2 Climate Change

During the late third millennium BCE there was a general increase in global aridity and “it is possible that the monsoon winds may have shifted southward, decreasing critical rainfall in some areas, causing drought, and increasing it in others, causing flooding.” (5) A good example of this climate change was the desertification of the Punjab. But, did this contribute to the decline of the Indus Valley Civilisation or if it did happen, did people adapt and simply move to new sustainable agricultural areas? Just because one area becomes depopulated it does not mean the end of the civilisation because the population is still alive and intact – it just had to move to better areas. But if a population is infected by an epidemic and they die; that is a different matter; because then the civilisation is adversely affected in a big way because it cannot survive if most of its inhabitants are dead.

It must also be pointed out here that the great civilisations of Egypt and Mesopotamia survived for thousands of years with their rivers [the Nile and the Tigris and Euphrates] running through arid deserts and did not have the benefit of monsoonal rains – just the fresh waters of their river; and yet they survived quite well. So why were the Harappans so special and different, that they could not survive under similar climatic circumstances?

3.6.3 Environmental Degradation

The Harappans used up a lot of timber for various reasons which led to deforestation of large areas of their land. Firstly timber was needed to fire the bricks used in the construction of all their buildings, whether they be large public buildings or just their home dwelling. Timber was also used as a domestic fuel for cooking and heating, as well as for metalworking. Lastly, large tracks of land were cleared of trees for agriculture to feed the population of the civilisation. The resultant deforestation would have caused large areas of soil erosion and other adverse climatic changes.

3.6.4 Earth Movement

The Himalayas mountain region, in the northern part of the Indus Valley Civilisation, runs along a fault line in the earth's crust and is subject to tectonic forces which cause earthquakes and vast changes to the earth's topography. These tectonic changes resulted in rivers flowing in different directions and coastlines to change.

3.6.5 Sea Level Changes

The combined impact of the late third millennium rise in global aridity and tectonic forces caused the sea levels to begin falling. "The sea levels began falling in the late third millennium, leaving Harappan ports in the Makran high and dry. This must have had a major impact on trade passing through the Makran." (6) Also "the port at Kunasi was abandoned around 1700BCE. On the other hand, a new port was established at Bet Dwarka on the northern peninsula of Saurashtra, a spot exposed by the receding coastline (and today again under water). (7)

So, again this shows the principle of man's ability to adapt to adversity; if one port closes, then another port opens. But does this mean the end of the civilisation; is this a final knockout blow that would end the civilisation; unlike a severe epidemic of smallpox or bubonic plague that could kill most of the population? No, because it just means building a new port and diverting shipping and changing the trade routes to suit; but the population is still intact, alive and well and able to adapt; unlike a population that is dead from an infectious disease epidemic.

3.6.6 Changes in flow of Rivers

The Indus River, like all major rivers, changed its course over the years. As Dr. Jane McIntosh notes in her book:

“The Indus has changed its channels many times, and sometimes there has been a major shift in its course; the river today flows much further east than in the Harappan period. However, major flooding and river course changes in the Indus plains were a regular hazard of life, with which the Harappans had learned to cope when they first colonized the plains: major settlements were constructed on massive platforms, while villagers in the floodplain may have managed by occupying houseboats for all or part of the year.’(8)

The Saraswati Valley was a different matter though as the Sarawati river system was a major river system flowing into the Indus River and its river valley sustained a large population. One of the major rivers that flowed into the Sarawati River was the Yamuna River and its flow was diverted from the Sarawati into the Ganges River system in the early second millennium, after tectonic forces changed the local topography, hence its flow. This caused massive depopulation of the Sarawati Valley in favour of the Ganges River system. Again, was this a final blow for the Harappans or did it just mean that this was an opportunity for them to expand their realm into the upper Ganges River system? This should have been regarded as an opportunity to expand the empire and not a cause to end it.

3.6.7 Changes in Agriculture

The staple crops for the Harappans were the winter planted crops of wheat, barley and some pulses. Rice was known but it was a summer crop and required intensive irrigation, hence was little grown.

“Native millets, also grown in summer, were the main crops in Saurashtra but were low yielding. However, in the early second millennium much higher-yielding African millets (sorghum, finger millet, and pearl millet) were introduced and began to be cultivated.” (9) So, was there contact between the Indus Valley Civilisation and the

west coast of Africa to allow this importation of African millets into the Gujarat region? And if so, did this include ancient Egypt? “During the Mature Harappan period, Gujarat was an area of low agricultural productivity.....The cultivation of African millets ,by greatly increasing productivity, brought about an agricultural revolution on Saurashtra during the early second millennium, with a massive increase in the number of settlements...” (10) This was not only because the African millets were much more productive but also because it meant they could plant two crops – one in winter and one in summer. With more labour available to develop irrigation, more rice was planted and so the eastern part of the Indus Valley Civilisation became more prosperous and important; thus encouraging the population to move eastward.

3.6.8 Aryan Invasion

Sir Mortimer Wheeler, the Director of the Archaeological Survey of India from 1944 to 1948, was a great **proponent** of the Aryan Invasion theory to explain the Mohenjo-daro “massacre” skeletons haphazard burial disposition. The forensic paleoanthropologist, Prof. K.A.R. Kennedy disproved this theory when he analysed these “massacre” skeletons and showed that there were no signs of violence, only malaria. This will be discussed in detail later in the Skeletal Analysis chapter. Prof. K. M. Srivastava also wrote a detailed article which disproved the myth of the Aryan Invasion titled “The Myth of Aryan Invasion of Harappan Towns” (11) So this cause for the end of the Indus Valley Civilisation can be eliminated.

Aryans may have been present in the late period when Indus Valley Civilisation remnants existed after its collapse. The Aryans did not invade and conquer but migrated gradually as pastoralists, seeking grass for their cattle.

3.6.9 Trade with Mesopotamia Ended

The Harappans were great traders and traded with all the known civilisations around the Persian Gulf region such as Sumer at the mouth of the Tigris and Euphrates Rivers, Magan (in today's Oman), Dilmun on the west coast of the Persian Gulf along with Elam (today's Iran) and Simasmi on the east coast of the Persian Gulf.

The Sumerians referred to the Indus Valley Civilisation as 'Meluhha' and it was apparently a major trading partner for the Harappans. Around 2000 BCE the Sumerian state suffered political changes which adversely affected trade with the Harappans because after this time Sumerian text have little reference to Meluhha. This sudden ending of trade with Sumer is proposed as a possible cause for the demise of the Harappan state. But it could also just as easily have served as a catalyst for the Harappans to expand their trading routes and partners to include the west coast of Africa, as shown by the introduction of African millets into Gujarat, and Egypt, as shown by the discovery of ancient Egyptian objects in the port of Lothal in Gujarat. They could also have expanded their trade with existing trading partners in Magan, Dilmun, Elam and Simasmi. So the end of trade with Sumer does not seem to be as devastating as first thought.

In summary, the above has shown that there are many possible causes for the end of the Indus Valley Civilisation and that each of these causes lacks the 'knockout blow' factor of a general infectious disease epidemic to end the Harappan's world. This is because the population could have adapted to the relevant slow environmental change or trade change that was occurring, which is not possible if the population was dying 'en masse' quickly from an epidemic.

3.7 Infectious Diseases in Ancient Times

3.7.1 Zoonoses

A zoonosis is any infectious disease that can be transmitted from animals (both wild and domestic) to humans (1). Both the Sumerian Civilisation c.2000 BCE and Indus Valley Civilisation c.1900 BCE were dominated by rural agricultural activity where peasants lived with wild and domesticated animals, hence by having contact with them all the time were prone to zoonoses.

Animals such as (in alphabetical order) bats, cats, cattle, dogs, fish, fleas, flies, geese, goats, horses, lice, mice, mosquitos, pigs, rabbits, rats, rodents, sheep, snails, ticks and wolves, may have been present in Sumer c. 2000 BCE and the Indus Valley Civilisation c.1900 BCE. These animals could have caused many different zoonoses such as (in alphabetical order) anthrax, brucellosis, bubonic plague, cholera, encephalitis, *Escherichia coli*, rabies, salmonellosis, tularemia and typhus, to name but a few. Malaria is not a zoonosis, even though it is transmitted by a mosquito, because it depends on the human to be a host for part of its life-cycle.

Of these zoonoses, brucellosis, *E. coli* and rabies would not be generalised enough, nor sustain an epidemic long enough to cause the end of the Sumerian or Indus Valley Civilisations. The other zoonoses such as plague, cholera, salmonellosis, typhus, encephalitis and tularemia would be capable of being spread over large areas and large populations, as well as lasting long enough to cause significant harm.

3.7.2 Leprosy or Hansen's Disease

Leprosy is a chronic disease caused by the bacteria *Mycobacterium leprae* and has been infecting man for over 4,000 years (2). Because it is a chronic slow growing disease it would have been too slow to be the devastating epidemic that helped deliver the knockout blow to end the Sumerian or Indus Valley Civilisations. Leprosy has been found in Harappan skeletons and this will be discussed later in the thesis.

3.7.3 Smallpox

Smallpox is caused by a virus, which is transmitted human to human via droplet infection. It has been infecting humans for some 12,000 years (3) and has a mortality rate, for the more common and more serious version called variola major, of up to 60% (4). Because it is easily transmitted via droplets, hence highly contagious with a short incubation period of about 12 days and a high mortality rate, smallpox is a good candidate for an infectious disease that could have helped end the Sumerian and Indus Valley Civilisations.

3.7.4 .Tuberculosis

Tuberculosis is caused mainly by the aerobic non-motile bacillus *Mycobacterium tuberculosis* and sometimes by the less common *Mycobacterium bovis* which has been eliminated today as a major cause of infection due to pasteurisation of milk (5). In 1900 BCE however it was a major source of the disease as people were exposed to cows more often and pasteurisation did not exist. Other less common **strains** of tuberculosis causing mycobacteria include *M. africanum* in Africa, *M. conetti* located in the Horn of Africa and the rare *M. microti*.

The main site of infection is the lungs but extra-pulmonary manifestations of the disease can be seen in the pleura, in the meninges as a form of meningitis, in the lymphatic system also known as scrofula when the cervical lymph nodes are involved, in the urinary system and in bones especially in the spine when it is known as Pott's Disease [named after the St. Bartholomew's Hospital surgeon Percival Pott (1714-1788) who first described it].

Tuberculosis is highly contagious and is transmitted by droplet infection when an infected person coughs, sneezes, spits, sings or speaks. It has been found in the remains of bison from 17,000 years ago (6) and in human skeletal remains from 6,000 years ago. Even Egyptian mummies from 3000–2400 BCE have shown signs of Pott's disease (6). The Greek physician Hippocrates said that it was the most widespread

disease and was nearly always fatal, hence it would be a good candidate for a disease to end the Sumerian and Indus Valley Civilisations.

Tuberculosis has been found in Harappan skeletons and this will be discussed later in the thesis.

3.7.5 Influenza

Influenza is caused by a virus and was described by Hippocrates 2,400 years ago. The “Spanish Flu” epidemic of 1918–19 killed up to 100 million people worldwide making it the single most lethal pandemic in history (8); so its potential as a ‘history changer’ should not be underestimated, hence it would be a good candidate for a disease to end the Sumerian and Indus Valley Civilisations. An example of how it could be a ‘game-changer’ is - it was one of the reasons why World War One ended in 1918 because the Germans could not mount a counter-attack against the Allies when they did their major push in August 1918 because they did not have enough soldiers as they were dying from the ‘Spanish Flu’.

Influenza in a virgin population that had not been exposed to it before could be catastrophic, as shown by first contact death rates of up to 95% in the New World Indians and the Pacific Islanders. After the Amarna period of Ancient Egypt “the pandemic that followed this period throughout the Ancient Near East may have been the earliest recorded outbreak of influenza” (9).

3.7.6 Poliomyelitis

Poliomyelitis is a viral infectious disease caused by the polio virus and spread from person to person mainly by the oral-faecal route. It can cause death by causing paralysis of the respiratory muscles by affecting the nervous system. Egyptian paintings from the 18th Dynasty (1403–1365 BCE) had depicted people with withered legs due to poliomyelitis (10).

In a virgin population not exposed to it before, the polio virus would be devastatingly lethal. As poliomyelitis occurs in epidemics many people would die from

respiratory failure due to the paralysis of their respiratory muscles. This was possible in the Sumerian and Indus Valley Civilisations.

3.7.7 Measles

Measles is a viral infection of the upper and lower respiratory system (11) caused by the *morbillivirus*. Like smallpox and influenza, measles in a virgin population is deadly as shown by its high mortality rate in the New World and the Pacific when they were first occupied by Europeans. This was also possible in the Sumerian and Indus Valley Civilisation.

3.7.8 Malaria

Malaria is an infectious disease caused by *Plasmodium* parasites which enter the body's blood stream from a bite from the Anopheles mosquito (12). Malaria has been infecting humans for over 50,000 years. There are several malaria-causing plasmodia namely *P. falciparum*, *P. malariae*, *P. ovale*, *P. vivax* and *P. knowles*. *P. vivax* causes the most infections but *P. falciparum* is the most deadly causing up to 90% of all deaths. Malaria would have been present in the Indus Valley Civilisation in 1900 BCE and signs of it have been found in Harappan skeletons, which will be discussed later in the thesis.

3.7.9 Typhoid Fever

Typhoid fever is caused by ingesting food or drinks contaminated by the bacterium *Salmonella typhi* (13). With the poor sanitation conditions at the time of the end of the Indus Valley Civilisation, when its famous city sewerage works would have deteriorated and even gone into a state of disrepair, it would have been a common infection causing severe high fevers, intestinal haemorrhage, encephalitis, delirium, abscesses and finally death. Typhoid fever is thought to have been the cause of the Plague of Athens (c 430 – 424 BCE) which killed one third of the population of Athens.

3.7.10 Dysentery

Dysentery is an infection of the colon which causes severe diarrhoea, bleeding from the bowel, high fever and eventually fatal dehydration. There are two types due to the different infective agents. The first type is amoebic dysentery caused by the amoeba *Entamoeba histolytica* and the second type is bacillary dysentery caused by the bacterium *shigella* which results in severe dysentery (14).

The poor sanitation conditions in the Sumerian Civilisation c.2000 BCE and Indus Valley Civilisation c.1900 BCE would have helped spread both these diseases.

3.7.11 Haemorrhagic Fevers

The Haemorrhagic Fevers infectious diseases are caused by various viruses. There are four families of viruses involved and these include today's life threatening *Ebola virus*, but also the fatal *Marburg Fever*, *Lassa Fever*, *Crimean-Congo Haemorrhagic Fever* and the terrible *Yellow Fever* because those infected go into liver failure and become jaundiced before they die.

Symptoms include a very high fever and sweating leading to severe dehydration and death. The vascular system also becomes badly inflamed causing bleeding to occur from most orifices including the mouth, nose and anus. Excessive bleeding would lead to death. There is evidence that Haemorrhagic Fevers existed in Sumer. This evidence will be presented later in the thesis.

The poor sanitation conditions in the Sumerian Civilisation and the Indus Valley civilisation would have helped spread all these highly infectious diseases.

3.8 Indus Valley Civilisation Skeletal Analyses

Introduction

The purpose of this chapter is to examine all the research that has been done on Indus Valley Civilisation skeletal remains so far. But before this can be done it is necessary to discuss the many limitations of such analyses, which then puts their results into proper perspective as to their ability to shed any light on the role of disease on the demise of the Indus Valley Civilisation. There are many issues in the interpretation of paleopathology results.

Firstly there is the concept of the Osteological Paradox.

“Paleopathologists identify diseases in bioarchaeological remains by the observation of skeletal lesions. However those that succumb to death shortly after contracting a disease will not show any signs of sickness on their skeleton, while those that were able to live much longer with the disease will have developed bony lesions. Due to this osteological paradox the question of a disease’s occurrence may be overlooked or misinterpreted, which in turn can lead to grandiose statements that some diseases were rare or non-existent in ancient times.” (1)

In other words – just because there is a normal skeleton, don’t assume that person was healthy and died of old age. Instead they could have died from an acute viral infection such as smallpox, measles or influenza or from an acute bacterial infection such as bubonic plague, typhoid or dysentery; but the skeletal remains do not reveal that fact because the person died so quickly that there was no time for the development of skeletal manifestations of the disease.

Secondly there is the concept of what I call the ‘cemetery paradox’. This is the situation where mainly wealthier and thus, one hopes, healthier people get buried in cemeteries and poorer people or the socially and economically marginalised, who are more likely to have more disease, may not be buried in the cemetery. So when the

skeletal remains of a cemetery are being investigated – are we seeing a true picture of what diseases were prevalent at the time in the whole population? This may not apply to a major infectious disease epidemic because smallpox or plague, for example, will kill a king just as easily as a commoner. But it may apply to more chronic diseases such as leprosy or tuberculosis, for example, where the poorer person's living conditions with poor sanitation and cramped living quarters would increase their predisposition to these diseases, and when they die their body is dumped somewhere out of sight. So when a skeletal survey of a cemetery is done and it states that so many skeletons had leprosy or tuberculosis – is this a true reflection of the leprosy or tuberculosis rate within the whole population of that city, including both rich and poor? Not necessarily.

Thirdly - not all the Indus Valley Civilisation skeletons have been examined, especially the partial skeletons and when they are examined and analysed, it has not been done properly in many circumstances. A proper and full examination should include ancient DNA analysis where possible, a forensic paleoanthropologist's examination of the skeleton and the involvement of a paleoparasitologist and paleoentomologist at the excavation site looking for the traces of disease parasites and insect or rodent remains. If this is not done thoroughly then diseases will be missed, hence not be able to be factored in when looking at the cause of the demise of the Indus Valley Civilisation. When there has been a proper analysis done on Indus Valley Civilisation skeletal remains then infectious diseases have been found, such as leprosy and tuberculosis by Prof. Gwen Schug in cemetery R-37 and cemetery H at Harappa. (2) But – how much has been missed or even lost forever so far by others though?

The final problem that needs to be factored in when analysing ancient skeletal remains is the quality of the DNA being extracted from the skeleton. Sometimes it is not possible to get good material for DNA analysis. Factors that may negatively impact on the quality of the DNA to be analysed include the age of the skeleton hence DNA degradation, how much flesh or soft tissue was left on the skeleton plus the environment in which the skeleton was buried such as the temperature, moisture

content and acidity of the soil. The other problem with DNA analysis is that of contamination of the material to be analysed by modern DNA; so that what is being seen may not be all ancient material. But ancient DNA can be extracted from the bone – especially the petrous temporal bone in the inner ear, teeth, faeces and hair of the deceased.

The Skeletal Surveys

Kenneth A.R. Kennedy was the Prof. of Physical Anthropology at Cornell University for 41 years and an authority on early humans in South Asia. He was the first Forensic Paleoanthropologist to examine the Mohenjo-daro ‘massacre’ skeletons. These skeletons have been referred to as the ‘massacre’ skeletons for decades because of their haphazard burial deposition at various places around the major Harappan city of Mohenjo-daro. It was assumed [never assume, find out the facts] that they had been the victims of the supposed Aryan Invasion – a **theory** championed by the British archaeologist and Harappan expert Brigadier Sir Robert Eric Mortimer Wheeler who was the Director-General of the Archaeological Survey of India from 1944 to 1948. Having a military background he assumed that these people had been killed during the Aryan Invasion [which in itself may be a myth] and were left for dead, where they were found 4,000 years later. Prof. Kennedy was to prove this all wrong.

Kennedy’s investigation resulted in an article titled “Trauma and Disease in the Ancient Harappans” (3). The opening paragraph of the article sets the tone of his scathing criticism:

“Over the course of the past fifty years of archaeological investigations of Harappan settlements, a thesis has persisted which concerns a massacre of a number of individuals some four millennia ago at Mohenjo-daro, the large urban centre on the Indus. It is ironic that this preoccupation with a traumatic demise of these Harappan citizens, or their aggressors, has been based upon the mode of disorderly disposal of the dead at Mohenjo-daro – essentially an archaeological datum – rather than upon the skeletal evidence of the trauma: the critical

biological datum.” (4) In other words he is saying that the skeletons need to be examined properly by someone who knows what they are doing. This is a good example of why archaeologists should do what they do best and stick to examining pottery etc.; and leave the skeletons to the properly medically trained experts.

He then goes on to say:

“In certain cases, where individual skeletons are described as bearing the marks of inflicted cuts and blows, the possibility that such damage originated with post-mortem erosional causes has not been considered.” (5). All supposed acute trauma marks turned out to be either due to post-mortem erosion or healed pre-mortem trauma marks – but nothing acute causing death.

“Furthermore, earlier investigators overlooked some very striking marks of pathological stress recorded on skulls and post-cranial bones of the reputed massacre victims.” (6) This bilateral thinning of parietal bones of the skull or “when thinning of the bones of the cranial vault is restricted to the outer table of compact osseous tissue and combined with porosity or the ‘punched-out’ appearance of these ectocranial plates and extensive remodelling of postcranial bones” (7) turned out to be what has been variously called ‘symmetrical osteoporosis’ by Hrdlicka in 1913 or ‘porotic hyperostosis’ by Angel in 1966 and finally ‘spongy hyperostosis’ by Steinboch in 1976 - a sign of chronic anaemia as seen in malaria for example. In summary Kennedy said “the massacre thesis does not stand on the basis of the skeletal record” (8)

Kennedy went on to investigate other Harappan skeletal series in India and Pakistan and found the rate of porotic hyperostosis to be as high as 25 per cent of the total Harappan sample. These investigations were done in 1964, 1977 and 1980 and showed that the condition occurred in both men and women from infancy to old age;

and was not just restricted to Mohenjo-daro – it was everywhere. Kennedy described how the skeletal manifestations occurred:

“The porous deformity is caused by pressure atrophy introduced by hypertrophy of the hematopoietic diploic tissue between the external and internal tables of the bones of the cranial vault. The cribiform appearance is brought about by the complete destruction of the external or ectocranial table and hypertrophied cancellous bone. Thus the cranial vault is thicker in the affected area than in normal: the hypertrophied bone protrudes over the normal contour of the skull. However, the absolute thickness of the external table is itself reduced by its sieve-like modification. Postcranially, there occurs an hypertrophied alteration of bone marrow beginning in infancy or childhood as more red blood cells are produced to compensate for the higher turnover of abnormal red cells caused by the anaemic condition” (9)

The possible causes for this skeletal abnormality include the inherited haematological disorders thalassaemia major and minor, sickle cell anaemia, hereditary spherocytosis, hereditary elliptocytosis and hereditary nonspherocytic haemolytic anaemia. Other disorders to cause this condition include iron deficiency, G6PD deficiency, pyruvate kinase deficiency, congenital haemolytic jaundice, cyanotic congenital heart disease and polycythaemia vera in childhood.

After examining the way the spongy hyperostosis was distributed in the skulls Kennedy concluded that “either thalassaemia or sicklaemia or both pathological conditions were present in the Harappan population.” (10) Kennedy then goes on to say:

“People heterozygous for thalassaemia and sicklaemia possess an inbuilt natural resistance to malaria. Later, it was recognised, by other workers that this resistance is due to the short life-spans of the red cells in these heterozygotes which inhibit or prevent malaria parasites from maintaining long-term infections in the circulatory system.” (11) and “Furthermore, the probability is high that these

diagnostic markers of thalassaemia and sicklaemia are associated with endemic malaria as a balanced polymorphism in ancient times in Harappan settlements.”
(12)

Kennedy was also critical of the motives for the skeletal examinations which were done for various reasons, except to find the cause of death. Motives included:

“the question of establishing the racial and physical characteristics of the ancient inhabitants of the cities and towns (Guha and Basu 1938; Gupta, Dutta and Basu 1962; Sewel and Guha 1931), to determining their degree of genetic homogeneity or heterogeneity (Bartel 1979; Dutta 1972, 1975a, 1975b), and to discovering their biological affinities to other ancient skeletal series or to contemporary human populations (Chatterjee and Kumar 1962, 1963a, 1963b; Krogman and Sassman 1943; Sakar 1964,1972).” (13)

Maybe the examiners did not try to find the cause of death and stuck to morphological factors instead, because they did not factor in the possibility of infectious disease as a cause of death; hence did not go looking for any signs of it. Thus there needs to be a reorientation of research designs and focus to include looking for signs of what infectious disease killed the skeleton in question being examined.

In summary; Kennedy concluded that the Mohenjo-daro series showed signs of some sort of plague due to the way the skeletons had “...been hastily and informally cast away, abandoned and left unaccompanied by funerary goods. For example, such was a common practice in medieval European plague pits into which the infected dead were cast. The repositories might be abandoned buildings...” (14) The researcher Marshall concurred: “Marshall attributed the disposal of the dead at Mohenjo-daro to causes related to plague, famine and sudden death.” (15) Famine would have made the population more prone and susceptible to infectious disease.

Finally, in the last paragraph of his article Kennedy hoped that his article “initiates a dialogue between his successors working today in the fields of archaeology and

physical anthropology.”(16) In other words this is an excellent example of why archaeologists should engage with the medical fraternity and use properly trained paleoanthropologists to examine the skeletons they find during the course of their excavations. Also today it is possible to do ancient DNA analysis of skeletons, which was not possible in Kennedy’s time.

Another study of Harappan skeletons which has revealed signs of disease was conducted by Prof. Gwen Robbins Schug who is an Associate Professor of Anthropology at the Appalachian State University, North Carolina, USA. She and her colleagues studied 160 skeletons, which was 67% of the total number excavated in Harappa, “from three main burial areas at Harappa: an urban period cemetery (R-37), a post-urban cemetery (H) and an ossuary (Area G).” (17) Hence this study is the largest and most comprehensive done so far.”...it is also the largest sample of skeletons that has been studied from an Indus city thus far. Our data include individuals from three different burial areas at Harappa, spanning a period of 700 years, making the BHARaT (Bioarchaeology of Harappa, Research and Training) project the most comprehensive survey of skeletal pathology from an Indus city to date.” (18) They used normal established paleoanthropological examination techniques to assess the bones for signs of diseases such as leprosy and tuberculosis; but did not subject the bones to ancient DNA analysis.

The study found:

“Leprosy was present in a relatively small proportion of individuals during the urban period but the post-urban phase saw increasing risks for health and safety. By the Late Harappan phase, leprosy and tuberculosis affected 15.4% of the individuals buried at Cemetery H and leprosy affected 21.7% of the Area G specimens.” (19)

This is quite a substantial percentage of the population infected with either leprosy or tuberculosis. The authors argue that because of the deteriorating climate

change scenario, that this had an adverse effect on the population at Harappa so there was an increase in infectious disease as seen when comparing Urban phase and Late Harappan phase infection rates for leprosy and tuberculosis.

Sir Alec Jeffreys is a British geneticist who developed the complex techniques required for DNA fingerprinting or DNA profiling in 1984. These techniques became commercially available in 1987. So from 1987 paleoanthropology entered a new world where DNA sampling of skeletal remains to look for any diseases present in the skeleton was possible – if done. And therein lies the problem – not all Indus Valley Civilisation skeletons have had DNA profiling done on them; only a few so far, unfortunately. One series of skeletons that needs to be subjected to DNA analysis and profiling would surely have to be the Mohenjo-daro “massacre” skeletons to see what infectious disease epidemic, such as smallpox or plague, **could have** caused their sudden death. The author of this thesis has repeatedly requested such an analysis via the Archaeological Survey of India, the Anthropological Survey of India and the High Commissioners for India and Pakistan in Australia, all to no avail unfortunately. Advances in DNA analysis have now allowed previously unacceptable skeletons, such as ancient skeletons from hot climates, to be examined. To overcome these difficulties material from the petrous temporal bone in the middle ear has been used successfully.

(20)

One such study that used DNA analysis of the skeletons in its series was done by Prof. Dong Hoon Shin, Prof. at the Bioanthropology and Paleopathology Laboratory, Dept. of Anatomy at the Institute of Forensic Medicine at the Seoul National University College of Medicine in Seoul, Korea. He is working in conjunction with archaeologists, headed by Prof Vasant Shinde, from Deccan College in Pune, India at their excavation of the Indus Valley Civilisation site at Rakhigarhi in North-West India. This is an excellent example of co-operation between archaeologists and paleopathologists which should be a role model for future Harappan investigations, because a paleoparasitologist is also being used to examine the soil around the skeletons being excavated looking for ancient parasites which may have infected the relevant body.

So far they have produced an article about the skeletal remains in the cemetery at Rakhigarhi, which focusses on the mode of burial. (21) Several different types of burial practices were discovered in this cemetery; but no 'mass graves' as would occur during an epidemic, only a single skeleton in each grave . The reseachers found both primary and secondary internments as well as bodies buried in the usual supine position and in the less common prone position, with various funerary offerings for the after-life, placed around the skeleton. The results of ancient DNA analysis of the skeletons are still pending.

3.9 Sumerian Civilisation Skeletal Analyses

This section will examine the research that has been done on Sumerian skeletons.

There have been few Mesopotamian skeletons found to examine unfortunately. The oldest is one skeleton dating some 6,500 years ago which is now housed in the University of Pennsylvania Museum's Center for the Analysis of Archaeological Materials. It was found in Ur and was long forgotten in the museum's basement until now. This skeleton is some 2,500 years too early for the scope of this thesis which is interested in disease c.2000 BCE. It also has not been properly examined so far.

The main skeletal series from Mesopotamia is from the excavations done by Sir Leonard Woolley from the British Museum at Ur between 1922 and 1934, with the assistance of the University of Pennsylvania. Because he found many expensive jewels and other trappings of wealth it has become known as the Royal Cemetery of Ur site. These skeletons date from 2500 BCE which is 400-500 years too early for what this thesis is interested in, namely c.2000 BCE. These skeletons have also not had ancient DNA analysis done on them yet. They are housed in the Natural History Museum in London and the author of this thesis asked the head of the museum's Ancient DNA Analysis Research Unit, Prof Ian Barnes, about doing DNA analysis to no avail.

Unfortunately there are no Sumerian skeletons c. 2000 BCE, the time period focus of this thesis, known to exist to be examined. **This fact is acknowledged; hence it is difficult to draw any conclusions about infectious disease as a possible cause of death.** Hence the only way to find any facts about infectious diseases in Sumer 4,000 years ago is to rely on the contemporary accounts written on clay tablets as City Laments, which is what this thesis has done.

3.10 Diseases Which May Have Caused the Decline of the Sumerian and Indus Valley Civilisations

3.10.1 Introduction

The decline of the Indus Valley Civilisation was most likely multifactorial involving, amongst other things, climate changes and tectonic movements resulting in a shift of the monsoonal rains and redirection of rivers. Both these significant changes resulted in drought and flooding, both of which caused famine; most likely on a large scale at times. Famine in turn makes populations more prone to infectious diseases, which are usually the final event leading to death.

Until now, no ancient history scholars have looked at the role that these infectious diseases may have played on the decline of the Indus Valley Civilisation. These infectious diseases may have been the result of famine, but also the result of a breakdown of the sophisticated sanitation system used by the Harappans, as their cities aged and deteriorated; or from contact with other civilisations, such as Sumer, via their extensive trade network. Finally these infectious disease epidemics may have occurred 'de novo', for no apparent reason.

The following is a list of possible infectious diseases which may have contributed to the demise of the Sumerian and Indus Valley Civilisations. The possibility of infectious disease should always be considered when excavating and skeletons need to be examined fully and properly to find signs of disease or to exclude infectious disease as a cause of death as well.

3.10.2 Plague

3.10.2.1 Introduction

The bubonic plague is caused by the enterobacteria *Yersinia pestis* and is transmitted to man by fleas from small rodents such as rats. There is also a pneumonic form of plague which came first and is spread by droplet infection from coughing. It is a

very lethal disease killing two out of every three people infected within four days. The usually accepted first outbreak of bubonic plague was the Plague of Justinian in 541. “The first recorded outbreak of bubonic plague was the world’s first great pandemic. Called the Mortalitas Magna (Great Death) or the Plague of Justinian, it began in Arabia ...The pestilence reached Constantinople by the spring of A.D. 542 and lurked around the eastern Mediterranean until the 760s.” (1).

New research however by Mark Achtman ³ has suggested that the bubonic plague began near China about 2,600 years ago and spread to Europe via Central Asia’s “Silk Road”.

Mark Achtman’s research was published in Nature Genetics in an article titled “*Yersinia pestis* genome sequencing identifies patterns of global phylogenetic diversity” (2). His team compared 17 whole genomes of *Yersinia pestis* isolates from various global sources and “conducted phylogenetic analyses on this sequence variation dataset, assigned isolates to populations based on maximum parsimony and, from these results, made inferences regarding historical transmission routes. Our phylogenetic analysis suggest that *Yersinia pestis* evolved in or near China and spread through multiple radiations to Europe, South America, Africa and Southeast Asia, leading to country-specific lineages” (3) But Kozloff and Panagiotakopulu [to be discussed later in this section] argue that bubonic plague, coming from India, could have occurred during the reign of Amenhotep III early in the 14th Century BCE, i.e. predating Achtman’s Chinese suggestion by over 750 years. Thus if Achtman continued his research he may find that China may have contracted the plague from India, and that India instead is the primary source of the bubonic plague. This thesis

³ Note: Mark Ashman BSc, MSc, PhD from the University of California, Berkeley, USA is a Canadian microbiology researcher at the University College, Cork, Ireland where he specialises in the population genetics of bacterial pathogens and microbial Phytogeography. Prior to this he was a researcher at the Max-Planck Institute in Berlin, Germany specialising in molecular genetics and infections biology.

will also show that plague, in the form of pneumonic plague from Russia, occurred even earlier when it infected Sumer during its decline, about four thousand years ago.

This all leads to the Plague of the Philistines, also known as the Plague of Ashdod, which occurred c1190 BCE and may have been caused by the bubonic plague. If Egypt had bubonic plague during the reigns of Amenhotep III (c.1386-1349) and his son, Akhentanen (c.1370–1350 BCE) then it could have recurred to the north east in southern Canaan fifty years later to become the Plague of the Philistines.

The Philistines lived in south Canaan at the end of the Bronze Age and ruled their five city-states or Pentapolis of Gaza, Askelon, Ashdod, Ekron and Gath. They were the Kingdom of Israel's worst enemy and they fought each other many times. Their origin is obscure though. Some historians, such as Carl Ehrlich (4), believe they were "Sea Peoples" from either the Aegean or Mycenae in Greece who settled in southern Canaan after being defeated by Pharaoh Ramesses III in c1190 BCE, while others such as Riemschneider (5) believe they came from Anatolia as refugees from the crumbling Hittite Empire.

As stated earlier the Plague of the Philistines occurred c1190 BCE (6) while others think it may have occurred later, either 1141 BCE or in the second half of the 11th Century BCE (7). But Peter Kuniholm's Aegean Dendrochronology Project has shown that our current dating scheme for ancient times maybe anywhere up to 150 years out when compared to his tree ring dating scheme. "Long standing assumptions and conventions in other Egyptian and Old World chronology and history will need to be re-examined" (8) he has stated, hence the 1141 BCE stated above could in fact have been about 50 years out making it 1190 BCE.

According to author Lee Allyn Davis in his book Natural Disasters, the Philistine Plague was caused by bubonic plague and began in 1200 BCE after the Philistines captured the Ark of the Covenant (a box that contained ancient Hebrew records such as the Ten Commandments and the First Torah Scroll) from the Israelites.

Thus the first recorded plague, prior to this thesis, is the one which beset the Philistines in 1200 BCE, and which is recorded in the Bible in the Book of Samuel. This

thesis will show however, that there was pneumonic plague in Sumer in the end of the third millennium, approximately nine hundred years earlier than this Plague of the Philistines. The Philistines in this year defeated an army of nomadic Hebrews at Ebenezer, captured the sacred Ark of the Covenant and carried it in triumph to Ashdod, a city near Mediterranean Sea. But their triumph was immediately tainted, according to 1 Samuel 5:9: “the hand of the Lord was against the city with a very great destruction; and he smote the men of the city, both small and great, and they had Emerods (swellings) in their secret parts”. These swellings could be the bubo or swollen lymph nodes from bubonic plague.

The description makes it clear that bubonic plague had invaded the army of Philistines, probably from a stricken ship. If it had originated in the Ark of the Covenant as the Bible notes, it would have been mentioned in the Old Testament.

Wherever they took the Ark (of the Covenant), the Philistines took plague too. They moved from Ashdod inland to Gath, then to Ekron. The plague followed them. Terrified, they trundled the Ark of the Covenant into a cart pulled by two milk cows. If the cows took the Ark to the Hebrew border town of Beth-shemesh, they reasoned that the Lord of Israel was responsible for the plague, and had indeed smitten them.

The cows took the Ark into the field of Beth-shemite, Joshua stopping alongside a huge stone. Israel rejoiced, but not for long. In 1 Samuel 6:19, the Bible chronicles the inexorable progress of the plague; “and he smote the men of Beth-shemesh, because they had looked at the Ark of the Lord, even He smote the people fifty thousand and three score and ten men; and the people lamented because the Lord had smitten many of the people with a great slaughter” (9).

Davis gets his idea of the plague coming from a stricken ship and not the Ark of the Covenant from a book about plague called Plague an Ancient Disease in the Twentieth Century by Charles T. Gregg (10). In it Gregg states that the Plague of the Philistines occurred in the 12th Century BCE and that:

The plague of the Philistines probably invaded the town of Ashdod from a stricken ship rather than with the Ark of the Covenant and then infected the

crowds that conveyed the ark to the other afflicted cities. Had the plague begun in Israel there should have been accounts of it in the Old Testament, but Samuel mentions the disease no more. (11)

Others who also think the Plague of the Philistines was bubonic plague include W.J. Simpson and W.W.C. Topley and G.S. Wilson.⁴

Simpson (1905) affirms that the pestilence was bubonic plague, and that the 'emerods' were plague buboes, and his assertion has been repeated by later writers. Topley & Wilson (1946), for example, assert that 'In the 5th and 6th chapters of the 1st Book of Samuel there is an unmistakable account of bubonic plague. (12)

The description of the plague also mentions tumours which could have been the buboes or swollen lymph nodes associated with bubonic plague. Eric Watson-Williams (13) and Lars Walloe, Prof. of Physiology in the Faculty of Medicine at the University of Oslo (14) also support the theory that bubonic plague caused the Hittite Epidemic of 1322 BCE, the Plague of the Philistines c.1190 BCE and the end of the Bronze Age c.1200 BCE. From its bases in Egypt and Canaan the bubonic plague could have

⁴ Note: Simpson served as a health officer in Calcutta and Hong Kong, and was a member of the Royal Society of Tropical Medicine and Hygiene. He was also an MD from Aberdeen, a PRCP (London), DPH (Cambridge), Professor of Hygiene, Kings College, London and Lecturer in Tropical Hygiene at the London School of Tropical Medicine. In 1905 he published his book A Treatise on Plague through Cambridge University Press.

Note: Wilson MD, FRCP, DPH Director of Public Health Laboratory Service, England and Wales was a British bacteriologist, a member of the U.K. Whooping Cough Immunisation Committee in 1954, and wrote the Foreword to Hugh Paul's book Control of Communicable Diseases published in 1953.

Note: Topley (1886–1944) was a British bacteriologist who became Fellow of the Royal Society in 1930. Together with Wilson he wrote the standard textbook on the subject of Pathology namely Topley and Wilson's Principles of Bacteriology and Immunity in 1946.

spread across the entire Near East and Eastern Mediterranean region destroying empires and ending the Bronze Age.

3.10.2.2 The Sumerian Connection – The Evidence

Introduction

The decline of the Sumerian Civilisation was most likely multifactorial and one currently accepted theory says that it involved destruction of agricultural fields by salination leading to famine within the general population. (1) This in turn was followed by invasion by neighbouring states such as the Amorites and the Elamites, with a weakened population from famine unable to defend itself. Another theory is that there was a major drought that lasted for 300 years beginning c.2200 BCE in northern Mesopotamia. This theory was first proposed by Harvey Weiss from Yale University. (2)(3)(4) This prolonged drought has been documented using a pollen based record of agriculture, and helped to make agricultural land salinization worse. This in turn caused famine in northern Mesopotamia, which led to migration of the population south into Sumer, which was more fertile and practiced irrigation, looking for food. Thus a 'perfect storm' situation for the spread of infectious diseases was produced, where the population was firstly subject to famine, secondly moving 'en masse' south and thirdly crowded together in the cities of southern Sumer. All these three factors made the population more prone to infectious disease because the famine made the population weaker, the mass movement south favoured the carrying of infectious disease, besides being exposed to more infectious diseases enroute and the overcrowded cities helped the spread of infectious disease by cross infection. But this sequence of events has one critical link in the chain of causation of the decline of the Sumerian Civilisation missing – infectious disease epidemics. **One proposes that once the general population** was weakened by famine it then became prone to infectious disease epidemics because the people's immune systems were lowered, thus making them unable to fight infectious diseases properly. And once the general population was dying 'en masse' from these infectious disease epidemics then it was unable to defend itself

from invasion by neighbouring states. Thus infectious disease is the missing, but essential and most important, link in the chain of causation of the decline of the Sumerian Civilisation. Another reason why there had to be an extra factor involved in the decline of the Sumerian Civilisation is that if it was only going to be due to salination of the agricultural fields then why did the Egyptian Empire not suffer the same fate; because it too was reliant on continual irrigation of its agricultural land in a desert situation, just like in Sumer?

The epidemiologist Professor Alfredo Morabia from Columbia University estimates that "The threshold demographic concentration of half a million people was reached in ancient Sumer (currently Iraq) around 2000 BCE." (5) Once this critical concentration of population and resultant city congestion was reached then infectious disease epidemics started to occur due to cross infection. When agriculture began in earnest 10,000 years ago it allowed man to live in relatively large cities because the population could be fed and not have to rely on being in 'hunter-gatherer' small groups. Then came domestication of animals, which became a reservoir for new infections that could be transferred to humans. These new infections due to living in crowded cities became known as the 'crowd diseases', and good examples of 'crowd diseases' include smallpox and plague.

William H. McNeill, Emeritus Professor of History from the University of Chicago and one of the leading 'World Historians' proposed in his book 'Plagues and People' that there were four waves of epidemics in the history of the world. (6) The first wave went from 2000 BCE to 500 BCE and involved infectious diseases in the large population concentration areas of the earliest civilisations such as Sumer. The second wave went from 500 BCE to 1400 CE and was due to commercial exchanges and land based trade routes which facilitated the circulation of epidemics such as the Black Death, which originated in Asia before going to the Near East and finally Europe. The third wave went from 1400 to 1700 CE and was driven by transoceanic voyages which allowed the Old World and the New World to exchange their various infectious diseases. For example, syphilis from the New World into the Old World and smallpox,

measles, influenza and the childhood infections of mumps, diphtheria and whooping cough from the Old World into the New World leading to up to 95% death rates on first contact in the New World. The fourth wave started in 1700 CE and continues today. It saw cholera and tuberculosis flourish in the 1800s and the world's biggest killer epidemic, the Spanish Flu epidemic of 1918. Today we have to deal with new emerging infections such as Asian Flu, Bird Flu, SARS, **covid-19** and HIV, plus antibiotic resistant tuberculosis.

Such infectious disease epidemics in 2000 BCE would have to involve an infective agent that could cause mass destruction and death over a wide area and over a long period of time. The two most obvious culprits that would fill these criterion would be either smallpox or bubonic plague. Other infectious agents such as leprosy, tuberculosis, malaria and water borne bacteria, like dysentery or cholera, would either be too localised in their infective capability or seasonal and not able to be prolonged over a long period of time. A widespread infectious disease epidemic such as plague would have had a disastrous and devastating effect on ancient Sumer.

Evidence of Plague from Cuneiform Tablets

The following argument that it was pneumonic plague that supplied the final '*coup de grace*' for the Sumerian Civilisation is based on an excellent article written by **H.L.J Vanstiphout** and Professor Amjad Daoud Niazi, Emeritus Professor in Community Medicine and consultant epidemiologist from the University of Bagdad, the largest university in Iraq and the second largest university in the Arab world, behind the University of Cairo. Professor Niazi was also educated in London where he gained his PhD from the London School of Hygiene and Tropical Medicine in 1980. He was also the recipient of the prestigious Dr A. T. Shousha Foundation Prize from the World Health Organisation in 2011. This prize is awarded to the person "who has made the most significant contribution to improving health in the Eastern Mediterranean, the geographical area in which Dr. A. T. Shousha served the Organisation." (7)

The article is titled "Plague Epidemic in Sumerian Empire, Mesopotamia, 4000 years ago." (8) and is based on information gained from reading the English translations of the thousands of Sumerian cuneiform tablets available from Oxford University on their ETCSL [The Electronic Text Corpus of Sumerian Literature] website. The author of this thesis has also consulted these translations and found even more examples of references to epidemics to compliment those quoted by Prof. Niazi in his article. This new material, from the five City Laments, will also be presented in the following pages.

Before quoting from the cuneiform tablets, some of the names used should be explained. The gods named include Enlil, the chief deity in Sumerian religion, and his sons Nanna and Ninurta. Other gods include Ningirsu, Ur-Namma, Suen, Enmerkar, Aratta, Sulgi, Kug-Nanna, Ninsubur, Gilgames, Huwawa, Sin-iddinam, Inana, Ninegala and Utu. Cities quoted include Ur, Eridu, Nibru, Unug, Sakkan, Tidnum, Gutium, Ansan and Urim. Lands quoted include Elam [today's Iran] and Sumer [today's southern Iraq]. It will be shown that the plague's devastation encompassed a large area involving today's Iraq and Iran; as shown by the various laments written in the tablets from so many different cities within this area.

Another point to remember is that the Sumerians had no concept of disease, let alone infectious disease. To them death of the general population, '*en masse*', was due to the wrath of the gods as punishment for something that the population had done wrong. So the 'laments' quoted from the cuneiform tablets are directed to the gods asking them for forgiveness. The words used by the Sumerians to describe what we know today to be the infectious disease epidemic include "storm", "cloud", "wind", "gale" and "flood" with the negative type prefixes such as "heavy", "savage", "whirlwind", "evil", "great", "bitter" and "dark". These disaster type words are their explanation for the devastation that was occurring everywhere around them. Except for the word flood, these words show that the Sumerians thought that the evil came from heaven, where the gods lived in the sky, and that they sent to earth gales, winds, clouds or storms to punish the population. Hence these occurrences were metaphors for disease. This concept has been confirmed by Nathan Wasserman, Professor of Assyriology at the Institute of Archaeology at the Hebrew University in Jerusalem. In his chapter in 'Disease in Babylon' he stated "... the diseases are considered as a concrete natural outcome of an atmospheric phenomenon." (9) And in private correspondence to the author of this thesis via email he has confirmed that these words were "...used metaphorically, in literary text, rather than concretely." (10) Two other Assyriologists who were consulted by the author of this thesis for their opinion about the concept of 'disaster type' words being used as metaphors for epidemics agreed with Prof Wasserman. In private email correspondence with the author of this thesis Dr. Irving Finkel, Head of the Department of the Middle East at the British Museum said – "It is possible that these are metaphors as you suggest..." (11) The other Mesopotamian expert was Dr. JoAnn Scurlock from the History Faculty at Elmhurst College in USA. Dr. Scurlock's private email to the author of this thesis stated – "Yes, there are many metaphorical ways (including those that you mention) to describe major demographic events." (12) So the concept of 'disaster type' words possibly being used as metaphors for infectious disease is to be accepted.

Other 'Key Words', besides those just mentioned, used in the Sumerian cuneiform tablet research for this thesis included "blister", "plague", "sore", "epidemic", "dead", "killed", "infection", "smallpox", "bubonic", "laid waste", "disease", "devastation", "haemorrhage", "bleeding" and "dying".

It should also be remembered that these cuneiform tablet descriptions of infectious disease are the earliest written descriptions of disease ever; let alone of infectious disease. A most significant point of historical interest. They are therefore also the first descriptions of plague and possibly smallpox ever made.

Another point to consider before actually going through the cuneiform texts is the concept of the Lament. Ancient Sumerian literature included City Laments – "These bewail the destruction of central Sumerian cities during the fall of the glorious kingdom known as "the third dynasty of Ur" in 2004 BCE. To date, five laments of this type have been identified and deciphered, each devoted to the destruction of a different city: the Ur Lament; the Sumer and Ur Lament; the Uruk Lament; the Eridu Lament; and the Nippur Lament." (13) Samet goes on to say " The City Laments are characterized by vivid, rich descriptions of the destruction of the city, the mass killing of its inhabitants, and the loss of its central temple. In addition, the laments devote special attention to the divine sphere, where the great gods order the destruction of the city, and the city patron gods beseech them to alter their decision, but to no avail." (14) Hence we have the great and fearsome gods, such as Enlil, ordering the destruction of the city and the compassionate and benevolent patron gods [usually goddesses] try to defend the city.

The Sumerian City Laments literary genre is based upon the earlier 'The Curse of Agade' lament according to Jerrold Cooper. (15). "Vanstiphout and Michalowski have done a brilliant job explaining the relationship of the city laments to one another, and the importance of Curse of Agade as the prior text to the entire series." (16). The Curse of Agade discusses man's relationship with the gods and is fiction; hence not a true historical record of the time, even though in the past it had become accepted as an historical record. Another example of a death that was fictional and not based on

historic fact is 'The Death of Gilgames' which describes his death before he goes into the nether world, but it also does not mention any cause for his death.

By contrast, the Sumerian City Laments are the best true historic source for textual references to infectious disease epidemics in Sumer and present several reasons for the destruction of a city. Firstly it could be because of the end of a reign or "when its appointed duration expires" (17) Secondly "in order to balance the uncontrolled multiplying of mankind." (18) – in other words to be a form of population control when "Mortal man multiplied to become as numerous as the gods." (Uruk Lament, lines 4-5). And finally the destruction could have no explanation at all. The following passage from the Sumer and Ur Lament states that the destruction "cannot be explained." (Sumer and Ur Lament, lines 456-458) " Father Enlil, the one who advises with just words, the wise words of the Land [...] your inimical judgment [...] look into your darkened heart, terrifying like waves. O Father Enlil, the fate that you have decreed cannot be explained." (Sumer and Ur Lament, lines 456-458) So the writer of this lament could not explain why Sumer and Ur were destroyed. One explanation though could be pneumonic plague because the writer of this lament would not have known about infectious disease epidemics. This hypothesis will be discussed in detail in the following section of this thesis. Many other sources and laments will also be examined by this thesis beside the Sumerian City Laments.

Why were the compassionate and benevolent patron gods most likely to be goddesses ? Professor Tikva Frymer-Kensky explains why in the following quote: "There were also important nonhousehold activities that were considered womanly and attributed to goddesses. Many of these grow out of the actions of women in their role as mothers, but extend beyond the household by being performed in public, for people who may not be related to the performer. Chief of these was singing of laments. Mourning is a manifestation of long lasting love and devotion, and as such is part of, and grows out of, the relational aspect of goddesses/women as mothers, sisters and wives." (19) In the Sumerian literary tradition "goddesses were the chief singers of public laments...the prime mourners over their destroyed cities." So the laments

“provided a public expression of grief, and allowed for emotional catharsis in the performers and listeners of the lament.” (20) Another role of the lament was for the city’s patron goddess to intercede with the great gods on behalf of the city to get the city rebuilt after its destruction.

The following quotes come from Professor Niazi’s article. The first quote comes from the ‘Lament of Sumer and Urim’ and describes the general devastation that the epidemic caused and how life at all levels ceased to function.

“....that on the two parallel banks of the Tigris and of the Euphrates bad weeds should grow, that no one should set out on the road, that no one should seek out the highway, that the city and its settled surroundings should be razed to ruin-mounds; that its numerous black-headed people should be slaughtered; that the hoe should not attack fertile fields, that seed should not be planted in the ground, that the melody of the cowherds’ songs should not resound in the open country, that butter and cheese should not be made in the cattle-pen, that dung should not be stacked on the ground, that the shepherd should not enclose the sacred sheepfold with a fence, that the song of the churning should not resound in the sheepfold...” (21)

The next quote comes from the ‘Lament of Unug’ and describes the sickness. The quote at the end actually uses the word “sickness” and says how people “settled on the ground”, which is a nice way of saying that they had collapsed. This lament also keeps asking “Who” is doing all these terrible things to Unug? The answer is - the gods via an infectious disease epidemic.

“That one drew nearer. That one settled on the ground. Why would he withdraw? Who distorted Unug’s good sense and deranged its good counsel? Who smashed its good unug deity? Who struck its good lamma deity too? Who desecrated the fearsome radiance which crowned it? Who brought about mob panic in Unug? Who...sickness too? Along with the city, the foreign lands..., who...in the temple of Unug? “ (22)

The following quote from the 'Lament of Sumer and Urim' describes how the god Enlil punished people by destroying them with "storm", "flood", "evil eye" and "great wind". It also describes how the people "breathed only with difficulty" which would be a description of the pneumonic form of bubonic plague, leading to acute respiratory failure and death. The other thing that this quote tells us is that the pneumonic plague came from the Zagros Mountains which lie to the north-east of Sumer. They were a natural reservoir or enzootic focus of plague where the Gutium people lived; as shown by "...Enlil then sent down Gutium from the mountains. Their advance was as the flood of Enlil that cannot be withstood." Powerful and very poetic words – the epidemic advanced from the Zagros Mountains like a flood that could not be withstood or stopped. The words of the lament are also very descriptive of the lethal effects of the epidemic on the population – "The storm immobilized them,", "There was no return for them," and "...no one moved about there." This lament also tells us that the epidemic stayed around and did not go away – "..., the storm did not retreat." So this is a very sad lament describing the wrath of a very powerful and angry god punishing the population with a "storm" that kills and cannot be "withstood". This is a good description of plague - a perfect killer that hangs around to keep killing again and again in recurring cycles or waves.

"The people in their fear, breathed only with difficulty. The storm immobilized them, the storm did not let them return. There was no return for them, the storm did not retreat. This is what Enlil, the shepherd of the black-headed people, did: Enlil, to destroy the loyal households, to decimate the loyal men, to put the evil eye on the sons of the loyal men, on the first-born, Enlil then sent down Gutium from the mountains. Their advance was as the flood of Enlil that cannot be withstood. The great wind of the countryside filled the countryside, it advanced before them. The extensive countryside was destroyed, no one moved about there." (23)

This next quote, also from the 'Lament of Sumer and Urim', tells how the epidemic killed the people of Urim – there was no one to fetch food or water and at the end “no one could rise.” It also tells us that the people were unable to fight against it – “He afflicted the city with that which cannot be withstood with weapons.” So it was not invaders who caused the devastation of Urim, because they could be fought off with weapons. There was no mention of the earth shaking as in an earthquake or of fire; so the “that” mentioned in this lament had to be an epidemic. The god Enlil let the “wind” [epidemic] in through the grand gate into Urim.

“Enlil threw open the door of the grand gate to the wind. In Urim no one went to fetch food, no one went to fetch water. Its people rushed around like water being poured from a well. Their strength ebbed away, they could not even go on their way. Enlil afflicted the city with an evil famine. He afflicted the city with that which destroys cities, that which destroys houses. He afflicted the city with that which cannot be withstood with weapons. He afflicted the city with dissatisfaction and treachery. In Urim, which was like a solitary reed, there was not even fear. Its people, like fish being grabbed in a pond, sought to escape. Its young and old lay spread about, no one could rise.” (24)

Another quote from the 'Lament of Sumer and Urim' talks about pneumonic plague infection in Urim with people's lungs full of fluid from the lung infection “as if drowning in a pond”, “gasping for breath” and even the king “breathed heavily” which shows that even the king is not immune from infection. Hence nobody was excluded from the infection. It talks about famine which would predispose the population to infectious disease. It also asks “How long until we are finished off by this catastrophe?” – note the use of the word “catastrophe” which sums up what a pneumonic plague epidemic would have been to the occupants of Urim because “Inside Urim there is death, outside Urim there is death” a sad but true statement – most people would have died.

“In the city, those who had not been felled by weapons succumbed to hunger. Hunger filled the city like water, it would not cease. This hunger contorted people’s faces, twisted their muscles. Its people were as if drowning in a pond, they gasped for breath. Its king breathed heavily in his palace. Its people dropped their weapons, their weapons hit the ground. They struck their necks with their hands and cried. They sought counsel with each other, they searched for clarification: “Alas, what can we say about it? What more can we add to it? How long until we are finished off by this catastrophe? Inside Urim there is death, outside Urim there is death. Inside it we are to be finished off by famine” (25)

But the author of this thesis went to the original source and found that there are an extra two important sentences at the end of this lament which Niazi did include in his article, namely – “Outside it we are to be finished off by Elamite weapons. In Urim the enemy oppresses us, oh, we are finished.” (lament lines 401-402). This tells us that the Elamites were invading Sumer and the weakened population, due to famine and infection, could not resist their invasion and would have died.

This scenario of Elamites invading Ur c.2000 BCE is backed up by the following statement: “In about 2000 BC, the Elamites came and Ur fell to them. Why, we do not know. “ (26). Well now we do know why – **possibly** famine and subsequent infectious disease. The quote goes on to say “There had been intermittent hostility between the peoples for a thousand years and some have seen in this the outcome of a struggle to control the routes of Iran which could guarantee access to the highlands where lay minerals the Mesopotamians needed. At all events, it was the end of Ur.”(26)

The lament then reconfirms Elam’s destruction of Sumer by saying –“Elam, like a swelling flood wave, left only the ghosts.” (lament line 405)

So it can now be argued then that infectious disease contributed to the end of Ur and thus Sumer c. 2000 BCE.

The 'Lament of Eridug' describes symptoms of bleeding – "Along with the fluids spilled from his guts, his blood spilled forth." (27) which may be referring to a form of haemorrhagic fever.

The following extract from the 'Lament of Sumer and Urim' describes how the storm spread like an epidemic would do. It describes some of the many cities that were affected by the "storm" and "evil wind", how foreign lands were also affected by the "storm" and how the population pleaded for the "storm" to go away and 'retreat' or "return to your home."

"O bitter storm, retreat, O storm, storm return to your home. O storm that destroys cities, retreat, O storm, storm return to your home. O storm that destroys houses, retreat, O storm, storm return to your home. Indeed the storm that blew on Sumer, blew also on the foreign lands. Indeed the storm that blew on the land, blew on the foreign lands. It has blown on Tidnum, it has blown on the foreign lands. It has blown on Gutium, it has blown on foreign lands. It has blown on Ansan, it has blown on the foreign lands. It has levelled Ansan like a blowing evil wind. Famine has overwhelmed the evildoer; those people will have to submit." (28)

During the time of the decline of the Sumerian Civilisation c.2000 BCE there was salination of agricultural fields, drought, famine, war and resultant confusion of the population that had to constantly move or live close together in polluted and crowded cities. All these factors favoured the spread of infectious diseases. Professor Niazi sums up his view in the Conclusion of his article – "An epidemic of plague have [sic] occurred 4000 years ago in Sumer and caused the fall of the Empire. This was authenticated by the literature available and included the description of the signs and symptoms of the disease its effects on the people its type of spread and propagation from mountainous areas enzootic with the disease." (29)

The following additional quotes from the Oxford University translations of the Sumerian cuneiform clay tablets [ETCSL] were found by the author of this thesis during

research for this thesis. The first quote is most interesting because it raises the possibility that two infectious diseases devastated Sumer namely pneumonic plague and smallpox; because this quote talks about "...a blister whose smell is foul..."; and blisters are characteristic of a smallpox infection. It also describes the epidemic as "...the hurricane of the mountains." referring to the Zagros Mountains which harboured plague. It again uses terms such as "storm" and "whirlwind storm" to describe the epidemic. The whole tone of the quote is filled with despair as "Its terrifying splendour..." kills and "...reducing everything to nothing..." before ending with "...the people are finished,...".

"Hero, ah, whatever further awaits you, do not on any account meddle with the hurricane of the mountains. Ninurta, lord, son of Enlil, I tell you again, it is made like a storm. It is a blister whose smell is foul, like mucus which comes from the nose it is unpleasant, lord, its words are devious, it will not obey you. My master, it has been created against you as a god; who can help you? Hero, it falls on the land as a whirlwind, it scrubs it as if with saltwort, Ninurta, it chases the onagers before it in the mountains. It's terrifying splendour sends the dust into clouds, it causes a downpour of potsherds. In the rebel lands it is a lion striking with savage teeth; no man can catch it. After reducing everything to nothing in the north wind, that one will batter you. The sheepfolds have been closed by ghostly demons. It has dried up the waters in the ground. In the whirlwind storm, the people are finished, they have no solution (?). From an implacable enemy, great hero, lord, turn away,' he said quietly." (30)

In the beginning of the Exploits of Ninurta lament there is a description of something that could be an epidemic. This time the word 'warrior' is used as a metaphor for the epidemic whose assault cannot be resisted, is described as "massive" and "no weapon has been able to overturn it.... neither the axe nor the all-powerful spear..."

“Who has so far been able to resist its assault?...This thing’s strength is massive, no weapon has been able to overturn it. Ninurta, neither the axe nor the all-powerful spear can penetrate its flesh, no warrior like it has ever been created against you.” (lament lines 57-69)

The next quote, from the same source, talks this time about “...the savage storm...” and how this storm “...walks on earth...” and not up in the clouds. It also talks about how this storm spilt “...poison on the earth’s breast...” i.e. the very heart of the earth was poisoned with infection. Again “The mountains ...” are mentioned as the source of this storm [infectious epidemic].

“The mountains could not bear the lord’s great strength. The great hero – the force of whose rage no one can approach, like heaven itself; the savage storm which walks on earth, spilling poison in the earth’s breast; the lord, the life-breath of Enlil, whose head is worthy of the tiara,...” (31)

This quote from the ‘Lament of Urim’ tells how the chief god Enlil took not only “...the storm of abundance away from the Land...” but also “...the good storm away from Sumer...” and replaced them with “...the evil storm...” and how this evil storm became “...the storm that annihilates the Land...” He [Enlil] also “...called upon the evil gales...” so the people got both storms and gales. No wonder “...the people groan.” so often. It is an interesting quote because it tells how the gods took away the good times and replaced them with annihilation.

“Enlil called the storm – the people groan. He brought the storm of abundance away from the Land – the people groan. He brought the good storm away from Sumer – the people groan. He issued directions to the evil storm – the people groan. He entrusted it to Kin-gal-uda, the keeper of the storm. He called upon the storm that annihilates the Land – the people groan. He called upon the evil gales – the people groan.” (32)

And still more of the same from the same lament telling of the “The storm that annihilates the Land...” and “The evil wind...” that “...cannot be restrained.” i.e.it cannot be stopped.

“Enlil brought Gibil to his aid. He called the great storm of heaven – the people groan. The great storm howls above – the people groan. The storm that annihilates the Land roars below – the people groan. The evil wind, like a rushing torrent, cannot be restrained.” (33)

The next quote from the same source tells of “...the bitter storm...” this time, that devours the land of Sumer.

“He swept the winds over the black-headed people – the people groan. Sumer was overwhelmed by a snare – the people groan. It attacked (?) the Land and devoured it completely. Tears cannot influence the bitter storm – the people groan.” (34)

The next quote talks about how the storm destroyed Urim, how it “...silenced the city.’ and how it “...covered Urim like a garment,”

“The reaping storm dragged across the Land. Like a flood storm it completely destroyed the city. The storm that annihilates the Land silenced the city. The storm that will make anything vanish came doing evil. The storm blazing like fire performed its task upon the people. The storm ordered by Enlil in hate, the storm which wears away the Land, covered Urim like a garment, was spread out over it like linen.” (35) This was followed by a great analogy telling how the epidemic kept coming and not going away – “The storm, like a lion, has attacked unceasingly – the people groan.” (36)

More from the ‘Lament of Urim’. This quote tells how all the people were “...struck down...” and asks the storm to go away – may it “...never recur...”, “...be entirely destroyed...” and “...the door be closed on it,”

“May the storm, like rain pouring down from heaven, never recur. May the storm, which struck down all the black-headed living beings of heaven and earth, be entirely destroyed. May the door be closed on it, like the great city-gate at night-time. May that storm not be given a place in the reckoning, may its record be hung from a nail outside the house of Enlil.” (37)

The next quote is from the ‘Lament of Sumer and Urim’. It tells how Enlil used an “...evil storm...” to silence the city of Urim and how it caused turmoil because it was something that the people had not known, seen, could name or fathom, hence they were confused. The perfect description of the epidemic – something that the people had not known or seen before, let alone be able to name or fathom; which caused confusion and turmoil.

“Enlil blew an evil storm, silence lay upon the city....Turmoil descended upon the Land, something that no one had ever known, something unseen, which had no name, something that could not be fathomed. The lands were confused in their fear. The god of the city turned away, its shepherd vanished.” (38)

The following quote describes ‘The death of Ur-Namma’ who was the King, ‘...the leader of Sumer...’, and its “...wise shepherd...” It tells how his “...resting place...was covered by a storm;” and how he became so weak from the sickness that he “...cannot step any more, he lies sick.” and he “...could not raise his neck anymore.” This lament keeps saying that “...he lies sick.” which means some sort of disease was killing him, and not war wounds or any other cause of death. And if the king was dying from this disease, then so too would be the general population.

“The wise shepherd...does not give orders any more...in battle and combat. The king, the advocate of Sumer, the ornament of the assembly, Ur-Namma, the advocate of Sumer, the ornament of the assembly, the leader of Sumer...lies sick. His hands which used to grasp cannot grasp any more, he lies sick. His feet...cannot step any more, he lies sick. The trustworthy shepherd, king, the

sword of Sumer, Ur-Namma, the king of the Land, was taken to the ...house. He was taken to Urim; the king of the Land was brought into the ...house. The proud one lay in his palace. Ur-Namma, he who was beloved by the troops, could not raise his neck any more. The wise one...lay down; silence descended. As he, who was the vigour of the Land, had fallen, the Land became demolished like a mountain; like a cypress forest it was stripped, its appearance changed. As if he were a boxwood tree, they put axes against him in this joyous dwelling place. As if he were a sappy cedar tree, he was uprooted in the palace where he used to sleep (?). His spouse....resting place....was covered by a storm; it embraced it like a wife her sweetheart (?). His appointed time had arrived, and he passed away in his prime.” (39)

The previous quotes were mainly about the ‘key words’ of ‘storm’ and ‘wind’; now the next quotes will be based on the other ‘key words’ of ‘cloud’, ‘flood’, ‘plague’, ‘devastation’, ‘dying’, ‘dead’ and ‘killed’. The following quote is from a ‘Letter from Sin-iddinam to the god Utu’ and it tells us that Elam [today’s Iran] had not yet been hit by the ‘heavy cloud’ or plague, hence its ‘time had not yet come’ to be destroyed. Be

“The mountain land of Elam where there are no dead in great numbers (?) like..., and Subir, a heavy cloud, which knows no reverence even towards the gods – these districts have not been weakened; their time had not yet come.” (40)

As described earlier in the Lament of Sumer and Urim:c.2.2.3 – the city of Urim was conquered by the Elamites. So could not these two quotes show that plague free Elam, as described in the above quote, was able to invade Sumer and destroy plague infected Urim ?

The next quote comes from ‘A hymn to Inana as Ninegala’ and tells of the ‘destructiveness’ of the god’s ‘storm-flood’ which then ‘washes over everything’.

“...,when you come forth from the corner, when you come forth from the side, when you are to be seen on the horizon, Inana, when in your destructiveness you make storm-floods wash over everything,...”(41)

The next three quotes mention ‘plague’. In ‘Letter from Kug-Nanna to the god Ninsubur’ the letter talks of “foreign plague” (42) implying that the infection came from somewhere outside Sumer. In ‘Proverbs’ there is mention of “...plague prevails over him...” (43) and finally again in ‘Proverbs’ there is the quote “Into a plague-stricken city one has to be driven like a pack-ass.”(44) implying that one is very reluctant to go into or visit a city which has the plague. This quote also shows that they knew about the concept of plagues and the potentially fatal consequences of plague [but they did not really know what caused them, other than the wrath of the gods].

Another quote from Proverbs again talks of having to drive people into, this time, “a death-stricken city.”

“You should drive them like pack-asses into a death-stricken city.” (Proverbs: collection 14:c.6.1.14), So these quotes show that plagues did exist and were documented; and caused “death-stricken” cities. This must have aided in the decline of Sumer if cities were “death-stricken” and their populations died.

In this quote from ‘Enmerkar and the lord of Aratta’, which is about the destruction of Aratta, there is mention of devastation several times such as “...lest like the settlement cursed by Enki and utterly destroyed too utterly destroy Aratta; lest like the devastation which swept destructively, and in whose wake Inana arose, shrieked and yelled aloud, I too wreak a sweeping devastation there...” (45)

In ‘Gilgames and Huwawa’ there is mention of ‘people are dying’ twice. Firstly there is “In Unug people are dying, and souls are full of distress. People are lost – that fills me with dismay. I lean out over the city wall: bodies in the water make the river almost overflow. That is what I see: that people die thus, which fills me with despair; that the end of life is unavoidable; that the grave, the all-powerful underworld, will spare no one; that no one is tall enough to block off the underworld; that no one is broad

enough to cover over the underworld – the boundary that a man cannot cross at the final end of life.”(46) This sad quote is full of ‘distress’, ‘dismay’ and ‘despair’ telling how the ‘People are lost...’ and that so many people had died that the river almost overflowed. That is a lot of people dead, like in an epidemic.

This second quote from ‘Gilgames and Huwawa’ is similar and tells how the ‘city people are dying’ and not killed, showing that congested cities are a place where the plague thrived. It tells how the author of the lament is reconciled to their fate as it [death] “...will happen to me...”

“Utu, I have something to say to you – a word in your ear! I greet you – please pay attention! In my city people are dying, and hearts are full of distress. People are lost – that fills me with dismay. I craned my neck over the city wall: corpses in the water make the river almost overflow. That is what I see. That will happen to me too – that is the way things go.”(47)

These two quotes talk about people “dying” – not killed, as would happen in a war, but “dying” as would happen in an infectious disease epidemic. So many people in fact were dying that their bodies had to be dumped in the river instead of being buried – “bodies in the water make the river almost overflow” because it is simpler and quicker. During an epidemic bodies need to be disposed of as quickly as possible and because so many people die there may not be enough people to dig mass graves – so into the river they go and it then becomes the problem of the people down-stream.

In the ‘The lament for Urim’ and ‘the lament of Nibru’ there are two quotes talking about people being ‘killed’ by ‘an evil wind’.

“O Nanna, the shrine Urim has been destroyed and its people have been killed.”(48) and “Its lord, who has despoiled it like an evil wind, has destroyed that city and its temples! He has ripped out their foundations, struck them with the adze, killed wives and their children within it, he has turned that city into a deserted city – when would he restore its ancient property? Its possessions have

been carried off by the wind! Enlil turned the city which used to be there into a city no longer.”(49) This is a very despairing quote telling of ‘a deserted city’ and ‘a city no longer’ where the people have been ‘killed’ by ‘an evil wind’.

After this examination of the text from the Electronic Text Corpus of Sumerian Literature [ETCSL], the CDLI:wiki, which is directly linked to the Cuneiform Digital Library Initiative was examined. Nothing was found for the key words wind, cloud, storm, gale, epidemic, death, died, dying, bleeding, haemorrhage, sore, blister, infection, plague, mutanu, laid waste and devastation. Dead brought up the ‘Dead Sea Scrolls’, flood brought up ‘The Flood’ as referred to in the bible and killed referred to those killed in warfare, but nothing about those killed by infectious disease. Fever brought up texts about the different types of fever but nothing on actual epidemics and disease found many texts on diseases but again nothing about actual epidemics. Illness found descriptions of illnesses due to divine causes but nothing about actual epidemics. And finally sick found a reference to King Amar-Suen who ruled Ur from 2046 BCE until 2938 BCE. He attempted to please the gods by trying to purify his city by expelling the sick and those who were unpleasant to look at. Again no actual epidemic was mentioned. So the CDLI was examined and nothing of note was found.

In summary, these quotes are due to disease and not warfare, earthquakes, flood or fire because there is no mention of soldiers, fighting, weapons, shaking ground or fire in them. The quotes talk of “...that which cannot be withstood with weapons.” and “...something that no one had ever known, something unseen, which had no name, something that could not be fathomed.” Implying the hidden infectious disease. The quotes mention ‘sick’, “plague”, “people are dying” (and not people are being slaughtered by soldiers), people “settled to the ground” (instead of being struck down by a weapon, they slump to the ground gently) and “no one could rise”. All of these words and expressions refer to disease and not trauma. There is also the mention of “..spilling poison in the earth’s breast” implying that disease was put onto the earth and “...a blister whose smell is foul“ which could be referring to smallpox. There was also

mention of vomiting up blood which could imply a haemorrhagic viral infection like today's Ebola virus. (50)

Finally there are the quotes which describe how people, including the king, were short of breath and were like "drowning", referring to the pneumonic form of bubonic plague. The only disease which is going to cause respiratory symptoms such as shortness of breath and kill 'en masse' would have been pneumonic plague. A bad influenza infection could give similar symptoms but it would not kill as many people as a pneumonic plague infection. Dying from pneumonic plague would have been terrifying; involving very high fevers, extreme lethargy, a rapidly progressing pneumonia, severe shortness of breath, coughing up blood and the inevitable death occurring a few days later. Research by Simon Rasmussen, a computational biologist at the University of Copenhagen, has confirmed that the main form of plague in existence four thousand years ago was the pneumonic type, as the bubonic form did not develop until later. (51) The researchers analysed the DNA from the pulp of teeth from skeletons found in Europe and the Russian Steppes dating back 5,783 years. It shows that pneumonic and septicaemic ancestral forms of *Yersinia pestis* were common across Bronze Age Eurasia and that the special *ymt* gene necessary for transmission by fleas to cause the bubonic form of plague was acquired c.1000 BCE; hence the Bronze Age form of plague was not capable of causing bubonic plague.

This research has been backed up by other, later research by Alda Valtuena et al from the Max Planck Institute for the Science of Human History (52). Their research studied the genomes of *Y. pestis* from the European Late Neolithic and Bronze Age [LNBA] dating upto 4,800 years ago. It has shown that "Interpreting our data within the context of recent ancient human genomic evidence, which suggests an increase in human mobility during the LNBA, we propose a possible scenario for the spread of *Y.pestis* during the LNBA: *Y. pestis* may have entered Europe from Central Eurasia during an expansion of steppe pastoralists, possibly persisted within Europe until the mid Bronze Age, and moved back towards Central Eurasia in subsequent human population movements." (53) The author of this thesis proposes that the initial

movement of steppe pastoralists from Central Eurasia west into Europe may have been to escape the *Y. pestis* plague killing them en masse back in their homeland. So they may have been pushed away from their homelands and into Europe. All this movement back and forth from Eurasia into Europe and then from Europe back into Eurasia has to cross the Middle East; hence plague could have been introduced into Mesopotamia during these large population movements. Figure 1 below shows these proposed movements through the Middle East, especially the second wave. This article provides yet more evidence that *Y.pestis* plague existed in the Middle East during the Bronze Age and as such may have contributed to the demise of some of these ancient civilisations.

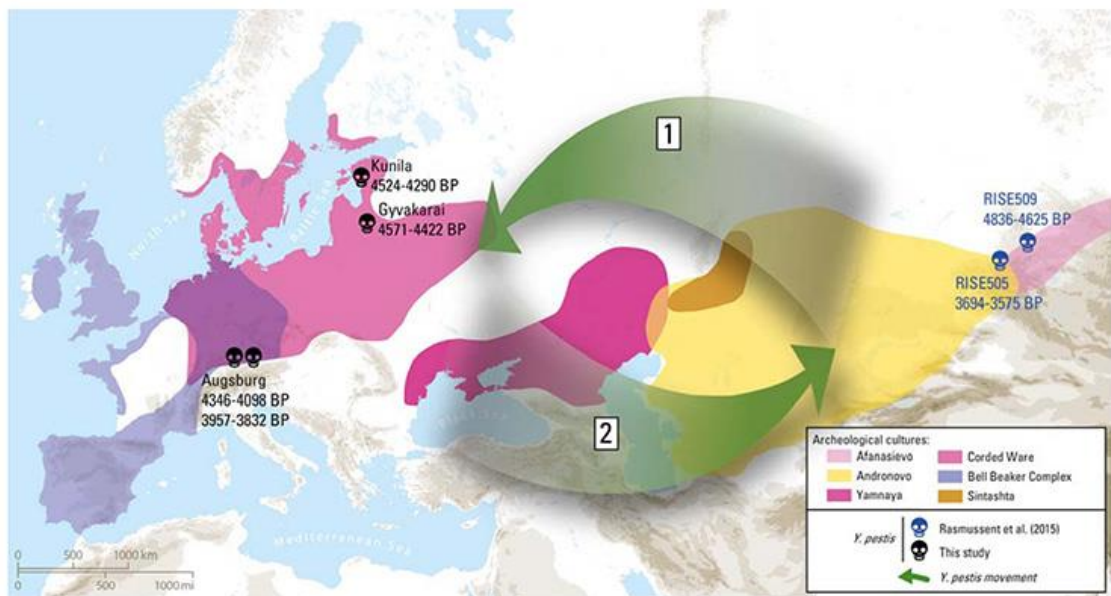


Figure 1: Map of proposed *Yersinia pestis* circulation throughout Eurasia. [1] Entrance of *Y. pestis* into Europe from Central Eurasia with the expansion of Yamnaya pastoralists around 4,800 years ago. [2] Circulation of *Y. pestis* back into the Altai from Europe. Only complete genomes are shown.

To complicate the situation even more; Simon Rasmussen’s latest research has examined the skeletal remains of a Neolithic burial pit in western Sweden and found ancient DNA of *Y. pestis*. The article was titled “Plague linked to the mysterious decline of Europe’s first farmers” (54) How did this 4.900 year old genome sequence of a strain of *Y.pestis* get there? There may have been an introduction of *Y. pestis* into Neolithic Europe before the introduction by the Steppe people; but from where and by whom? Or

the Steppe pastoralists migrated into Europe earlier than previously thought by researchers such as Alda Valtuna and carried the plague with them.

With major cities such as Urim or Ur being adversely affected by infectious disease epidemics and Elamite invasion; it seems inevitable that Sumer would end.

Conclusion

After analysing all of the above it can be concluded that infectious disease epidemics; most likely bubonic plague, with also the possibility of smallpox [the blisters in the quote] played a significant role in the decline of the Sumerian Civilisation c.2000 BCE. Because Sumer traded by sea with the Indus Valley Civilisation during this time it is very likely that this pneumonic plague epidemic was eventually transferred to the Indus Valley Civilisation as well, carried by seaman on board these trading vessels. This pneumonic plague would have had a devastating effect on the Indus Valley Civilisation, as it did on the Sumerian Civilisation; and any other place it moved to over the years, such as Mari or Haft Tappeh as will be discussed in the next section of this thesis.

It is also important to remember that plague does not come in 'small doses' or 'half measures'; especially in ancient times. You would not have had a 'touch of plague' like today how you can have a 'touch of flu'. When it came, it would have come as a full on epidemic with devastating effect, killing people in very large numbers.

Also one must remember that the plague would not go away until it had killed most people: then it would return and keep returning in the years to come; which is the epidemiological nature of the beast – it keeps returning and it would have had the power to end empires.

3.10.2.3 Beyond Sumer – The Kingdom of Mari c. 1761 BCE

3.10.2.3.1 The Kingdom of Mari – an outline

Mari was an ancient Kingdom located in the south-eastern corner of modern day Syria near the modern day town of Tell Hariri. It was a purposely-built city, located where it was so that it was near the middle of the Euphrates River trade routes between Sumer to the south and the Levant to the west. More specifically it was located at the crossing of the trade routes between Syria to the north-west via the Euphrates River and Babylon to the south-east via the Khabur River. It was built about two kilometres from the Euphrates River so it could avoid flooding and was connected to the river by a man-made canal.

As an intermediary trade centre it flourished as a trading hub from c.2900 BCE until it was destroyed by Hammurabi of Babylon between c.1759 BCE and c.1757 BCE. During this destruction the city was burnt so its vast library of cuneiform tablets and archive of records was baked hard, thus preserving them forever. Today there are about 25,000 of these baked tablets available to be examined by scholars.

The ruins of Mari have been excavated by French archaeologists; the main one being Jean-Claude Margueron between 1979 and 2004. The Syrian civil war has interrupted digging for the past few years.

Mari went through three major Kingdoms or Cities as Margueron called them.

Kingdom 1 or City 1

City 1 began as a purposely-built city to function as a trading hub between 3000 BCE and 2900 BCE [Early Dynastic Period I]. It was abandoned for unknown reasons between c.2650 BCE and c.2550 BCE [Early Dynastic Period II]. The reason that archaeologists and ancient historians do not know why it ended is because the builders of City 2 levelled City 1 and built on top of it; thus destroying any archaeological evidence that could help work out what happened. But one possible explanation

though that cannot be discounted is that an infectious disease epidemic helped cause City 1 to be abandoned.

Kingdom 2 or City 2

City 2 was rebuilt on top of City 1 c.2500 BCE [Early Dynastic Period III] . During the Second Kingdom Mari went to war with its traditional rival Ebla, but it was eventually destroyed and burnt by Sargon of Akkad c. 2290 BCE [or c. 2265 BCE according to Michael Astour using the Short Chronology] and incorporated into the Akkadian Empire.

Kingdom 3 or City 3

City 3 was rebuilt by the Akkadian King Manishtushu c.2266 BCE. Under the Akkadians Mari was ruled by a military governor called a Shakkanakku. The first of these was called Ididish. Eventually the Akkadian Empire disintegrated and Mari became an independent Kingdom again, but continued to use the term Shakkanakku for its ruler. To strengthen its position a princess of Mari married the son of King Ur-Nammu of Ur; so Mari became part of the greater Ur City-State, but still retained its independence.

By this time Mesopotamia, which included Sumer to the south with its City-State of Ur, was surrounded by rival states such as Elam to the east and a nomadic people from Syria to the west who were called the Amaru or Amorites. Eventually the Ur dynasty ended c.2000 BCE; either due to invasion by the Elamites as shown by the quote in Section 3.6.1.2.2 which described the Elamites attacking Urim or Ur while it was weakened by an infectious disease; or by incursions by the Amorites which again would have been much easier if the people in Ur were dying from an infectious disease and the Amorites were disease free.

Later the Shakkanakku dynasty ended for unknown reasons in the middle of the 19th century BCE (55). Could one of the unknown reasons have been infectious disease, hence it was weakened and thus more prone to eventual invasion by the Amorites who may have been infectious disease free?

Eventually the Amorites dominated Mesopotamia, which included Mari. By c.1830 BCE Mari became the home of the Amorite Lim dynasty. The first Lim dynasty king was King Yaggid-Lim who continued to rule Mari in a similar way as the Shakkanakku. The Lim dynasty, in order to stay viable, had to compete with its neighbours such as Ekallatum, Assyria, Elam and Babylon. It was at war a lot of the time and in the end fought a war with Elam c.1765 BCE before being finally conquered in 1761 BCE by Hammurabi of Babylon thus ending the Lim dynasty. Hammurabi destroyed the whole city of Mari between c.1759 BCE and c. 1757 BCE, after it rebelled against him in c.1759 BCE.

Mari continued on as a smaller administrative centre over the years and later became part of Assyria, then Hana and finally the Neo-Assyrian Empire. It finally disappeared after the Hellenistic period.

In summary – there were two periods when Mari collapsed for no apparent reason. Firstly when City 1 ended c. 2650 BCE and secondly when the Shakkanakku dynasty ended in the middle of the 19th century BCE, during the time of City 3. It is possible that infectious disease epidemics could have contributed to these two collapses; along with the collapse of Ur c. 2000 BCE, which made Mari vulnerable to invasion by its rival neighbours. Thus the possibility of infectious disease as a contributing variable in the history of Mari should be factored in and not discounted, as is the current situation.

3.10.2.3.2 Evidence from the texts

3.10.2.3.2.1 ARM – The Archives Royales De Mari

The main source of texts about the Kingdom of Mari is the ARM - 'Archives Royales de Mari' written in French and referred to earlier in this thesis. About 25,000 tablets were excavated by French archaeologists at Mari between 1933 and 1938. Many were from the Royal Palace and the rest were from private homes. Unfortunately most were written in the 50 years prior to Mari's destruction by Hammurabi c.1759 BCE, so they did not include the two time periods when Mari ended for no apparent reason [the end of City 1 c. 2650 BCE and the end of the Skakkanakku era c.1850 BCE]; possibly from infectious disease epidemics. Instead they cover the reigns of Yahdun-Lim, Sumu-Yamam and the last King of Mari, Zimri-Lim who reigned for the last thirteen years of Mari. Being records of the palace they focus mainly on palace life and administration, politics and religion and not so much on life outside the palace such as the life of a medical practitioner fighting an epidemic.

Another source of texts about Mari is the Ebla Archives, written by people in Ebla, Mari's neighbour to the north-west. These texts will be examined in the next section of this thesis.

The ARM has supplied Tablet X, 129 which was found in room 108 of the great Mari Palace and has been analysed by several French, German, American and English scholars. It was stored in the National Museum in Aleppo, hence it may unfortunately have been destroyed during the Syrian civil war and/or ISIL's recent occupation of Aleppo.

It is in a letter from King Zimri-Lim of Mari to his first wife Queen Sibtu and discusses a contagious disease affecting a woman named Nanname (Neufeld 1986). Unfortunately it does not mention any epidemic; but it does show that medical people during the 18th century BCE in Mesopotamia knew that this person's signs and symptoms meant that anyone who touched them would get the same disease – so they isolated her. So it describes the concept of contagious disease where one could 'catch'

a disease either directly from the patient or indirectly from objects [fomites] and the concept of quarantine, so the person infected was isolated so no one else would 'catch' the disease. It was the first time the Akkadian word 'mustahhiz' meaning 'catching' was used in this medical context (56).

Neufeld claims that this Mari tablet describes the earliest documented case of a contagious disease ever in Mesopotamia, dated c.18th century BCE. But this thesis has described documented earlier Sumerian contagious diseases, such as pneumonic plague, which occurred two hundred or more years earlier than the case described in this tablet.

Neufeld also states that – “The dread in anticipation of epidemics was by far greater than can be inferred from the scanty evidence.” (57). Hence it can be assumed that they were fearful because of prior experience. They knew the consequences of an infectious disease epidemic from earlier history and exposure. Neufeld then goes on to say at the end of his article:

“As pointed out, the notion of contagiousness, the usage of isolation of patient-carriers, as well as the concept of fomites, were defined by long tradition. They were drawn from many generations of accumulated experiences, reaching far back into the past. It is increasingly clear that long before Zimri-Lim, man in his struggle for survival, and in order to dissipate the fear and discord caused by such diseases, applied the attitudes and the thinking well illustrated in this tablet.” (58)

So this is yet more evidence which shows that major epidemics must have occurred in the past over many generations for them to know about the consequences of these epidemics and so to dread and fear them.

The Mari letters also discuss some epidemics (59) and the role of the exorcist in controlling them. The physicians or 'asu' were not involved – “but the activities of the asu are not mentioned in this connection in the Mari archives, perhaps because the asu would have little to offer by way of effective remedies.” (60). Instead the exorcist used their magic incantations to fight the epidemic because it was due to the wrath of the gods, hence a religious and magical problem.

In one letter to King Yasmah-Addu an epidemic in Tuttul made its inhabitants ill with few deaths, while an epidemic in Dunnum caused at least twenty deaths and forced people to leave the city and escape to the mountains. (61)

Another letter to this king reported another epidemic in the two cities of Zurubban and Zapad. These two cities were not close to each other, so this indicated that this infectious disease epidemic was more widespread. (62)

A third letter to King Yasmah-Addu reported an epidemic called 'the hand of the god' which killed craftsmen, weavers and agricultural workers (63). Because this letter only refers to workers and not elite people it can be assumed that their living conditions such as living and working in congested close quarters, with poor sanitation could have contributed to the spread of the epidemic.

Yet another letter to King Yasmah-Addu told him that an epidemic had passed "but survivors had delayed in burying the dead until the proper omens had been taken (Durand 1988,p.564, No 263), indicating that diviners were also present, in addition to exorcists and lamentation priests." (64). The only weapons they had to combat an epidemic was to bury the dead as quickly as possible, quarantine the area and purify the area by washing and burning. "After the burials had taken place, the exorcists and lamentation priests purified the city (Durand 1988:564) " (65)

So the Mari Archives have produced several letters which talk of epidemics or contagious infections. They are described in tablets 129, 259, 261, 263 and 264. The epidemic described in tablet 264 may have been quite significant.

The Mari Archives have also produced an incantation which describes smallpox. In his article 'About the emergence and spreading of smallpox in the Ancient Near East – did it reach us from camels or from cattle ?' published in the *Le Journal des Medecines Cuneiformes*, Thomas R. Kammerer states that "this investigation concerns the first recognisable written records about smallpox in Mesopotamia at all. They date back to the beginning of the 2nd Millennium BC and originate from Mari, a city in eastern Syria at the today's border to Iraq." (66). He then goes on to say "From the outgoing old-Babylonian period an incantation remains, which after pre-working by others A. Goetze

has presented as “An incantation against diseases”. From this incantation different text duplicates exist as well as a neo-Babylonian version. Supplementing a further incantation exists, which is published by A. Cavigneaux (Nr.15289, tablet catalogue of Mari) and treats the same topic.

On this cuneiform incantation tablet a disease is described and exorcised, which for both, humans and animals (lambs, kids, animals of the steppe, no camels respectively dromedaries) was understood obviously as the same illness, as smallpox.” (67). Smallpox and plague were the two big infections which had the potential to decimate an empire and here is written evidence that, what is most likely smallpox existed in Mesopotamia. If this is true then ancient historians should take this seriously, because of the potential “game changer” [for the worse] role smallpox could have on an empire. In his Conclusion Kammerer states “The smallpox would then have moved similar ways as the plague.” (68) meaning that both smallpox and plague spread around the known world in a similar fashion, killing most of the people that they contacted and infected.

In summary – the Marian Archives show evidence of infectious disease, especially smallpox; hence confirm the need of ancient historians to factor in their potential presence when writing their histories.

3.10.2.3.2.2 The Ebla Archives

Ebla was a Kingdom to the north-west of Mari in today’s Syria, about 55 Km southwest of Aleppo. It was founded c.3500 BCE and flourished during the Third Millennium and first half of the Second Millennium. The first Ebla civilisation was destroyed during the 23rd century BCE. It was rebuilt to form a second Ebla civilisation ruled by a new royal family only to be destroyed again at the end of the third millennium BCE. The Amorites then took control of Ebla until it was once again conquered – this time by the Hittite King Mursuli I in c.1600 BCE. Ebla was finally abandoned about 700 CE.

It was a rival of Mari's, not only as a trading centre but also as an empire. Letters were sent between the two kingdoms, some of which talk about the Kingdom of Mari, hence are therefore worth examining for any talk of infectious disease in Mari.

Ebla showed that the Levant was also a centre of an ancient civilisation, which could rival both ancient Egypt and Sumer. It has been excavated by the Italian archaeologist Paolo Matthiae since 1963. Prof Matthiae has uncovered about 20,000 clay tablets written in cuneiform dating from c.2350 BCE. The tablets were written in both Sumerian and Eblaite.

Excavations ceased in 2011 due to the Syrian Civil War. Since then the site has been subject to looting by local villagers looking for ancient artifacts.

The Ebla Archives found by Matthiae mainly and others; come mostly from the Royal palace and deal with palace administrative affairs such as accounts, ledgers and inventories, royal family diplomacy, affairs of state and political relations and finally religious matters. They do not mention disease at all. This thesis has examined Alfonso Archi's comprehensive book 'Ebla and its Archives' (69), Giovanni Pettinato's 'Ebla – A New Look at History' (70) and his earlier book 'The Archives of Ebla – An Empire Inscribed in Clay' (71) and finally Paolo Matthiae's 'Ebla – An Empire Rediscovered' (72), all to no avail unfortunately.

This thesis has also examined the Ebla Digital Archives [EDA], a project of Ca' Foscari University of Venice. A search of the EDA using the Keywords as designated earlier in this thesis also revealed nothing about disease.

3.10.2.3.3 Haft Tepeh

Haft Tepeh, also known as Haft Tepe and Heft Tepeh, is an ancient Elamite city in southwestern Iran, which has been the site of excavations by the Iranian Center for Archaeological Research and the Institute of Egyptology and Ancient Near Eastern Studies at Johannes Gutenberg University in Mainz, Germany.

The ancient civilisation of Elam existed from early 3rd millennium BCE until the middle of the 1st millennium BCE and was located immediately to the east of Sumer. Its

capital, Susa, which was located in the lower Zagros mountains about 15 kilometres north of Haft Tappeh, has been excavated by the French on and off [allowing for World War I and II] since 1885.

In the 1960s a bulldozer was being used for roadwork at Haft Tappeh and it uncovered the brick vault of an ancient tomb. Subsequent excavations revealed clay fragments bearing the seal of Athibu, the governor of the ancient Elamite city of Kabnak. Excavations by the Iranian Center for Archaeological Research and the Institute of Egyptian and Ancient Near Eastern Studies at Johannes Gutenberg University at Mainz began in earnest in January 2005.

The excavations have shown that “At the end of the 14^h century BC, the urban developments in Haft Tappeh stagnated for reasons that are yet unknown. Some of the monumental structures were abandoned while others ceased to be used;” [73] A possible explanation has been found for this stagnation and abandonment – “A team of archaeologists from Mainz University headed by Dr. Behzad Mofidi-Nasrabadi recently discovered the the city’s population fell victim to a massacre at the end of the settlement phase. They found a mass grave containing the skeletal remains of several hundred people in a street between the dwellings of the final building layer. The dead had simply been haphazardly piled one on top of another behind a wall.

The German Research Foundation (GRF) has recently approved financing of the project. Thus it will now be possible to continue the excavations in order to reveal the particular circumstances of this human tragedy and its historical background.” [74]

The skeletons included men, women and children and date from c.1350 BCE. So far no skeletons have shown any signs of trauma; which begs the question – if this is supposed to be a massacre, why are there no signs of trauma? The answer to this question is that it was not a massacre and that these unfortunate people most likely died from from an infectious disease epidemic and had their bodies dumped behind a wall to get rid of them quickly – so quickly that there was no time to dig a common grave in which to bury them. These bodies should be subjected to ancient DNA analysis to see if such an infectious disease exists and if so what type. The most likely

infection would have been plague and this would fit in with the passage of the plague epidemic around the Near East, Egypt and the Indus Valley Civilisation at the time, causing the retreat of Egypt from the Levant during the 18th Dynasty, the end of the Indus Valley Civilisation by c.1300 BCE and the end of the Hittite Empire and Bronze Age in the Near East c.1200 BCE.

Yet again, this is another example of the possibility of an infectious disease causing the death of a lot of people in ancient times being ignored by archaeologists and ancient historians unfortunately and given some other wrong cause of death. These skeletons should be subject to ancient DNA analysis to find out where they came from and what infection killed them.

There is another record of plague in the Near East at this time. Fales makes a mention of bubonic plague in his chapter:

“Plagues or epidemics – possibly caused by the bite of infected fleas, which lead to the bubonic plague form – were also very frequent, especially in urban contexts – to the extent that a representative of Pharaoh could advise the King of Byblos in the Levant, his subordinate, to basically disregard the problem in a letter of the 14th century BC:

As to what you wrote: “I will not allow men from Sumur to enter my city. There is a pestilence in Sumur” – is it a plague affecting men or affecting asses? What plague affects asses so that they cannot walk? And watch out: do these asses belong to the king, or not?..If the king is the owner of the asses, then look out for the king’s asses!”
(75)

3.10.2.4 The Egyptian Connection

(This section has been modified for this thesis from the author’s
UNSW 2014 Doctor of Medicine thesis)

The search for the possible infection that the Egyptian prisoners of war and civilian captives had contracted, which then caused the 20 year Hittite Empire epidemic beginning in 1322 BCE, when they were taken back to Hattai, starts with the reign of Pharaoh Amenhotep III.

Amenhotep III ruled Egypt for 38 years from c1405–1367 BCE (1) during the 18th Dynasty. His name meant “Lord of the truth is Ra and he was known as “The Magnificent King”. He ruled Egypt at the peak of her glory, his mortuary temple was the largest ever built, but was destroyed by Ramesses II to build his own temple” (2). He was the father of Amenhotep IV, who later changed his name to Akhenaten, and grandfather of Tutankhamun. “With the accession of Amenophis III (c1405–1367 BC) Dynasty XVIII attained the zenith of its magnificence,” (3). He has the distinction of being the Pharaoh with the most surviving statues of himself with a count of over 250.

Amenhotep III was fanatical about recording and documenting everything that occurred during his 38 year reign.

Over 200 large commemorative stone Scarabs that have been discovered over a large geographic area ranging from Syria (Ras-Shamra) through to Soleb in Nubia. Their lengthy inscribed texts extol the accomplishments of the pharaoh. (4)

Amenotep’s reign was relatively peaceful, with only one known military campaign against the rebellious Kush. His reign continued the traditional political and religious association with the Anum priesthood later to be done away with by his reforming son Akhenaten. The rest of his reign was uneventful except for a possible plague that affected Egypt for eight years from the twelfth to the twentieth years of his reign.

The ancient Egyptians liked their long held traditions and subsequent stability, they did not like change. So according to Egyptologist Arielle P. Kozloff “When there is an eight year lapse in the written record despite the fact that Amenhotep loved to memorialize his every action, when there are major anomalies in religion, art, burial and marriage practices, excuses are made instead of recognising them as part of a larger, darker picture” (5).

Arielle P. Kozloff was the curator of ancient art at the Cleveland Museum of Art for 28 years from 1969–1997. She has written two books about Amenhotep III, firstly

Egypt's Dazzling Sun Amenhotep III and His World in 1993 and secondly Amenhotep III: Egypt's Radiant Pharaoh in 2011 and proposes that some sort of infectious disease epidemic, most likely bubonic plague, explains the eight year hiatus or gap in Amenhotep's reign, which she outlined in an article titled "Bubonic Plague During the Reign of Amenhotep III?" A summary of Kozloff's evidence presented in this article follows:

Firstly there was the significantly increased interest in the Goddess Sekhmet. She was the Goddess of War and Pestilence and was regarded as "a relatively minor deity" (6).

Even during times of increased war activity, as occurred during the reign of Tutmose III who reigned from 1479–1425 BCE and was called the "Napoleon of Egypt" because he expanded Egypt's empire into the Levant, there was no significant increase in the worship of Sekhmet as the Goddess of War. But during Amenhotep's reign, when he had no significant military action, he "commissioned more monumental statues of Sekhmet than of all the other gods put together" (7).

Note for Reference 7: This is also verified by the St. Louis University course on Egyptology - <http://euler.slu.edu/~bart/egyptianhtml/kings%20and%20Queens/amenhotepiii.htm>, p.5 Accessed 7 December 2012 where it states "At some point Amenhotep III had many statues of Sakhmet erected in the temple of Mut precinct in Karnak. Many hundreds of these statues have been found over the years. Some have speculated that the protective nature of the goddess may point to an attempt to have the gods protect Egypt against disease."

Also refer to – Sekhmet, <http://www.egyptianmyths.net/sekhmet.htm>, p.1, Accessed 9 December 2012 which states "Having once unleashed her powers for the destruction of mankind, the Egyptians feared a repeat performance by Sekhmet. The Egyptian people developed an elaborate ritual in hopes she could be appeased. This ritual revolved around more than 700 statues of the goddess. The ancient Egyptian priests were required to perform a ritual before a different one of these statues each

morning and each afternoon of every day of every single year. Only by the strictest adherence to this never-ending ritual could the ancient Egyptians be assured of their ability to placate Sekhmet.”

Also refer to – Sakhmet, <<http://www.pantheon.org/articles/s/sakhmet.html>> p.1, Accessed 9 December 2012 which states “She [Sakhmet] was also the “Lady of Pestilence” who could send plague and disease.”

Also refer to – Sekhmet, <<http://ancientegyptonline.co.uk/Sekhmet.html>> p.1 Accessed 9 December 2012 which states “Amenhotep III (father of Akhenaten, Dynasty Eighteen) built hundreds of statues of Sekhmet in the precinct of Mut’s temple (known as “Isheru”) south of the Great Temple of Amun in Karnak. It is thought that there was one for every day of the year and that offerings were made every day.”

Amenhotep III had over 1,000 large statues of himself made during his reign and made less than 200 large statues of all other deities. But for the lioness-headed deity Sekhmet he commissioned over 700 large statues – why if not to protect Egypt from a plague in her role of the Goddess of Pestilence?

The recording of bad news such as a plague by the ancient Egyptians was rare so there is little written about a plague during Amenhotep’s reign, but there is an Amarna letter (EA11) (8) written during the time of Amenhotep’s son Akhenaten’s reign which mentions the plague during Amenhotep’s reign. In the letter from King of Babylon Burnaburiyas to Akhenaten, Burnaburiyas was replying to Akhenaten’s earlier letter in which he stated that one of his father’s wives (but not his first wife Tiye) had died of plague. If the Pharaoh’s wife can die of the plague, so can the rest of Egypt.

Many scholars have examined the effects of infectious epidemics on the culture of the survivors. Millard Meiss looked at how the Black Death had affected painting in Florence and Siena in his book Painting in Florence and Siena after the Black Death published in 1951. A.A. Smith discussed the cultural and geographic affects of several plagues in his 1996 article “Plague in Ancient World: A Study from Thucydides to Justinian”, while John Julius Norwich looked at the affect of the bubonic plague on the Byzantium Empire in his book Byzantium: The Early Centuries in 1988. Then there is

the classic description of the Plague of Athens written by the Greek historian Thucydides (c460–c395 BCE) who lived through the epidemic and somehow survived the plague that killed off most of Athens.

Several common traits of how plagues affected the culture and geographic characteristics of the survivors became apparent according to Kozloff (9):

- 1) The plagues and epidemics cited occurred during periods of increased international trade and/or military movement.
- 2) Plagues, in particular bubonic plague, ravaged dense populations. This included monasteries or priestly groups, military and other highly concentrated populations, such as artisans, causing noticeable changes in religious and military activity and in artistic output and styles.
- 3) Panic caused flight from infected sites to “clean” areas.
- 4) Mass burials and other non-traditional methods of burial were practiced among diminished populations needing to dispose of large numbers of corpses. Mass graves where there is no evidence of foul play provide circumstantial evidence for the occurrence of mass death by disease, even though most infections leave no specific trace upon the bones.
- 5) In religious life, severe plagues caused a disaffection for old beliefs and support for new belief systems. In some cases, this meant the death of prominent cults and the rise of new or minor cults.
- 6) Artistic representations changed both in style and subject matter after plague episodes. In some cases entire artistic colonies died out along with their artistic production. Where art continued to be made, it became more ritualistic and spiritual.
- 7) After plagues, marriages increased as part of efforts to replenish the population.

Kozloff then goes on to describe similar characteristics as listed above during the reign of Amenhotep III.

Characteristic 1: Plagues usually occurred in times of increased international activity

Amenhotep's reign occurred during a time of great international trade in goods and people. Egypt engaged in trade and commerce not only with Mediterranean states but also in the Levant, the Middle East and the Indian subcontinent from where it will be shown later that the bubonic plague may have originated.

Characteristic 2: Devastation of Dense Populations

T. Save-Sodergergh was part of the Scandinavian Joint Expedition to Nubia in 1967–8. He wrote "Everything indicates a decreasing population from the Middle of the XVIII Dynasty and finally (Lower) Nubia seems to be more or less depopulated" (10).

He also wrote that the tombs from the reign of Amenhotep III onwards were impoverished due to the lack of skilled stonemasons to make them and sculpt them. The Amarna letters also record that there was a lack of gold being produced presumably due to a lack of skilled workers. These workers were housed together in fortified settlements along the Nile. Such close knit population concentrations were perfect targets for a spreading plague.

The Black Death was a devastating infectious epidemic, traditionally thought to be caused by bubonic plague, which occurred in Europe in the mid-14th Century mainly from 1348–50. It was called the Black Death because the skin of those infected with it turned black before they died. It occurred at the beginning of the Hundred Years War between England and France from 1337–1453. During the period of the Black Death truces of several years duration were common. "It was no wonder that truces were concluded, which lasted for over two years; and were reviewed – despite some local bickering and raids by both sides – till 1354" (11). The same may have applied to Amenhotep's reign as both he and his enemies would have had depleted populations,

too small to raise large armies to fight large scale wars. That could be why Amenhotep's reign was so relatively peaceful.

Characteristic 3: Flight to Clear Plague free areas

Amenhotep relocated his palace from Karnak to Malkata. Was this to find a clear plague free area in which to live? Malkata was a mud brick complex located on the West Bank of the Nile near Thebes which is on the East Bank of the Nile and part of the modern-day city of Luxor. The Karnak Temple Complex is located 2.5 km to the north of Luxor and is dedicated to the God Amun.

Malkata was Amenhotep's residence throughout most of the later part of his reign. "It is thought that Amenhotep III began construction of the Malkata Palace during the eleventh year of his reign....made this palace on the West bank the administrative centre of his kingdom as well as his home. He housed his extensive harem in quarters in the palace complex." (12).

Note that construction started around year 11 of his reign which is the same time the eight year "gap", possibly due to the plague, commenced – so it could have been built to flee the plague.

The Egyptologist C. Aldred "felt that Akhenaten's move to Akhetaten was an attempt to find an area free of plague" (13). Akhetaten meaning "horizon of the Aten" (Aten being Akhenaten's new sole God) is also known as Amarna and was established by Akhenaten in c1348 BCE. It was the usual practice of pharaohs to visit towns and travel from religious festival to religious festival along the Nile but Akhenaten did not travel and stayed only within the boundaries of his new city – was it to isolate himself from the plague?

Character 4: Mass Burials, non-traditional burial methods and Poverty of Grave Goods

Burials during Amenhotep's reign were unusual for three reasons. Firstly there were more mass and multiple burials than before, secondly the burial chambers were poorly decorated and the offering objects were of poor quality and lesser quantity, and

thirdly there was an unusually high number of married couple burials, as if they had died nearly simultaneously.

Amenhotep's reign occurred in the time of "tremendous luxury and unprecedented wealth" (14) so it seems strange that most mass or multiple burials occurred in roughly cut and poorly decorated tombs. Was this due to a lack of stonemasons and artists, who would have made the tombs the way we know and the usual Egyptian tomb to look like – well cut and well painted? Was this lack of artisans due to their death in the plague?

A.H. Rind discovered an undecorated Theban tomb-chamber in the mid-19th century. It was sealed with Amenhotep's name and dated year 27 of his reign (15). The chamber contained no bodies but had artefacts for the king's sister Tiaa, his granddaughter Nebetta, many other princesses, butlers, guards, accountants and an embalmer.

One explanation for the tomb being empty is that the bodies had "been disposed of in a more expedient manner" (16) earlier because they had died of plague, and the empty tomb was a reburial cenotaph done later. Rind also had "been surprised by the poverty of goods placed within the royal cenotaph. Poverty of grave goods is typical of plague" (17) due to a lack of artisans to make them.

Examples of married couples buried together include the king's parents-in-law Yuya and Thuya buried in the Valley of the Kings in an undecorated tomb, Henutwedjebu who was buried with her husband Hatiay in a rough cave and Kha and his wife. All tombs were rough and either undecorated or poorly decorated suggesting either that there was no time to plan for the burial or that there were too few artists available. Both scenarios point to plague.

Characteristic 5: New Cults and Changes in Religious Affiliation

The worship of Gods associated with health, disease and healing increased during Amenhotep's reign. The most important of these was the increase in the number of larger than life statues of Sekhmet the goddess of war and pestilence. Her consort

Ptah who was both punisher and healer also became more popular. His temple at Mennufer (Memphis) was expanded and redecorated during Amenotep's reign at great expense. "The little dwarf-god Bes, protector of health and home and warrant against disease, also gained new levels of attention during the reign of Amenhotep III" (18).

Khonsu, an ancient god of the Old Kingdom who was famous for being blood thirsty, suddenly became a healing deity by the end of the New Kingdom. Amenhotep also made himself a god just before the Sed festival to celebrate the thirtieth year of his reign. Was this an extremely rare act to help him ward off the plague?

At Karnak there is a scribe statue that records how Amenhotep, son of Hapu, the king's most trusted and powerful official had been ordered by the king to make a census of all the remaining Amen priests, and to fill their empty ranks after something (plague) had occurred throughout the Nile Valley.

The final piece of religious evidence favouring a plague is that Amenhotep's son Akhenaten instigated a religious revolution when he started monotheism with the God Aten. He may have done this because the traditional gods had failed him and he was trying desperately to save his kingdom from the plague. Also, if the numbers of traditional priests were greatly diminished due to dying from the plague, then there would be much less opposition to starting his new religion. So the old gods such as Amun were "out" and the new one god Aten was "in".

Characteristic 6: Changes in Artistic Subject, Style and Quality

Art during Amenhotep's reign became more spiritual and ritualistic. Early in his reign tomb painting flourished but in the middle of his reign tomb painting nearly ceased. Was this due to a lack of artists?

"Instead there seems to be an increase in painted wooden boxes and chests, executed by artists of lesser skill than the earlier tomb painters. The decrease in skill level of artistry is typical of plague times; it suggests that the tomb painters died out, or at least declined in numbers, several years before the end of Amenhotep III's reign" (19). The tomb painters lived at Deir el Medina which was destroyed by fire during the

time of Amenhotep or Akhenaten. If Deir el Medina was infested with plague killing off the tomb painters, then the best way to cleanse the site would be to destroy it with fire.

Another feature of tomb painting at this time that changed was the subject matter. During the early part of Amenhotep's reign tomb painting featured traditional happy scenes such as fishing, fowling and large banquets with extended family. Later in his reign the subject matter changed to more serious and spiritualistic images with images of the king, limited family members and mourning scenes. There were also fewer animals depicted because they may have been banished for fear they caused the disease. "The highly specialised glass-vessel industry also declined towards the end of the reign of Amenhotep III. It died out completely during the reign of Akhenaten, and was not reviewed until early Ramesside times" (20).

Another important example by Kozloff showing how the standards of Egyptian artisans, in this case hard-stone sculptors, had significantly deteriorated during the reign of Amenhotep follows:

After an eight-year total lapse in the written record of Amenhotep III's reign, the first text to appear is the year 20 record of the promotion of a temple official, Nebnefer, which occurred in the presence of four high priests of Amen. This extremely important document is not inscribed on a large and expensive grandiorite stela or statue, but rather around the sides of a small, poorly executed limestone statuette, giving the impression that the best hard-stone sculptors and engravers were not available. (21)

All the changes point towards a major loss of artistic skill and talent during the time of Amenhotep and Akhenaten. Why, was it due to a plague as there were no major wars or famines to account for the deaths?

Characteristic 7: Increase in Marriage

Incest was avoided by the ancient Egyptians and it was very rare for a Pharaoh to marry his daughter, so when Amenhotep III married not only one daughter but two, namely Princess Sitamen and Princess Iset both by his first wife the Great Queen Tiye, most scholars assumed “that these marriages were merely symbolic or ceremonial” (22). Amenhotep performed the ceremony just before his first Sed festival in year 30 of his reign and may have had another reason for marrying his daughters, to replenish the numbers of the royal family with pure stock, because its members had been killed off by the plague.

Amenhotep had also made himself a God to perhaps make it more acceptable to marry his daughters who were of child bearing age, instead of marrying his sisters who were too old to become pregnant. So instead of the marriages being pure lust and incest they were transformed to a higher level of a god doing his divine duty of ensuring the survival of his kingdom and royal family, after a disaster such as a plague had killed so many.

Amenhotep did not stop there:

By year 30 Amenhotep was ‘either bargaining for or already married to (his year 10 Mitannian wife Gilukhipa’s) niece Tadukhipa, two Babylonian princesses and the daughter of the King of Arzawa’. These foreign marriages cannot be attributed entirely to plague response because such alliances had been joined before the Eighteenth Dynasty; however the number of Amenhotep’s foreign queens far exceeded the norm. (23)

Also in Year 30 of his reign Amenhotep made many women exempt from tax so that they would become financially secure enough to marry men who otherwise would not have been able to support a wife and children. This act by Amenhotep was a marriage incentive to help repopulate the empire. The women exempted from taxes

included “hairum girls and songstresses for the Amen estate, as well as ‘free women who were servants since the time of his (Amenhotep III’s) forebearers’ ” (24).

Akhenaten continued this incestuous marriage practice of his father. He married a sister and with her fathered Tutankhamun (the pharaoh made famous by his intact tomb’s discovery in 1922 by Howard Carter). He also married three of his daughters namely his eldest daughter Meritaten, his second daughter Meketaten and his third daughter Ankhesenphaten who in turn would later also marry her half-brother Tutankhamun. Were all these incestuous relationships also in response to the plague and the need to restock a depleted royal family with genetically “pure” stock?

In summary, following a period of trade with Western Asia and the Indus Valley Civilisation, Egypt was subject to an eight year “gap” period of no written record between the years of 12 to 20 of Amenhotep III’s reign. This was followed by the commissioning of many hundreds of over-life-sized hard-stone statues of the God of Pestilence Sekhmet; which would have left fewer artisans available to do other work, besides those that had already died off due to the plague.

It also caused Amenhotep to move from his royal palace in Karnak to his new clean area site in the middle of the desert at Malkata, because he may have observed that green areas such as Karnak on the banks of the Nile (where rats would have flourished) suffered badly from the plague, whereas desert areas such as Malhata (where rats would not have flourished as well) were less likely to suffer from the plague.

Because so many infants and small children had died off during this first bout of the plague it meant that by year 30 of Amenhotep’s reign there was an acute shortage of people of child-bearing age available; so he exempted from paying taxes the three classes of women who would have survived this first bout of the plague, as children were now reaching child-bearing years so they could marry and have children.

The second bout of the plague may have occurred around year 27, which would explain the unusual mass burial tomb found by Rind and also explain why Amenhotep made himself a God and married his two daughters just before his year 30

celebrations. Another bout may have occurred in the early years of Amenhotep III's son's reign. In response to this Amenhotep IV changed his name to Akhenaten, changed Egypt's religion to Atenism because all the old Gods had failed to protect him and Egypt from the plague, and moved his royal palace to his own clean area site at Amarna.

So what could have caused the original eight year textless gap and subsequent episodes? As stated earlier Amenhotep did not fight any major wars which would have killed off large numbers of young men but not women, children and artisans. Nor was Egypt invaded during his reign which could have resulted in many men, women, children and artisans being killed. There were no major famines either. So all evidence points to an epidemic or epidemics by some sort of recurrent infectious plague to account for such loss of life amongst men, women and children and lack of skilled artisans. But which type of infectious disease epidemic?

The research conducted by paleoentomologist Eva Panagiotakopulu will answer this question. More evidence to prove that trade between Pharaonic Egypt and India occurred can be provided. Panagiotakopulu has found the Khapra beetle, a native of India, in wheat from a Middle Kingdom tomb at El Gebelein (25). Gebelein is Arabic for "two mountains" because there is a north and a south mountain at El Gebelein, which is an ancient Egyptian archaeological site just south of Luxor (ancient Thebes) on the western bank of the Nile. Its ancient Egyptian name is Inr-ti meaning "two rocks". It has been excavated from 1884 and these excavations have shown that El Gebelein was occupied over a very long period of Egyptian history from the Pre-Dynastic Period until the Ptolemaic Period. Excavations at the cemetery on the northern hill unearthed the first Pre-Dynastic bodies ever discovered in Egypt, dating from 3400 BCE; while excavations on the southern hill revealed the Temple of Hathor which was torn down for its limestone during Roman times.

Dr Panagiotakopulu has also suggested that the *Rattus Rattus*, necessary for bubonic plague transfer to humans, was introduced directly from India: "...the black or

ship rat, *Rattus rattus*, introduced from India or indirectly via Mesopotamia during the Pharaonic period.” (26)

If there was trade between ancient Egypt and ancient India which introduced bubonic plague into ancient Egypt, then that same bubonic plague must have existed at the source i.e. ancient India. This bubonic plague may then have contributed to the demise of the Indus Valley Civilisation as well.

Yersinia (Pasteurella) pestis is the name of the bacillus that causes the bubonic plague. It can be transmitted to humans via various fleas but classically via the black rat flea *Xenopsylla cheopis* which can also live on a number of other animals such as cats, guinea pigs, dogs and carnivorous animals that eat rats. Other fleas that could carry the plague bacillus include the human flea *Pulex irritans* and the cat flea *Ctenocephalides felis*. Egyptians were very fond of cats and actually worshipped them. Panagiotakopulu has researched at the Workman’s Village at Amarna, Egypt and found human fleas there along with cat fleas (27). Note that this is the earliest known discovery of the human flea in the Old World.

Boessneck found black rat remains at his dig site of Tell Eldab’a in the Nile Delta dating from 1700–1600 BCE, along with Nile rat remains (28). Plague like illnesses have been mentioned in Egyptian papyri as the following shows:

Perhaps the first time plague is mentioned is in the Ebers Papyrus, a medical papyrus dated around 1500 BC, but probably compiled much earlier:

If thou examinest a man who suffers from the said (i.e. from the shivering fit described in 38, 3-10) for hours, like consuming for purulency, and he is weak like a breath that passes away, then thou shalt say that it is (due to) closing (?) of an accumulation, which cannot be raised and does not trust in a weak remedy; it (i.e. the accumulation) has produced a bubo, and the pus has petrified, the disease has hit. Thou shalt prepare him remedies to open it by means of medicines. (Ebers Papyrus 39, translated by Ebbell, 1937).

Another tentative description of a disease that could be the plague is found in the Hearst Medical Papyrus, a text paleographically related to the Ebers Papyrus, and dated to c1520 BC: one of the incantations is against 'the Canaanite illness':

Who is knowledgeable like Ra? Who knows the like of this God? – when the body is blackened with black spots – to arrest the God who is above. Just as Seth had banned the Mediterranean Sea, Seth will ban you likewise. O Canaanite illness! You shall not intend to pass through the limbs of X, born of Y. (Hearst Papyrus H X1 12–15 translated by Goedicke, 1984, p.94).

In the London Medical papyrus, dated 1350 BC, there are incantations 'in the language of Keftiu' against the 'Canaanite illness' (Goedicke, 1984). A further possible description of the disease could be in the incomplete section of the same papyrus:

When the body is coal black with charcoal (spots) in addition to the water (urine) as red liquid (i.e. bloody)... (London Medical Papyrus 15, 8-10, translated by Goedicke, 1984).

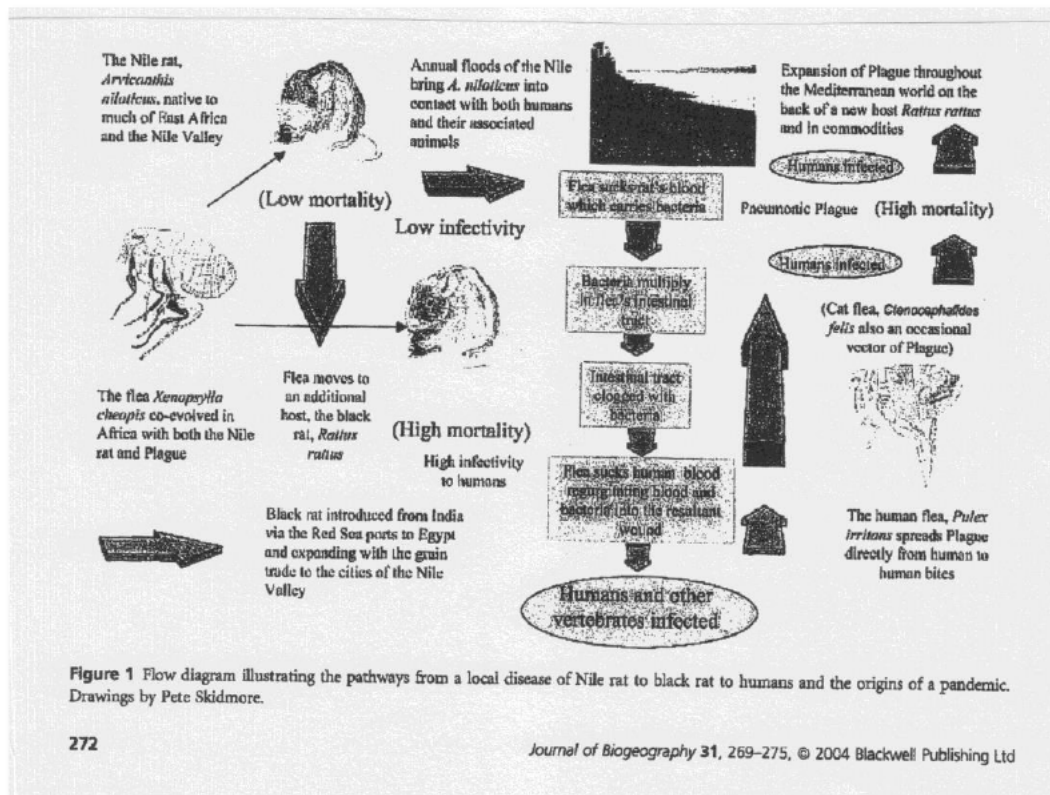
Goedicke (1984) is definite that this disease is bubonic plague, although the evidence is insubstantial. This disease was probably called the Canaanite or Asiatic (Amu) illness, either because of the place in which it started, or simply because everything deleterious tends to be blamed on somebody else. The case of syphilis, Shakespeare's 'Malady of France' (Henry V, Act V, Scene 11), provides a more modern example of the same.

One of the Amarna letters, a collection of incoming diplomatic correspondence sometimes heavy on exaggeration, also refers to plague. In letter EA 35, the king of Alasia (? Cyprus) explains why the amount of copper he sent to the king of Egypt is small:

Behold the hand of Nergel (pestilence, plague) is now in my country; he has slain all the men of my country, and there is not a (single) copper-worker (translated by Moran, 1992) (29).

It can be seen then that there must have been a devastating infectious disease in Alasia, so bad that it killed off all the men. Thus there would be no men to grow food leading to famine, no men to mine minerals so less trade and income for the country, no men to administer the country, let alone defend it from invasion leading to its possible demise.

Panagiotakopulu has proposed the following hypothesis (30):



Amarna had a short history being abandoned after about 20 to 25 years. Akhenaten reigned from c1353–1334 BCE, and had Amarna constructed between years 5 and 9 of his reign. He used mud brick and whitewash, instead of stone, to speed up construction while important buildings were faced in local stone. It was abandoned after the death of Akhenaten. Was this due to no more patronage by the

pharaoh or was it because plague infected the city as “the sudden deaths of several members of the royal family could be linked to the plague” (31)?

It can now be seen that bubonic plague existed in Egypt at the time of Amenhotep III and Akhenaten, if not earlier. Bubonic plague also has a nasty habit of recurring in epidemics many years apart when circumstances permit. So it is logical to think that the infectious disease introduced into the Hittite Empire by the Egyptian prisoners of war in 1322 BCE was possibly a recurrence of bubonic plague, because there is evidence of it in Amarna only a few years earlier from c1348–1334 BCE and from c1378 BCE (after year 12 of Amenhotep’s reign).

That is why German archaeologists refer to the Hittite Epidemic of 1322 BCE as bubonic plague “another disaster will punish his (Suppiluliumas’) Empire: the plague, more precisely, the bubonic plague” (32) or in German “die pest, genauer: die Beulenpest” (32) and not smallpox as the earlier doctors had thought. This bubonic plague theory for the cause of the 1322 BCE Hittite Epidemic is also supported by Eric Watson-Williams (33) and Lars Walloe (34).

The end of the Hittite Empire occurred over 120 years later in c 1200 BCE when it was part of the bigger catastrophe known as the end of the Bronze Age in the Near East.

New excavations done by the Amarna Research Foundation at the northern cemetery at Amarna have discovered mass graves containing the skeletons of children and teenagers; which they suggest are the remains of child slaves used to build Amarna. Amarna was built of mud bricks; so child slave labour could have been used to make the bricks and transport the bricks, because they would have been much lighter than the large stone blocks used to build other buildings before in ancient Egypt. But these child slaves could also have died from childhood infectious diseases such as diphtheria or measles, or from plague. Until ancient DNA analysis of the skeletons is done this doubt will always remain. The author of this thesis has tried to contact the Amarna Research Foundation to find out if such an analysis is going to happen; to no avail unfortunately.

Introduction

For bubonic plague to have been introduced into ancient Egypt from the Indus Valley Civilisation during the late 18th Dynasty there had to be direct contact between the two civilisations by sea to allow for the transfer of the plague carrying *rattus rattus*, from Harappa to Egypt, as unwanted stowaways on boats. Currently ancient history scholars think that there was no such direct contact between Pharaonic Egypt and the Harappans; only indirect contact via Sumer. This is because both Egyptian artifacts and Harappan trade seals and other shell objects have been found in Sumerian archaeological excavations; plus Sumerian cuneiform tablets mention both Egypt and Meluhha, the Sumerian name for the Indus Valley Civilisation. The following will try to change this misconception that there was no direct contact.

The Evidence

Paul LeBlanc is a Canadian classical historian from the University of Ottawa who wrote an article about such direct contact titled 'Ancient Egyptian Ties with the Indus Valley Civilization: Theories of Contact' (1). The main focus of the article was the anthropological theories put forward by various scholars to explain the contact. "These theories of contact are mostly anthropological in nature and can artificially be separated into two distinct groups, firstly, the theoretical views held by many Afrocentric scholars (e.g. Cheikh Anta Diop [1981], Wayne B. Chandler's [1995], Runoko Rashidi [1995]) that propose a genetic affiliation between the ancient Indus people and/or culture with Black Africa – what some scholars see as a commonly shared African origin between the Indus and Kemet/Egypt. Secondly, there is another class of scholars (e.g. Henri Vallois [1944], Bernard Sergent [1997], Alain Froment [1992,1994]) – for the most part mainstream Western scholars – who also hold specific views on the racial categorization of the ancient Indus inhabitants and, surprisingly at times, their views often corroborate the Afrocentric approach in seeing an African origin as being an integral part of the Indus equation insofar as searching for the origins of the culture, people and language." (2)

Their argument states that “The connectionbetween the ancient Egyptian and Indus cultures, is an interrelationship involving early Kushite/Ethiopian history.” (3) They argue that the north eastern part of Africa (today's Ethiopia, Somalia, Djibouti and Eritrea) had common links with both Egypt and the Indus culture, not only supplying the basic population root stock but also later continued contact and trade. Evidence of this trade has been found in the form of “a copal necklace uncovered in a tomb at Tell Asmar (near Baghdad) and dated to 2500-2400 BC (Beaujard & Fee 2005:407); this object likely came from North East Africa – and more specifically still – from the vicinity of Zanzibar.” (4)

The other main argument put forward in LeBlanc's article is the Comparative Linguistic Hypothesis which is championed by Bernard Sergent. In this hypothesis Sergent proposes that common linguistic characteristics in the languages of India and north eastern Africa means that there was a common ancestry and thus connection between these peoples.

Thomas McEvilley is a Distinguished Lecturer in Art History at Rice University and also a visiting professor at Yale University and the Art Institute of Chicago. He is an expert in Greek and Indian philosophy and his book 'The Shape of Ancient Thought' explores the history of early Eastern (Indian) and Western (Greek) philosophy. It shows how trade, migration and imperialism facilitated the spread of different cultural philosophies throughout ancient India, Egypt, Greece and the Middle East.. In it he states “Around 1500-1300 B.C. full East-West transport of goods – almost from one end of Eurasia to the other – was achieved.” (5) This would include from India to Egypt.

The ancient Egyptians referred to the Horn of Africa area as the Land of Punt. Pharaoh Sahure of the Fifth Dynasty (25th century BCE) organised the first official expedition to the land of Punt; but records show that gold from Punt was delivered to Egypt earlier, during the reign of Pharaoh Khufu in the Fourth Dynasty, during the Old Kingdom. (6)

The four main ancient Egyptian Gulf of Suez/Red Sea ports being excavated currently are (going from north to south) Ain Sukhna, Wadi el-Jarf, Mersa Gawasis and

Al-Qusair. Kathryn Bard is a Professor of Archaeology at Boston University and she is co-director, along with Rodolfo Fattovich, of the excavations at Mersa Gawasis which had contact with the Nile River at Waset via the Wadi Gawasis. It was a loading port for expeditions to Punt, especially during the Middle Kingdom period and the excavations have revealed the remains of the world's oldest seafaring ships. The author has contacted Prof Bard via email and she confirms that, so far, no Harappan artifacts have been found at Mersa Gawasis.

Pierre Tallet, an Egyptologist from the University of Paris-Sorbonne has is the director of the excavations of the world's oldest port dating back 4,500 years to the reign of the Pharaoh Khufu; at Wadi al-Jarf. It is over 1,000 years older than any other known port and had contact with the Nile River via the Wadi Araba. The third port at Al-Qusair was important in ancient times because it was located at the Red Sea end of the shortest route between the Nile River and the Red Sea. Ain Sukhna was used as a port from the time of the Old Kingdom through to the New Kingdom mainly to cross the Gulf of Suez to access the southern part of the Sinai Peninsula where important mineral mines existed.

If the Egyptians could sail as far as the Horn of Africa; then it was not much further for them to continue coastal voyaging along the coast of southern Arabia (today's Yemen), staying in sight of land, until they reached Magan (today's Oman) and then across the entrance of the Arabian/Persian Gulf to Harappa. And the reverse was also possible. Harappan sailors knew about Magan on the southwest side of the entrance to the Persian Gulf (there are Harappan sites there) and they too could have coastal voyaged until they arrived at the entrance to the Red Sea and the Land of Punt. These voyages would have been limited by the ship's rigging which did not allow them to sail into the wind. So the voyages would have been seasonal and occurred when the prevailing winds were favourable.

Is there evidence that such long voyages by the Harappans were possible back then? Yes there is because researchers from the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany have found Indian genome material in the

Aborigines of northern Australia. (7) Dr Irina Pugach and Dr Mark Stoneking have shown that Indians from about 4,000 years ago had contact with the Aborigines and their genetic material is present in the Aboriginal population's genes. They have also shown that these Indians sailed directly to northern Australia, bypassing Malaysia and Indonesia, as there was no evidence of their genome material in these populations. So if people from the Indus Valley area of India can sail from there directly to northern Australia over the vast Indian Ocean then they are more than capable of sailing a much shorter distance to Egypt. The timing is important as well because it is around the time of the beginning of the end of the Indus Valley Civilisation about 4,000 years ago. Were they leaving or being "pushed away" from an infectious disease epidemic and seeking or being "pulled" towards a new infectious disease free land ? Thus this is the same old "push" and "pull" factors seen before in ancient history due to infectious diseases, repeating itself. Or were they explorers or were they fishermen who got blown out to sea ?

Once established in northern Australia the descendants of these Indians must have moved eastward across the Pacific Ocean from island to island until they came to Easter Island. The evidence for this migration is provided by the distinctive form of writing used by the Harappans. The Harappans used a form of pictogram writing using symbols which can be seen on their seals used for trading. They have unique symbols which can also be seen in the writing used in Easter Island. "Rongorongo is Oceania's only indigenous script. It is found in one location only – in the centre of the Pacific Ocean, over a thousand miles from any continent. We now know that the first migrants to Easter Island were deliberate, because they involved taking the people, plants and animals needed to establish sustainable colonies. The script was first identified in 1864, and any suggestions that it originated after European contact are rejected on the basis that at least two of the Rongorongo tablets are dated to before their arrival. So the big question remains ...where did it come from ?" (8) The article goes on to show further evidence that cannot be ignored. "In addition, recent epigraphic research have revealed both further similarities between the two scripts, but also, and more

significantly, that similarities between groupings can be found in both scripts. A finding which cannot be ignored or considered simply a further coincidence. We are left with a mystery which however unlikely, appears to show a thread of connection between the two cultures.” (9) In other words, not only are the symbols or script the same, but also the groupings of the symbols are the same – the probability of this being a coincidence is very remote indeed.

Other evidence of contact between ancient Egypt and Harappa is available. The Petrie Museum in London has a necklace containing one of the unique Harappan carnelian stone beads with the characteristic drilled hole through the full length of the middle of the bead. Its reference number is ‘UC 30334 – Carnelian etched barrel-bead with the design in white colour to represent an eye-pattern combined with a chevron design’. According to Dr Alice Stevenson, the Curator of the Petrie Museum of Egyptian Archaeology, University College London, this bead could have come to Egypt from the Indus Valley Civilisation via multiple stops through the Middle East and especially Sumer and not necessarily come directly by boat. The same goes for the many necklaces and other forms of jewelry made from Lapis Lazuli that are in the Petrie Collection. “Lapis can be transferred via a number of routes from Afghanistan.” (10)

When the Indus Valley Civilisation port at Lothal was excavated in the late 1950s and 1960s Egyptian objects were found and they are now housed in the Archaeological Survey of India’s Museum there along with seals from Bahrain and terracotta figurines from Sumeria. (11) Did these objects come to Lothal from trade with Egypt via Sumer or did they come directly to Lothal from Egypt by boat? Lothal was still active in the latter period of the Indus Valley Civilisation when it contracted down towards the Gujarat region, ending c.1300 BCE; well after the end of Sumer c. 2000 BCE. Thus after the end of Sumer, the Indus Valley Civilisation may have been forced to trade directly with Egypt and Lothal may have been the port from which the plague left for Egypt directly by boat in the mid Fourteenth century BCE.

Another piece of evidence is the importation of high yielding African millets (sorghum, finger millet and pearl millet) from the west coast of Africa into Harappa

during the early second millennium BCE, already mentioned in section 3.5.5, to help with the food supply. Were they imported directly to Harappa by boat or did they take the 'scenic route' and go to Harappa via the much longer Sumerian route ?

The last pieces of evidence are supplied by Dr Eva Panagiotakopulu and her work as a paleoentomologist in Egypt. As discussed in section 3.9.2.3 'The Egyptian Connection' Dr. Panagiotakopulu has found the Khapra beetle from India in a Middle Kingdom wheat storage granary in El Gebelein. How did it get there – on a camel across the desert via Sumer or directly on a boat ? She also found the remains of the *rattus rattus*, again from India, in Amarna. It could not have hitched a ride on a camel to cross the desert to get to Egypt – it must have come to Egypt directly by boat. Hence the medical model provides the definitive answer – there had to be direct contact between Harappa and Egypt by boat to allow the transfer of *rattus rattus* rats from Harappa to Egypt. Also the Harappan voyage to northern Australia 4,000 years ago proves that the Harappan sailors were more than capable of making the much shorter voyage to Egypt.

Even Dr.Schug suggests that there was trans Arabian Sea trade in the third millennium BCE “that stretched across the Arabian Sea.” - “We argue that if leprosy evolved in Africa in the Pleistocene it is unlikely to have spread into Asia and become a serious health issue until the late Holocene, when South Asia and Northeast Africa were part of a larger regional trade network that stretched across the Arabian Sea. We argue that transmission of *M.leprae* between Asia and Africa is most likely in the third millennium B.C. when India had extensive, wide-ranging networks for movements of peoples, goods, and potentially infectious diseases.” (12)

3.10.3 Leprosy

Schug's research has shown that up to 21.7% of the later skeletons in her cemetery series had leprosy; which is quite a significant number of people, not to be ignored. But that was for the bodies buried in the cemetery – the rate of infection would have been even higher for the poorer people, too poor to afford to be buried in the

cemetery. Even so, leprosy would have been a constant source of infection but not bad enough to be the infection to cause the decline of the Harappan's empire or Sumer because it is a chronic and slow growing disease – not one to cause an epidemic.

The Indian hymns from their Hindu text the Atharva – Veda numbers I,23. and I,24. which appear in the Appendix; are for cures for leprosy – so it has been known to the Indians for thousands of years.

3.10.4 Tuberculosis

The evidence for the existence of tuberculosis during the Bronze Age comes again from Sir Marc Ruffer and his examination of Egyptian mummies. In his book "Studies in the Paleo pathology of Egypt" he identifies the typical spinal lesions of Pott's disease as shown in Plate IX, figures 14 and 15 (1). Modern science has also identified the DNA of *Mycobacterium tuberculosis* in the spine of Egyptian mummies (2), thus providing primary physical evidence for the existence of tuberculosis in the Near East in the late Bronze Age. In the crowded living conditions in cities with the malnutrition and poverty, tuberculosis would have had perfect breeding conditions in which to flourish and devastate the local population with its high mortality rate.

Schug's research has shown that tuberculosis existed in the skeletons examined in her cemetery series - but that was only for the skeletons buried in the cemetery. What about the poor people who were too poor to be buried in the cemetery and because they were poor they would have been more prone to tuberculosis? Their rate of tuberculosis would have been even higher than the examined cemetery's rate. Tuberculosis would have been a constant source of infection, but not at high enough rates to be the infection that delivered the 'knockout blow' to the Harappans.

The Indian hymns from their Hindu text the Atharva – Veda, numbers VI,25., VI,83.,VII, 74. and VII,76. which appear in the Appendix; are for cures for scrofulous or tuberculosis; hence it has been known to the Indians for thousands of years.

3.10.5 Malaria

Malaria has been infecting humans “for the entire history of the species” (3) and existed in the Near East from Anatolia through the Levant and into the Nile in Egypt in the late Bronze Age, as it still does today. So it had the constant potential to cause death in humans, especially the virulent *Falciparum* strain during the end of the Bronze Age era.

The investigative work of Kennedy was discussed earlier and it showed that malaria was endemic in the Indus valley Civilisation at a rate of up to 25%, hence it was a constant source of infection and potential death for the Harappans as well. A bad *Falciparum* strain epidemic could have had a devastating effect on both the Sumerian and Harappan civilisations, just as it did to help end the Western Roman Empire in 476 CE.

3.10.6 Smallpox

Smallpox or variole is a virulent infection caused by a virus. It was first called smallpox in Europe in the late 15th Century to distinguish it from the “great pox” or syphilis. Thought to have originated in north eastern Africa 10,000 BCE, smallpox then spread to Egypt and from there onto India (4).

Ramesses V is the fourth pharaoh of the Twentieth Dynasty of Egypt and he died c1157 BCE (5) most likely from smallpox. The well preserved mummy of Ramesses V shows classical smallpox lesions on the face, neck and shoulders as verified by smallpox expert Donald R. Hopkins in 1979 (6). This period was a time of expansion of the Egyptian Empire, so cases of smallpox could have been imported into Egypt because of this expansion into new territories and war. If the pharaoh, who would have been protected from all harm, finally succumbed to smallpox; how long had it been ravaging the general population of Egypt and how far had it spread in the Near East?

Sir Marc Armand Ruffer ⁵ in 1910 described a smallpox like rash on a mummy from the same period (Twentieth Dynasty) as Ramesses V (7), thus giving more primary physical evidence of the existence of smallpox in the Near East at the time of its ending between 1200 and 1150 BCE.

Normally a pharaoh is mummified and buried precisely 70 days into the reign of his successor (8) but Ramesses V was buried two years after his death – why? Hopkins suggests three possible reasons for this. Firstly the body may have deteriorated due to the infection hence needed prolonged mummification. Secondly the embalmers feared being infected by the smallpox. Finally there may have been a shortage of embalmers because they too had been killed by the smallpox epidemic. There may have also been a shortage of stone masons and stone cutters as well, because Ramesses VI was also buried in the tomb of Ramesses V, i.e. two pharaohs in the one tomb which is not the usual practice.

Tom Slattery has degrees in East Asian Studies from the University of California, Berkeley and in English from Central Washington University. In his book The Tragic End of the Bronze Age. A Virus makes History (9) Slattery argues that smallpox may have killed Ramesses V and started the end of the Bronze Age. He also argues that as people died off with smallpox, there were not enough men to mine tin, vital in bronze production, hence the Bronze Age ended because less bronze was able to be made. Slattery also thinks that the Hittite Plague of 1322 BCE was due to smallpox.

Thus it is most likely smallpox would have existed in Sumer and it may have been the cause for the foul smelling blister described in the earlier laments from the ETCSL. If it did exist it would have caused devastating epidemics – bad enough to end an empire by killing most of the population; or make it so weak that it would have been wide open to invasion by a jealous neighbour.

⁵ *Note:* Sir Marc Armand Ruffer (1859–1917) was an Anglo-French pathologist who pioneered paleopathology. In 1882 he graduated from Oxford with a BA, then in 1887 gained his MBChB from University College in London followed by his MD in 1889. In 1916 he was knighted for his services to bacteriology and hygiene and for his services to the Red Cross Organisation.

Donald Hopkins is an authority on smallpox having worked as a Director of the Centers for Disease Control and Prevention in Atlanta, plus being part of the World Health Organisation's Smallpox Eradication Programme. He wrote the definitive history of smallpox titled 'Smallpox in History. The Greatest Killer' in which he discusses smallpox in India stating – "Evidence of the long existence of smallpox in India derives primarily from clinical descriptions in ancient medical and religious texts....they may recount descriptions from as early as 1500 B.C." (10)

He then goes on to say – "The Susruta Samhita includes a vivid description of smallpox:

Before Masurika appears, fever occurs, with pain over the body, but particularly in the back....When bile is deranged, in this disease, severe pain is felt in the large and small joints, with cough, shaking, listlessness and languor; the palate, lips and tongue are dry with thirst and no appetite. The pustules are red, yellow, and white and they are accompanied with burning pain. This form soon ripens....When air, bile and phlegm are deranged, in the disease the body has a blue colour, and the skin seems studded with rice. The pustules become black and flat, are depressed in the centre, with much pain. They ripen slowly.... This form is cured with much difficulty, and it is called Charmo or fatal form. (Wise 1845, 234)" (11)

In ancient times Brahmin priests worshipped a smallpox diety and in spring, the smallpox season, travelled the countryside inoculating people against smallpox. "Thus India was apparently the first ancient civilisation to manifest a need for a specialized goddess of smallpox....a fact that may reflect an earlier appearance of smallpox in India." (12)

Thus smallpox would have existed at least in the latter part of the Harappan Empire, but the only way we will definitely know is to find ancient DNA evidence in skeletons – if archaeologists look for it.

Smallpox would have had a devastating effect on both Sumer and Harappa and had the potential to end either or both civilisations.

3.10.7 Water Borne Diseases Such as Cholera, Typhoid and Dysentery

The Harappans had the most sophisticated sanitation and drainage system in the ancient world, but during the latter stages of their empire this system was not properly maintained hence would have been a source of infection by waterborne diseases such as dysentery, typhoid and cholera.

These waterborne diseases would have also been present in Sumer because of the abundance of water from the two rivers [Tigris and Euphrates] and their sophisticated irrigation system. These infections would have been seasonal and localised, thus not the ones that would have caused the decline of the Indus Valley or Sumerian Civilisations.

3.10.8 Measles, Polio and Influenza

As stated earlier in this thesis, measles in a virgin population had the potential to cause a lethal epidemic, but unfortunately there is no good evidence or records to show it occurred. We only have its potential as a cause of an epidemic. This also applies to the other potent viral infections of influenza and polio.

3.10.9 Haemorrhagic Fevers

Mesopotamian medical practitioners recognised that contagious disease existed, but did not know that micro-organisms caused them. They recognised that "...a greater likelihood for a person to become ill when in contact with someone with certain diseases; lexical texts equate "infected" with "place that has been touched". (13).

One of the most contagious disease groups back then, and still even today some four thousand years later, are the Haemorrhagic Fevers. As the name implies, the Haemorrhagic Fevers cause high fevers and generalised bleeding, with an

extremely high mortality rate even today [as shown by the high death rates in the latest Ebola Virus outbreak in west Africa in 2016].

The Mesopotamians wrote therapeutic manuals for medical practitioners for the diagnosis and treatment of various diseases. The oldest such manual and “oldest known Mesopotamian medical text dates from the Ur III period (2112-2004 BC).” (14). Research into a Sumerian therapeutic manual by Scurlock and Coleman has revealed references to two diseases that could be interpreted as Haemorrhagic Fevers. The first one was referred to as “Hand of Sibitti” and the second one was referred to as “Hand of Marduk”. Unfortunately both proved to be fatal infections.

The following examples describing possible Haemorrhagic Fever in Mesopotamia date from the mid First Millennium BCE, so are much later than the scope of this thesis, but they are included here for completeness. They come from tablets in a medical diagnostic series analysed by Rene Labat, an eminent French scholar and published in his book ‘Traite Akkadien de Diagnostics et Pronostics Medicaux’ or (TDP) (15).

The first example comes from tablet 17 of the diagnostic series and states the following:

“If during his illness he does not raise his eyes (and) blood comes out of his eyes, his nose, his mouth, his ears and his penis all at the same time (it is) ‘Hand of the Sibitti’”. (TDP 158:25-26).

Example Two comes from tablet 23 and states the following:

“If (his) limbs.....his epigastrium (has) a piercing pain, blood flows incessantly (from his mouth), his arms are continually weak, depression continually falls upon him (and) his eyes are suffused with blood (it is) ‘Hand of Marduk’; he will be worried and die.” (TDP 180/182:34-35)

The third example also comes from tablet 23 and it reads:

“If his limbs.... his temples are overwhelmed, his throat (looks) skinned, his insides are continually cramped (and) he is sick all day and all night (it is) ‘Hand of Marduk’; he will be worried and die.” (TDP 182:36-37)

Example Four appears in tablet 12 and states:

“If his chest is not congested, his forehead looks bruised, blood flows incessantly from his mouth (and) his heart incessantly flutters (it is) ‘Hand of Marduk’: he will be worried and die.” (TDP 100:2-3)

These four examples describe severe bleeding in various parts of the body, which could be one of the Haemorrhagic Fevers; hence usually fatal. The author of this thesis is a medical doctor and finds it interesting to note that fever was not mentioned in any of these descriptions. It is something that a medical doctor would find strange not to mention. These bleeding infections would have been devastating 2,500 years ago, killing most people and ending empires. Even though these examples were written in the mid first millennium; they would have been based on medical observations and texts written many hundreds, if not thousands of years earlier. So these examples show that Haemorrhagic Fevers would have been a possible infectious disease scourge 2,500 years ago and also earlier, hence during the scope of this thesis, killing most people in their wake.

3.11 Did Climate Change Help Spread The Plague ?

Climate change is currently one of the new focuses of science, but it is not a new problem. As discussed in sections 3.3 and 3.6, about currently accepted theories for the decline of the Sumerian and Indus Valley Civilisations respectively; it can be seen that climate change played a role in changing the environment so that it favoured the development and spread of the plague and other infectious diseases.

In the case of Sumer it was the 300 year drought, as described by Wiess, which would have caused famine, thus making the population weaker and more prone to infectious disease, and migration south to Sumer; which helped the development and spread of pneumonic plague. The drought started c. 2200 BCE and the following verse from the writing called 'The Curse of Akkad' describes the resultant famine:

“For the first time since cities were built and founded,
The great agricultural tracts produced no grain,
The inundated tracts produced no fish,
The irrigated orchards produced neither syrup nor wine,
The gathered clouds did not rain, the masgurum did not grow,
At that time, one shekel's worth of oil was only one-half quart ...
These sold at such prices in the markets of all the cities !
He who slept on the roof, died on the roof,
He who slept in the house, had no burial,
People were frailing at themselves from hunger.” (1)

Prof. Peter de Menocal is an oceanographer and paleoclimatologist from Columbia University where he is the Dean of Science and the founding director of Columbia's Centre for Climate and Life. He works from Columbia's Lamont-Doherty Earth Observatory. De Monocal has been studying the North Atlantic current and deep-sea sediments; which act as archives of past climate change. He has shown that cooler waters in the North Atlantic can alter the paths of weather systems resulting in reduced

rainfall in Europe and the Middle East. His research has shown that there was such a cooling of the North Atlantic just before the 2200 BCE drought. (2)

In the Indus Valley several climate change related factors were involved starting with the shift of the Monsoon south and also away from the Indus Valley into the Ganges Valley, thus causing drought in the north and flooding in the south – both of which are not conducive to growing abundant crops, hence famine would follow. Other climate related factors included changes in the flow of rivers and changes to the sea level.

The decline of the Sumerian and Indus Valley Civilisations was multifactorial though; involving not only climate change but also the thing that delivered the final blow or '*coup de grace*' to these civilisations – possible infectious disease epidemics; which had been helped in their development and subsequent spread by climate change. People can escape from drought by migrating to more favourable lands where there is water. People cannot escape from the plague. It will kill you where you are currently living; or you will carry it with you, if you are infected, and you will die from it at your new destination.

CONCLUSION

This thesis has shown that significant infectious diseases such as leprosy, tuberculosis, malaria, haemorrhagic fever, smallpox and plague did exist during the time of the Indus Valley Civilisation and that they may have contributed to its decline, as part of a multifactorial group of causes for this decline. The latter two, namely smallpox and plague, are highly refined and efficient mass serial killers, perfected by nature to be such. Thus this thesis has shown that infectious disease can have a significant impact on important historic events that can change subsequent history, thus infectious disease should always be factored in and not ignored as is the current practice.

But did the Indus Valley Civilisation actually collapse and end; or did it decline and then transform itself into the Cemetery H Culture and Ochre Coloured Pottery Culture; eventually becoming the foundations of the Vedic Civilisation? It may not have transferred physical and material things that archaeologists can excavate; but instead transferred something more precious – it transferred intangible things such as ideas and beliefs. Social relations plus religious beliefs and ideology were the main things transferred to later Indian culture by the Harappans.

Warren Calhoun Robertson from Drew University, New Jersey has stated that disease and other catastrophes such as earthquakes and droughts “are external agents of change that shape history and culture.” (1) Having similar views is Pitirim Sorokin, the foundation Professor of Sociology at Harvard University, Boston who said “for good or ill, calamities are unquestionably the supreme disrupters and transformers of social organisation and institutions.” (2) Finally, William H. McNeill, the Professor of History at the University of Chicago thinks that infectious diseases are “one of the fundamental parameters and determinants of human history.” (3)

This thesis has shown that there must have been contact between Pharaonic Egypt and the Indus Valley Civilisation which allowed the plague, which existed in the Indus Valley Civilisation, to be introduced into ancient Egypt. Proof of this contact has

been shown with the Khapra beetle from India being found in Middle Kingdom grain from El Gelebein, the bones of the black rat *Rattus Rattus* from India being found in late 18^h Dynasty workman's cottages at Amarna, Indus Valley beads being found in ancient Egypt and Egyptian objects being found in excavations at the Indus Valley Civilisation port of Lothal, for example.

The Mohenjo-daro "massacre" has been shown to be a surprisingly long standing myth and that it's most likely cause was an infectious disease epidemic where bodies were buried in a haphazard way. No doubt one of many such epidemics throughout the region. These Mohenjo-daro "massacre" skeletons need to be subjected to DNA profiling to see which infectious disease epidemic caused their sudden death. It seems very strange and sad that this examination has not been done thus far. The author of this thesis has made several requests to the Archaeological Survey of India and the Anthropological Survey of India, both directly and through the Indian High Commissioner in Canberra, plus the Pakistani High Commissioner, to do the necessary DNA analyses; to no avail unfortunately. It is the hypothesis of this thesis that if an analysis was done then the most likely cause found would be plague.

Many skeletal analysis deficiencies have been revealed during the research of this thesis such as ancient DNA analysis of teeth and bones has only been done on some of the skeletons and certainly not all of them. Not all skeletons found so far have been examined – there are many yet to be examined, especially incomplete skeletons and when they have been examined post mortem injury of the skeletons has often not been factored in. Examination of the skeletons is usually for morphometric reasons to determine sex and the homogeneity or heterogeneity of the skeleton to help determine its ethnic origin, rather than looking for disease or any pathology involving the skeleton. Engaging paleoentomologists, paleoparasitologists and forensic paleoanthropologists to help examine the skeletons and the dig site is rarely done hence a lot of potentially good and helpful pathological material and information is being missed or has been thrown out, hence lost forever. It seems then that the potential of a disease having caused the skeleton in question's death is rarely factored in or even considered. The

potential of an infectious disease causing the death has to always be factored in, hence always first think – what disease could have killed this person? Another factor is how were the skeletons buried? Were they laid out neatly and surrounded by funerary offerings, or thrown into a pit in a haphazard way? If the latter then think of an epidemic with rushed mass burials, rather than a military invasion.

Ancient historians and archaeologists argue that the people of the Indus Valley Civilisation were pushed away from their homes by climate change forces such as drought and flooding from the shift in the monsoon; and then pulled eastward towards the Ganges River basin to where the monsoons had migrated. But another scenario is that there was mass migration of the population because they were ‘pushed’ out of their homes by an infectious disease and ‘pulled’ by the prospect of new infectious disease free lands. There also seems to be a need for medical historians, who are cross disciplinarian, to “put it all together”, to be part of the team of ancient historians who eventually write the history of these people. Ancient historians and archaeologists seem to be missing “the biggest elephant in the room – infectious disease.” But WHY? The Mohenjo-daro skeletons, for example, are proof that the Indus Valley Civilisation was subject to some form of severe infectious disease epidemic – most likely plague.

This thesis has also discovered additional written evidence from the Sumerian cuneiform tablets to support Professor Niazi’s theory that a pneumonic plague epidemic helped in the decline of the Sumerian Civilisation c.2000 BCE. The Laments are the best reference source for actual examples of infectious disease epidemics because the writer is lamenting about the many deaths that had occurred and documented them in the Laments that they were writing, as these events happened. Marian tablets also showed that they knew about the dire consequences of these epidemics from past experience with them. Thus this thesis has taken the earliest documented description of *Yersinia pestis* plague back a further 2,500 years from the Plague of Justinian in the sixth century CE, to the latter days of the Sumerian civilisation. It has also shown that smallpox and haemorrhagic viral infections may have been present as well. All these three severe infectious diseases could have ended

civilisations. This thesis has also shown that the earliest documented description of a contagious disease in Mesopotamia can now be taken back another two hundred years or more, from Neufeld's infected women in ARM Tablet X 129, to the latter days of the Sumerian Civilisation with its pneumonic plague. This thesis has also shown that *Y.pestis* genome analysis research done by Rasmussen and Valtuena confirms that *Y.pestis* existed in the Middle East region from 5,000 years ago, so it was present in Mesopotamia during the timeframe of this thesis.

But did the Sumerian civilisation actually collapse and end; or did it slowly decline? It may not have transferred many physical and material things that archaeologists can excavate such as the ziggurat of Ur; but instead, just like the Harappans, it transferred something more precious – it transferred intangible things such as ideas and beliefs. Language, cuneiform writing, mathematics, medicine, social relations, government; plus religious beliefs and ideology were the main things transferred to later generations.

This thesis has also raised the possibility that the skeletons found at Haft Tappeh and Amarna had died from an infectious disease of some kind; and that it is possible that the Kingdom of Mari may have ended twice with infectious disease being a contributing factor.

Finally this thesis has shown that the study of any historical period or civilisation can be greatly enhanced by the inclusion of the potential of an infectious disease as a causative agent in its decline and that historical epidemiology should be an integral part of any critical and analytical survey of events in the past.

The Royal Society's motto is : "Nullius in verba" meaning "take nobody's word for it".

In other words – find out for yourself and don't believe or rely on other people's opinion. Current opinion of ancient historians is that infectious disease was not a factor in the decline of both the Sumerian and Indus Valley Civilisations and that there was no direct contact between Ancient Egypt and the Indus Valley Civilisation. This thesis hopefully has changed those misconceptions.

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Barnard, L. [Ed], (2010), Historical Atlas, Millennium House, Sydney

Black, G. [Ed], (2002), Encyclopedia of World History, Paragon Publishing, Bath

Blainey, G., (2001), A Short History of the World, Viking/Penguin Group (Australia) Publishers, Camberwell, Victoria, Australia

Brothwell, D.R., and Chiarelli, B.A., [Eds], (1973), Population Biology of the Ancient Egyptians, Academic Press, London

Burenhult, G. [Ed], (2004), Great Civilizations, Fog City Press, San Francisco

Cline, E.H. (Ed.). (2010), The Oxford Handbook of The Bronze Age Aegean (ca. 3000-1000 BC), Oxford University Press, Oxford. Chapter 36 titled 'The Collapse at the end of the Bronze Age' by Durham University's Oliver Dickinson gave a very useful summary of current thinking about the causes of the collapse including noting the abandonment of sites. Plague is mentioned but the conclusion is that it was most likely multifactorial.

Cockburn, A. and E., [Eds], (1998), Mummies, Disease and Ancient Cultures, Cambridge University Press, Cambridge

Cunliffe, B. (Ed.). (1994), The Oxford Illustrated Prehistory of Europe, Oxford University Press, Oxford

Daniels, P., (2003), Almanac of World History, National Geographic, Washington, DC

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Diamond, J., (1997), Guns Germs and Steel, Viking for Random House, London

Dickinson, O., (2006), The Aegean from Bronze Age to Iron Age, Routledge, Abingdon, Oxon. Chapter 2 titled 'The Collapse of the Bronze Age Civilisation'

Dupuy, R.E. and T.N., (1993), The Harper Encyclopedia of Military History, Harper Collins Publishers, New York

Farrington, K., (2002), Historical Atlas of Empires, Mercury Books, London

Finlay, M.I., (1981), Early Greece: The Bronze and Archaic Ages: New and Revised Edition, W.W. Norton & Co, London

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Gemet, J., (2002), A History of Chinese Civilisation, The Folio Society, London

Goetz, P.W. [Ed], (1989), The New Encyclopaedia Britannica, University of Chicago, Chicago

Grant, M., (1969), The Ancient Mediterranean, Charles Scriber's Sons, New York

Hendel, R., (2005), Remembering Abraham – culture, memory, and history in the Hebrew Bible, Oxford University Press, Oxford

Isaacs, A., (2000), Oxford Dictionary of World History, Oxford University Press,

Kozloff, A.P., (1992), Egypt's Dazzling Sun: Amenhotep III and His World, Cleveland Museum of Art. Kozloff provides an in depth look at the reign of Amenhotep III and shows, through examination of artefacts from this period of Egyptian history, that some major destructive force adversely affected his reign. This force was most likely bubonic plague. It is a very thorough work and is used in this book.

Kuhrt, A., (1995), The Ancient Near East c. 3000-330 BC Volume One, Routledge, London

Lemche, N.P., (1998), The Israelites in History and Tradition, SPCK, London

Mieroop, M. Van De., (2008), A History of the Ancient Near East ca. 3000-323 BC, Blackwell Publishing, Oxford

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Roberts, J.M., (2002), Ancient History, Duncan Baird Publishers, London

Roberts, J.M., (2003), The New History of the World, Oxford University Press, Oxford

Ruffer, M.A., (1921), Studies in the Palaeopathology of Egypt, The University of Chicago Press, Chicago, Illinois. Ruffer examined many mummies and other Egyptian material, thus founding the science of Paleopathology, in this thesis. He showed that Egyptian mummies showed evidence of smallpox, tuberculosis, schistosomiasis and polio for example. It is a very thorough work and is a major resource for this thesis.

Scarre, C., (1993), Timelines of the Ancient World, Dorling Kindersley, London

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Barnes, E., (2006), Diseases and Human Evolution, University of New Mexico Press, Albuquerque

Beck, R.W., (2000), A Chronology of Microbiology in Historical Context, American Society of Microbiology Press, Washington

Bollet, A.J., (2004), Plagues and Poxes – The Impact of Human History on Epidemic Disease, Demos, New York

Burke, R.M., (1938), A Historical Chronology of Tuberculosis, Charles C. Thomas Publishers, Springfield, Illinois. This book described tuberculosis in ancient Egypt, hence was used in this thesis.

Bynum, W.F. and Porter, R., (1993), Companion Encyclopedia of the History of Medicine - Volume 1 and 2, Routledge Reference, London

Cartwright, F.F and Biddiss, M., (2004), Disease and History, Sutton Publishing, Stroud, Gloucestershire

Clendening, L., (1960), Source Book of Medical History, Dover Publications, New York

- Davies, G., [Ed], (2000), Timetables of Medicine, Black Dog and Leventhal, New York
- Davis, L., (2008), Natural Disasters, Facts on File Science Library
- Desowitz, R., (1997), Tropical Diseases from 50,000BC to 2,500AD, Flamingo, London
- Dobson, M., (2007), Disease, Quercus, London
- Duffin, J., (2006), History of Medicine, University of Toronto Press, Toronto
- Farnell, J., (1998), Invisible Enemies – Stories of Infectious Disease, Farrar Straus Giroux, New York
- Gregg, C.T. Plague, University of New Mexico Press, Albuquerque
- Grmek, M.D., (1989), Diseases in Ancient Greek World, The Johns Hopkins University Press, Baltimore
- Haeger, K., (2000), History of Surgery, Harold Starke Publishers, London
- Hare, R., (1954), Pomp and Pestilence – Infectious Disease, Its Origins and Conquest, Gollancz Publishers. In this book Hare continued Wynn's possibility that the 1322 BCE Hittite Empire epidemic was due to smallpox, imported into the Hittite Empire by Egyptian prisoners of war. This assumption is challenged by this thesis.
- Hays, J.N., (2003), The Burdens of Disease, Rutgers University Press, New Brunswick, New Jersey

Hoff, B., (2000), Mapping Epidemics – A Historical Atlas of Disease, Franklin Watts for Grolier New York

Hopkins, D.R., (2002), The Greatest Killer – Smallpox in History, The University of Chicago Press, Chicago. This book confirmed that Ramesses V had smallpox, as the author was allowed to view the mummy of Ramesses V in person, with the permission of Anwar Sadat, the President of Egypt at the time. This book also says that the 1322 BCE Hittite Epidemic was most likely due to smallpox – a view that this thesis disputes. A very thorough and well-presented history, written by one of the world's authorities on the subject.

Karlen, A., (1995), Man and Microbes – Disease and Plague in History and Modern Times, Simon and Schuster, New York

Kennedy, M.T., (2004), A Brief History of Disease, Science and Medicine, Asklepiad Press, Mission Viejo, California

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McNeill, W.H., (1998), Plagues and Peoples, Anchor Books for Random House, New York

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Porter, R., (2004), Blood and Guts – A Short history of Medicine, W.W. Norton and Co., New York

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Watts, S., (1999), Epidemics and History, Yale University Press, New Haven

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Finkel, I.L. and Geller, M.J., (2007), *Disease in Babylon*, Brill, Leiden, Netherlands

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McEvilley, T., (2002), The Shape of Ancient Thought: Comparative Studies in Greek and Indian Philosophies, Allworth Press, New York

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Websites about Sumer and Sumerian Cuneiform Translated Text:-

BDTNS: The Data Base of Neo-Sumerian Texts

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Robinson, A., (2015), Cracking the Indus script, Nature, 22 October 2015, Vol. 526, p. 499

Schug, G.R. et al, (2013), Infection, Disease, and Biosocial Processes at the End of the Indus Civilization, Plos One, 17 Dec.2013, p.1-18. This article was used a great deal as it showed that leprosy and tuberculosis existed in significant rates during the Late Harappan period.

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Study Sheds More Light on Collapse of Harappan Civilization, <<http://www.sci-news.com/archaeology/science-collapse-harappan-civilization-01705.html>> Accessed 27 April 2014

Surprising Discoveries from the Indus Civilization, <<http://www...national-geographic.com.au/news/2013/13/130425-indus-civilization-discoveries-harappa-archaeology-science/>> Accessed 27 April 2014

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Armana, <[http://www.kchanson/Armana tablet 35](http://www.kchanson/Armana_tablet_35)> Accessed 3 December 2013. This article provided more evidence, through Amarna letters, of the presence of infectious disease in various places around the Near East in the time frame of this thesis.

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Battle of Kadesh, <<http://www.allaboutturkey.com/kades.htm>> This article discussed the first recorded major battle in the ancient world which was the Battle of Kadesh between the armies of the Hittite Empire and ancient Egyptian Empire. The battle occurred where these great power's borders met – in Syria near the town of Kadesh and was inconclusive as to who actually won, as both sides claimed victory. It raises the question that if the Hittite Empire had more soldiers, instead of losing so many in the 1322 BCE Hittite epidemic, could they have had a major victory and then been able to go on and invade Egypt itself and not just occupy some land in one of its far off provinces to the north. Accessed 3 December 2013

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Keith, J.H., Boston University Arts and Sciences Magazine article about Mersa/Wadi Gawasis, <<http://www.bu.edu/cas/magazine/fall10/Egypt/>> Accessed 25 February 2015

Kozloff, A.P., (2006), "Bubonic Plague during the Reign of Amenhotep III?" KMT A Modern Journal of Ancient Egypt, vol.17, no.3, p.36–46 and 83–84. This article is an excellent resource for this thesis and was quoted extensively. In it Kozloff argues, very thoughtfully and thoroughly with great examples, that after examining the quality of the tombs and artefacts from the reign of Amenhotep III it is apparent that some major disaster adversely affected Egypt during the years 12 to 20 of his reign. Later on in the article Kozloff suggests that the adverse event was not a war or invasion by another country or a famine but an infectious disease epidemic – most likely bubonic plague. This article shows that there was a reservoir for the bubonic plague in Egypt which later infected the Hittite Empire as the 1322 BCE Hittite epidemic and later still as a possible cause for the end of the Bronze Age and Hittite Empire.

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<http://www.uic.edu/classes/osci/osci590/6_2Mummies%20Mummies%20and%20Disease%20in%20Egypt.htm> This article discussed various diseases seen in ancient Egyptian mummies and thus supports Ruffer's work by showing that smallpox, tuberculosis and polio for example existed in ancient Egypt. Accessed 10 October 2011

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Trevisanato, S.I., (2007), "The 'Hittite plague', an epidemic of tularemia and the first record of biological warfare", Medical Hypotheses, 69, p.1371-1374. In his third and final article Trevisanato argues that the Hittite epidemic of 1322 BCE was also due to tularemia and not smallpox as had been previously thought.

Trevisanato, S.I., (2007), "The biblical plague of the Philistines now has a name, tularaemia", Medical Hypotheses, 69, p.1144-1146. In the second of Trevisanato's trilogy of articles on the infectious disease tularemia he argues that tularemia was the disease described in the Plague of the Philistine's and not anthrax as had been previously thought.

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Walloe, L., (1999), "Was the Disruption of the Mycenaean World caused by repeated Epidemics of Bubonic Plague?" Opusula Atheniensia, vol 24, p.121-126. This was an excellent article and was used in the thesis. It focused only on bubonic plague and predated the research of Panagiotakopulu so was unable to provide any hard evidence to support his theory.

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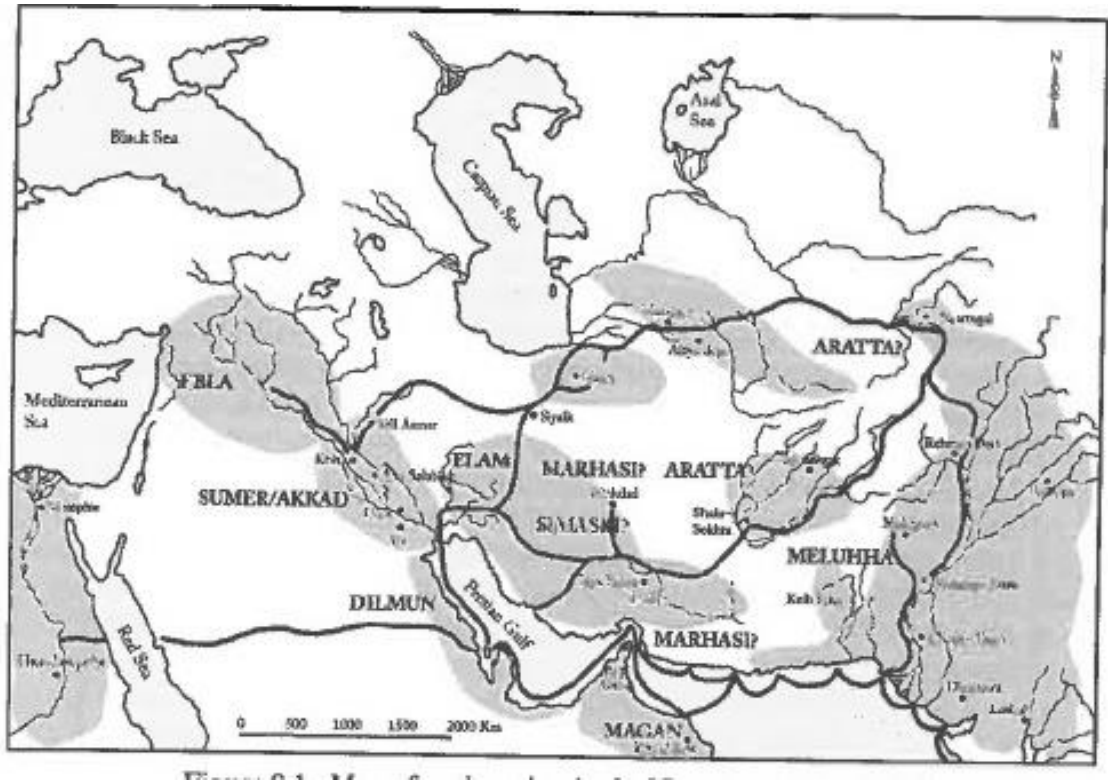
(C) SPECIAL CORRESPONDENCE – experts consulted during research for this thesis:

- (a) Pharaonic Egypt – Prof. Naguib Kanawati, A/Prof. Boyo Ockinga, Prof. Kathryn Bard and Dr. Alice Stevenson
- (b) Ancient Sumer – Prof. Daniel Potts, Prof. Nathan Wasserman, Dr. Irving Finkel, Dr JoAnn Scurlock and A/Prof. Javier Alvarez-Mon
- (c) Indus Valley Civilisation – Prof. Nancy Lovell
- (d) Ancient Indian Medical history – Dr. A. Narayana
- (e) Forensic Analysis of Skeletons – Prof. Dong Hoon Shin, Prof. Vasant Shinde and Prof. Ian Barnes
- (f) Ancient Carnelian Beads – Mr. Gunnar Myhlmann

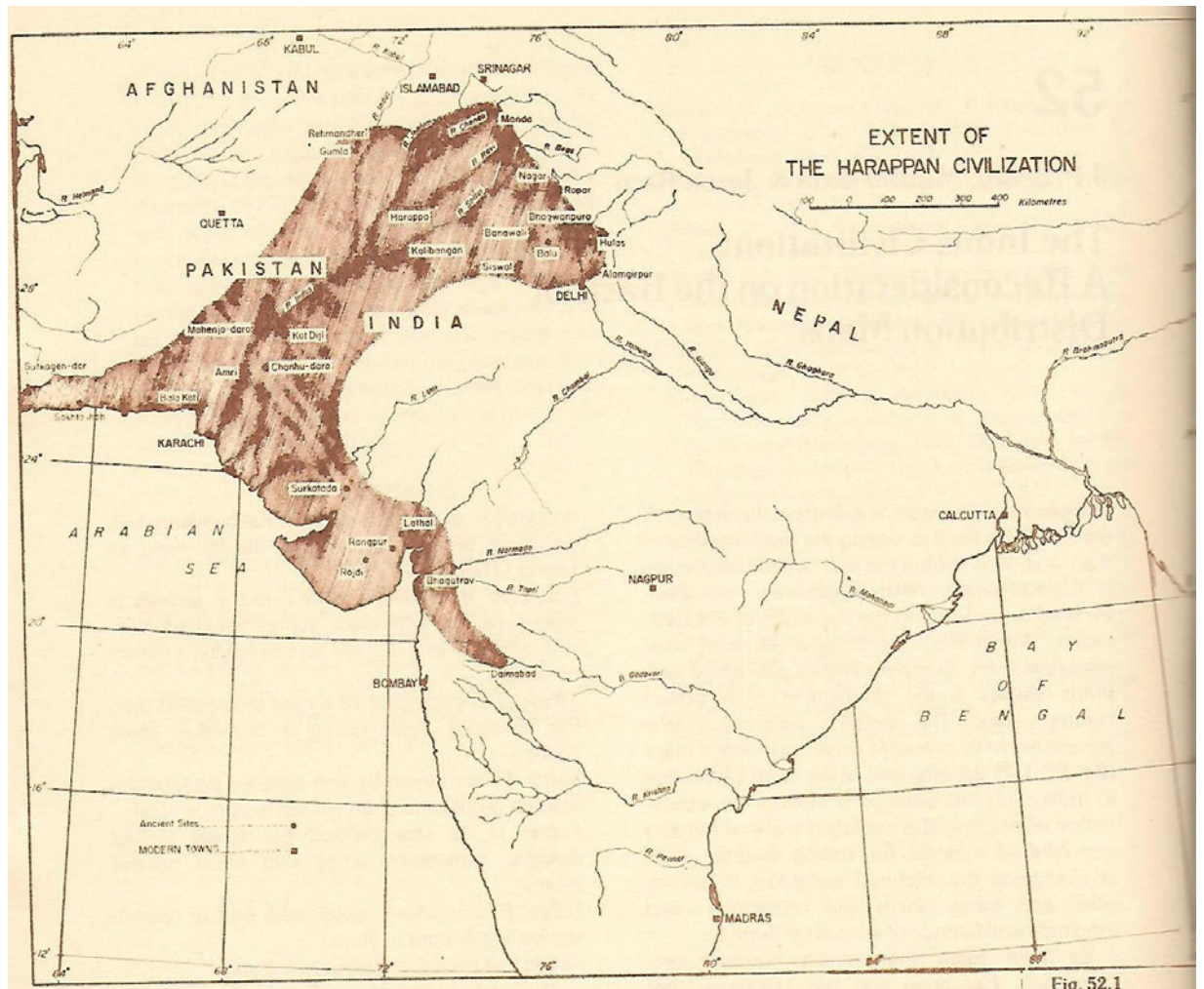
APPENDIX

A. MAPS

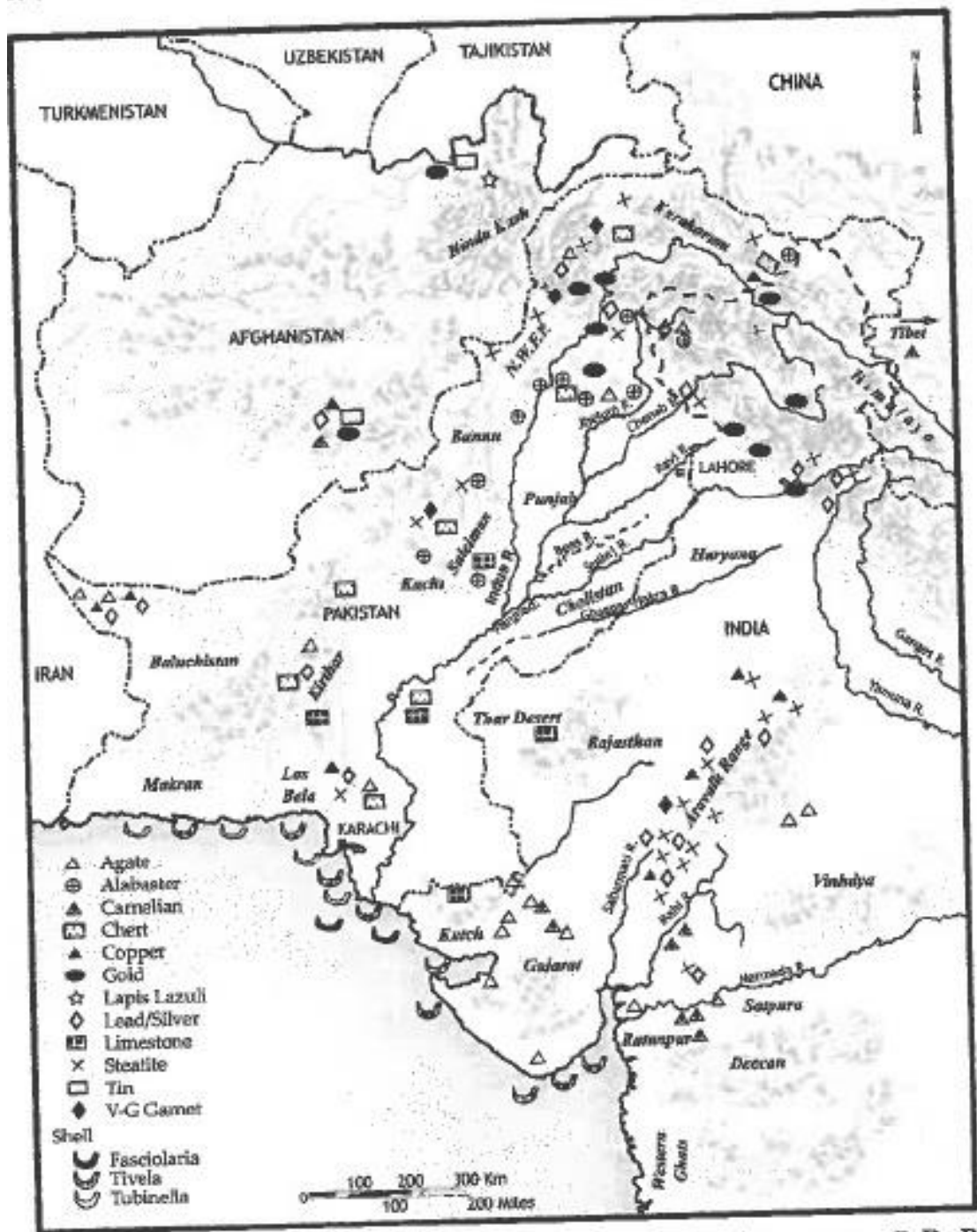
Map 1: Ancient sites in the Near East, Indus, Central Asia and Arabian Peninsula (Wright 2010 p.217)



Map 2: Extent of the Harappan Civilisation (from Lal and Gupta 1984 p.512)



Map 3: Map Showing Distribution of Natural Resource of Indus Valley Civilisation (from Wright 2010 p.190)



Map 4: Indus Valley Civilisation (from Wright 2010 p.311)

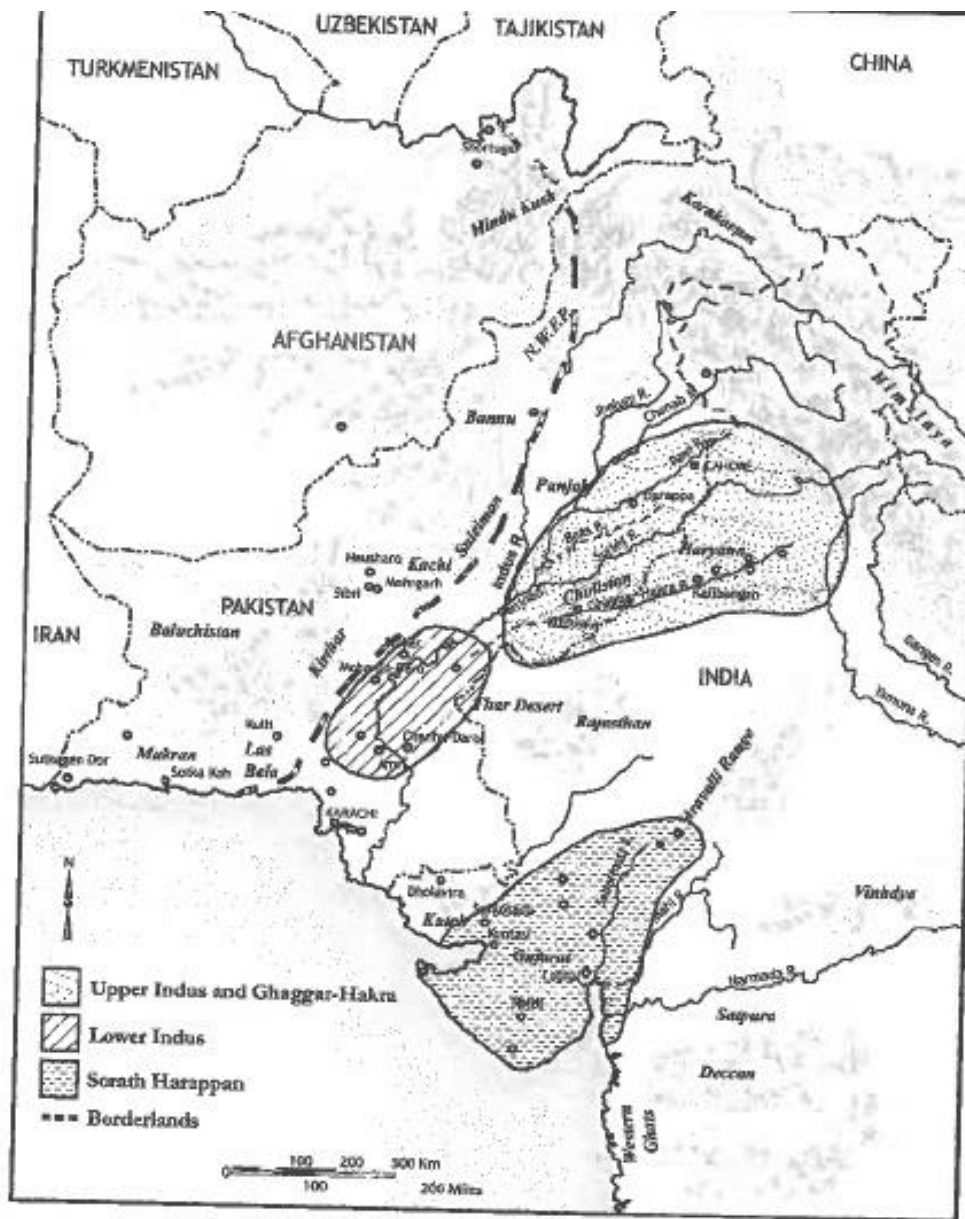
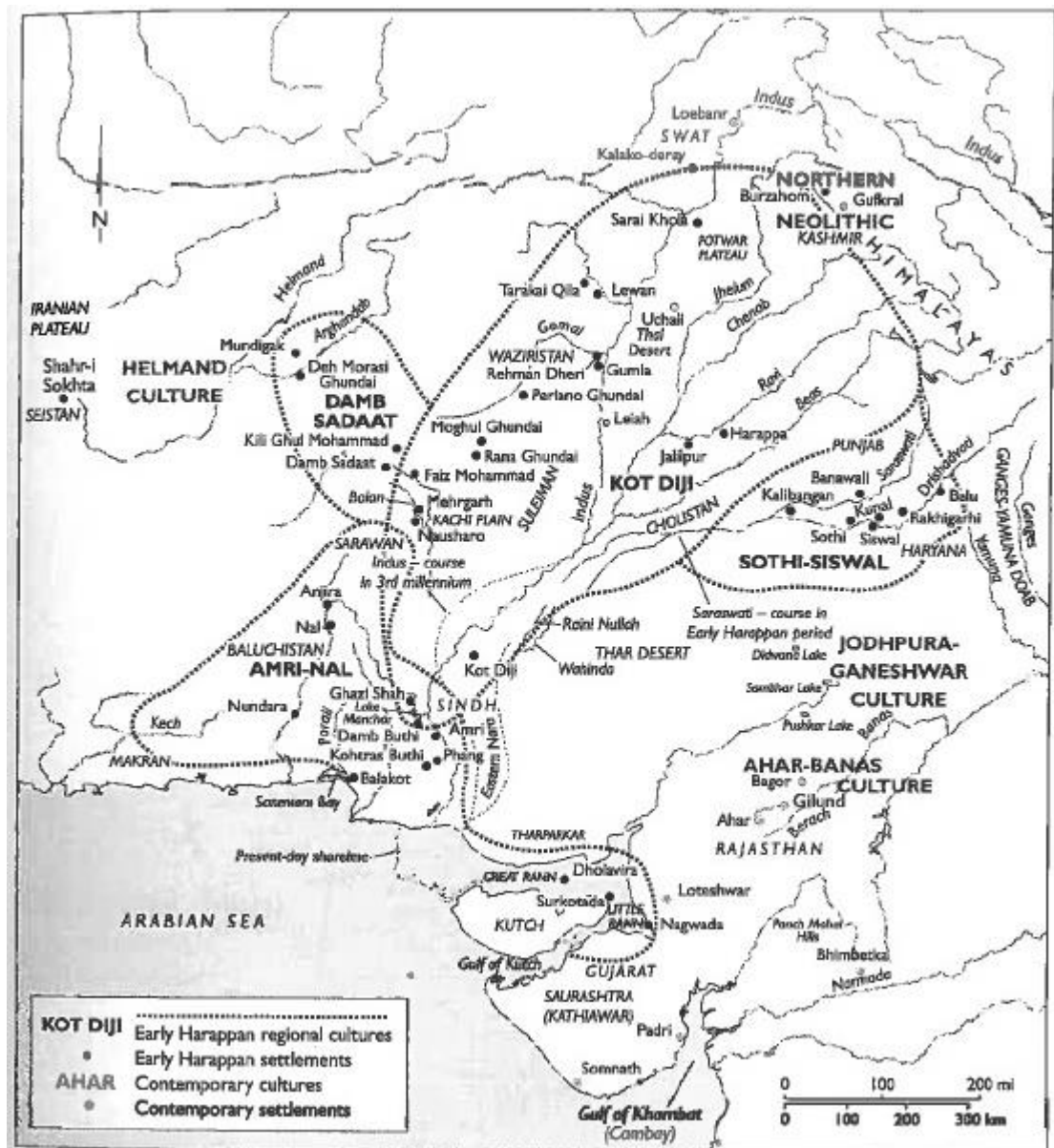
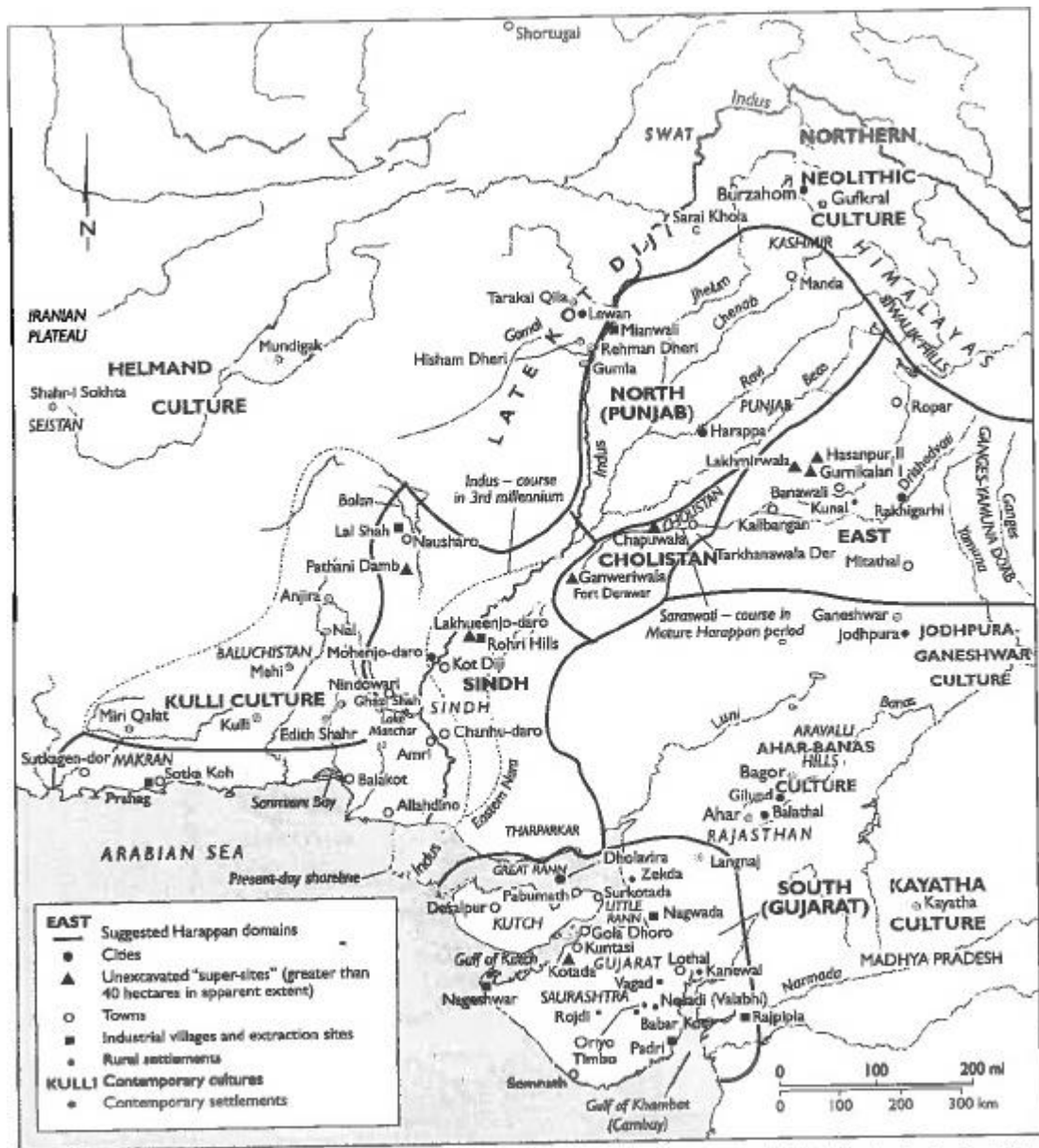


Figure 11.1. Geographic extent of the Indus Valley Civilisation.

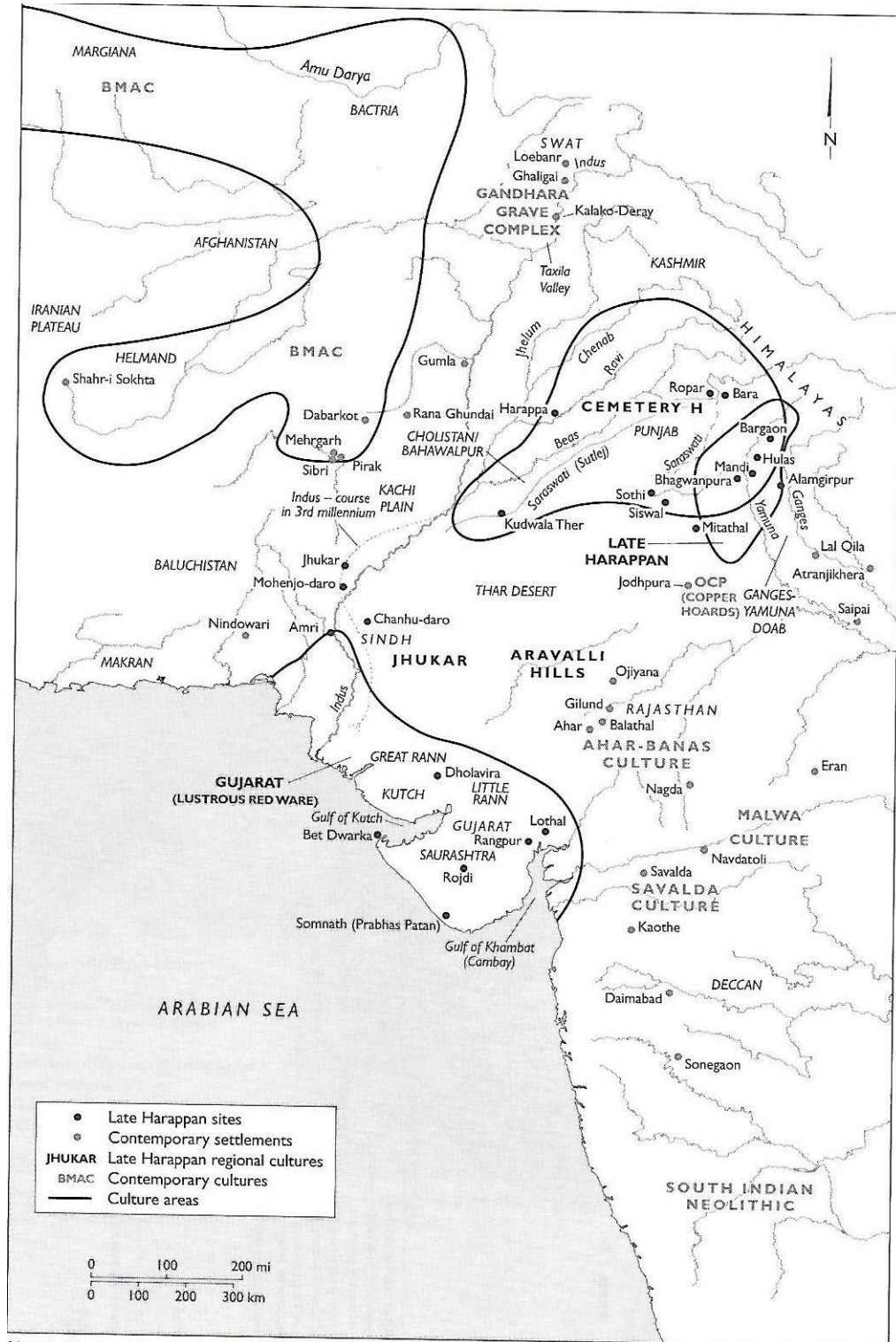
Map 5: Indus Valley Civilisation in the Early Harappan Period (from McIntosh 2008 in the front of the book)



Map 6: Indus Valley Civilisation in the Mature Harappan Period (from McIntosh 2008 in the front of the book)



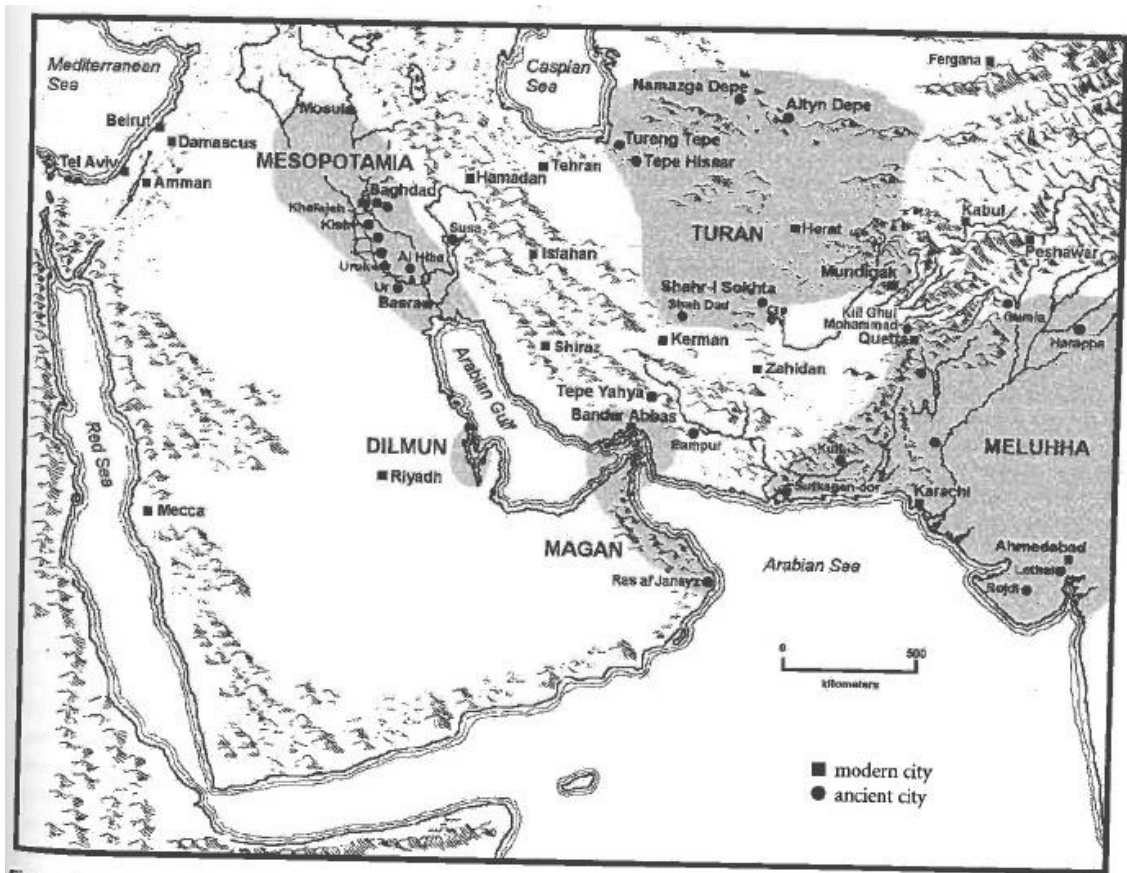
Map 7: The Post Harappan Period (from McIntosh 2008 in the front of the book)



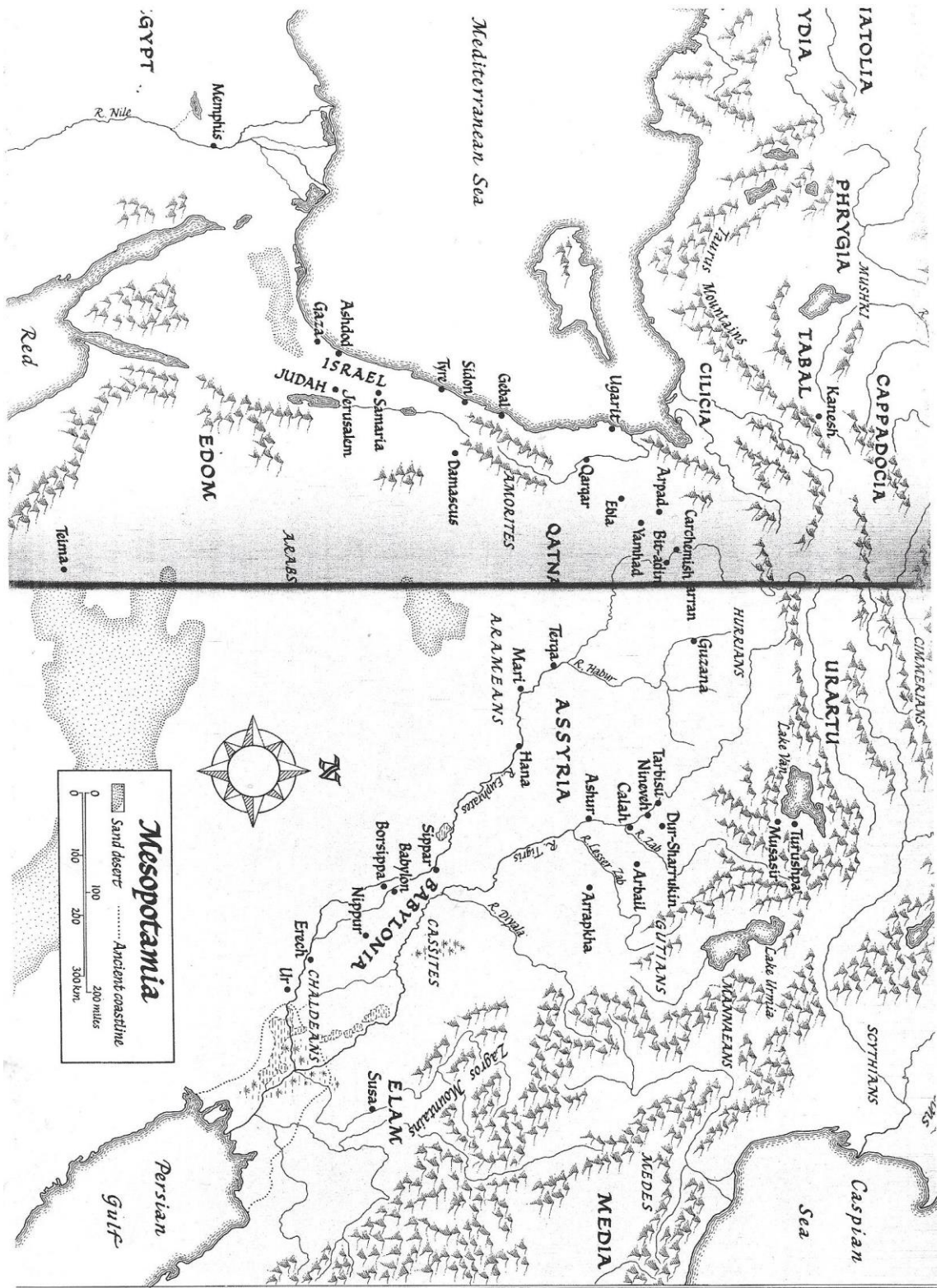
Map 8: Harappan Trade (from McIntosh 2008 in the front of the book)



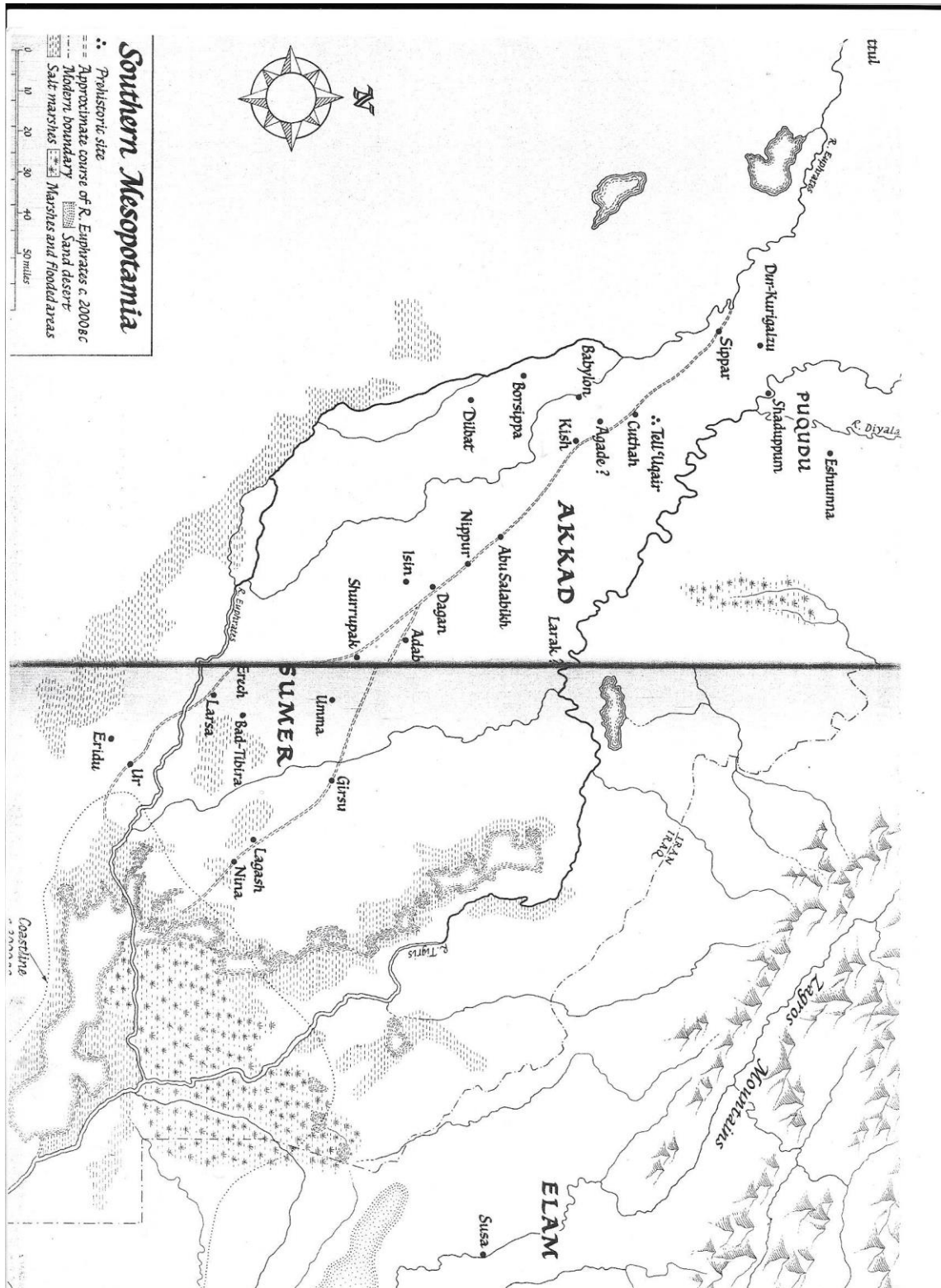
Map 9: Area of the Middle Asian Interaction Sphere (from Possehl 2002 p. 215)



Map 10: Mesopotamia Map (Saggs 2005, inside cover)



Map 11: Sumer Map (Saggs 2005, inside cover)



Map 12: Second Mariote Kingdom c.2500 BCE – c.2290 BCE



Map 13: Third Mariote Kingdom c.2266 BCE – c.1761 BCE



B. HARAPPAN SKELETONS

1. Skeletal Photographs



Mohenjo-daro - the "HR Area Tradeegy" (from Lal and Gupta 1984 photograph 213)



Mohenjo-daro – the “VS Area Tragedy” photograph

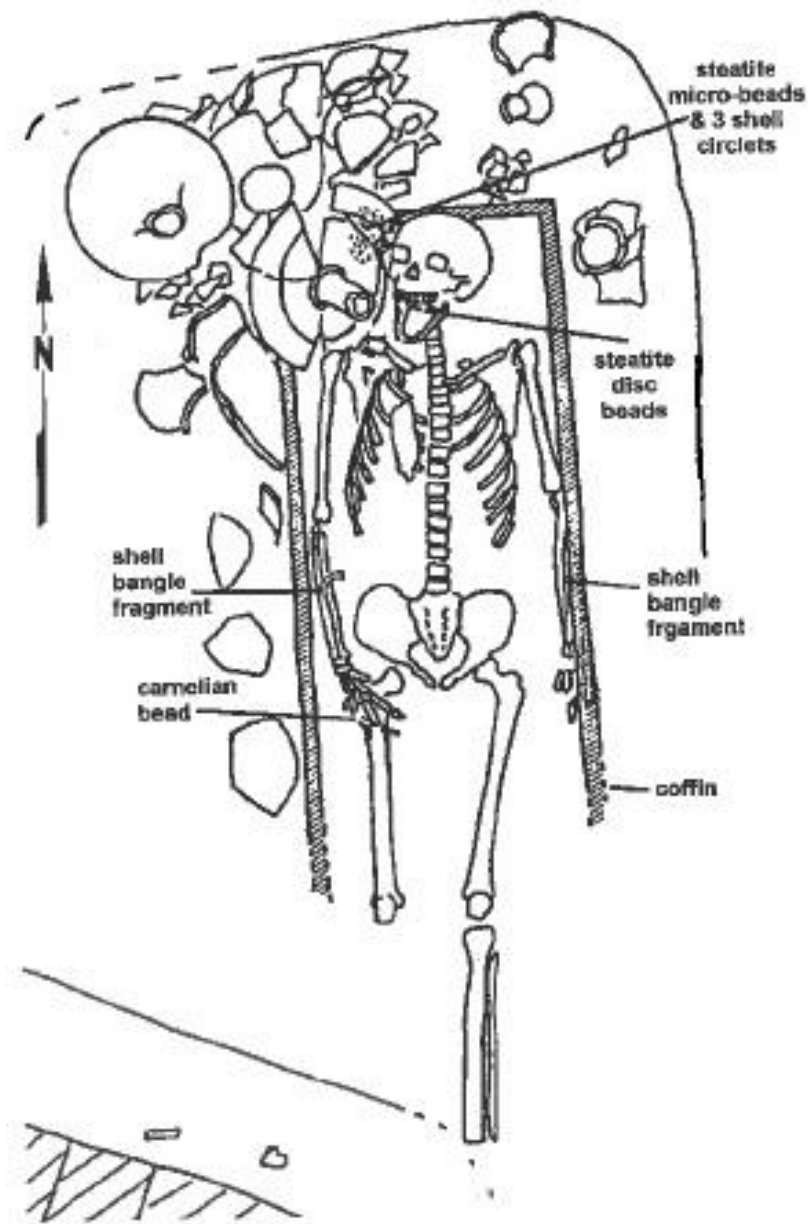


Mohenjo-daro – the “Long Lane Group” photograph



Mohenjo-daro – the “Well Room Tragedy” photograph

2. Skeletal Sketches



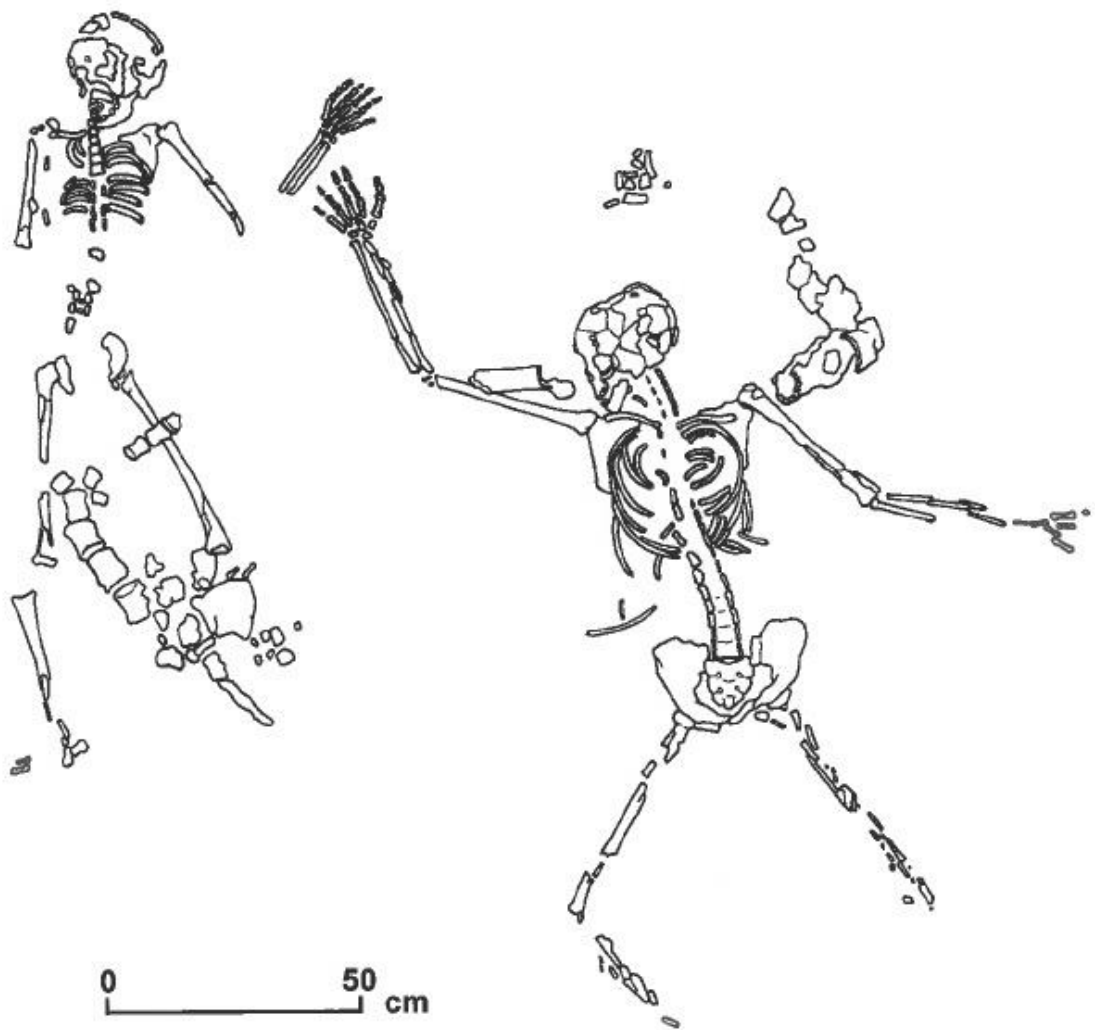
a) Indus coffin burial from Harappa (after Meadows 1991).

A normally prepared burial site with the body laid out straight and funeral offerings placed around the body (from Possehl 2002 p.169)

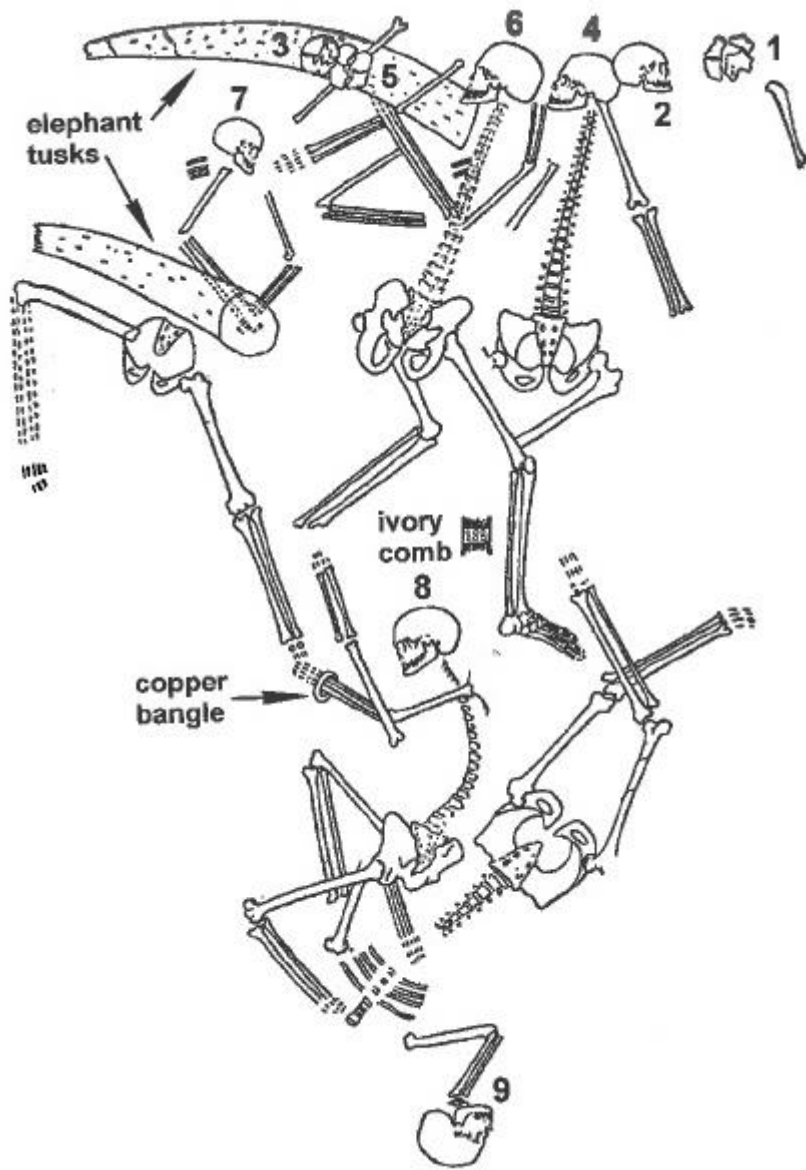


b) The "HR Area Tragedy" at Mohenjo-daro.

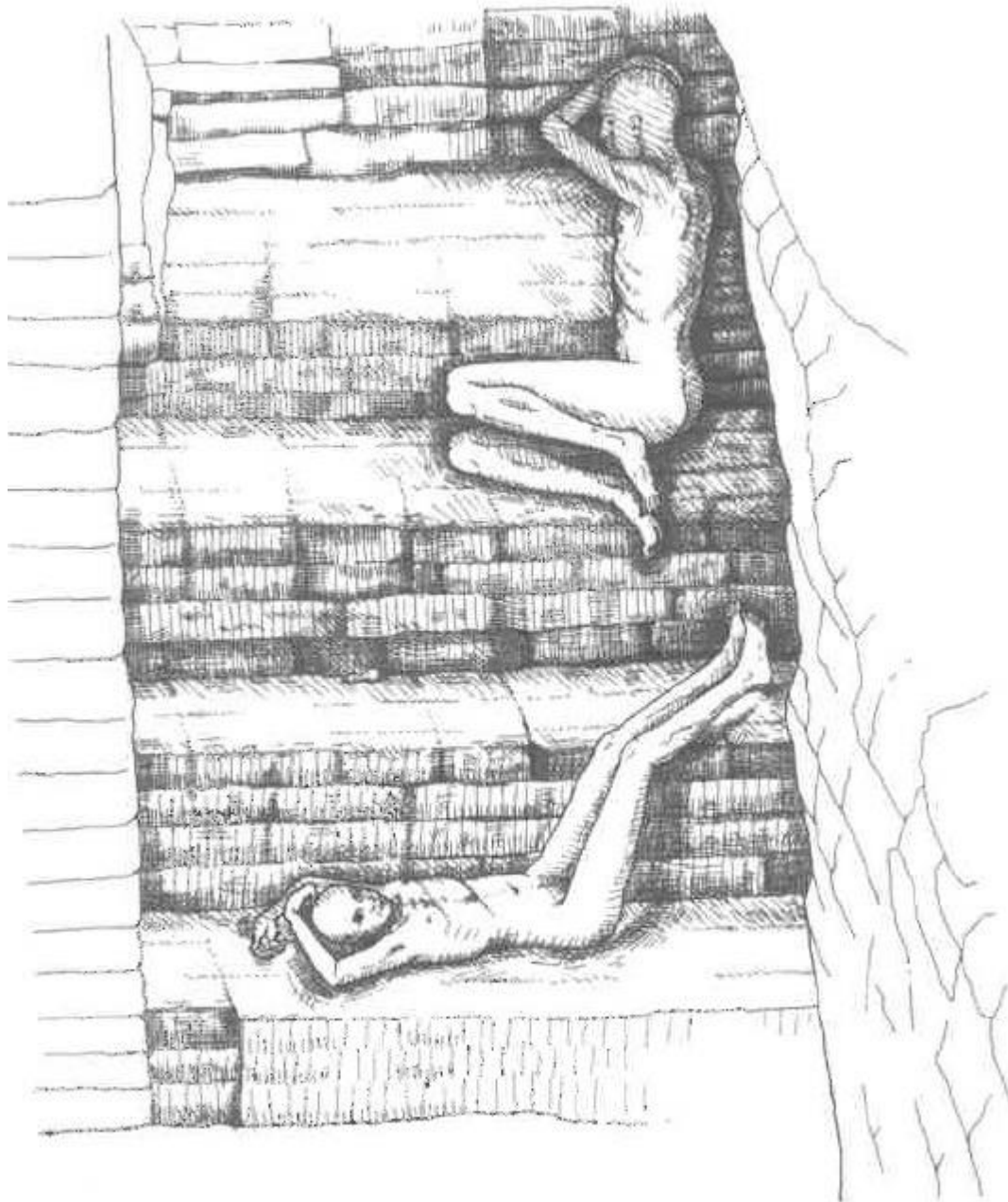
This is a sketch of the Mohenjo-daro group photograph showing random burial resting placement and haphazard (from Possehl 2002 p.161)



c) The "VS Area Tragedy" at Mohenjo-daro (from Possehl 2002 p.164)



d) The “Long Lane Group” (after Mackay 1937-38) at Mohenjo-daro (from Possehl 2002 p.165)



e) The "Well Room Tragedy" at Mohenjo-daro (from Possehl 2002 p.166)

C. HAFT TEPPEH SKELETONS

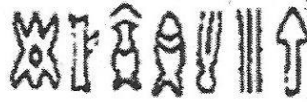
Photograph of dig site



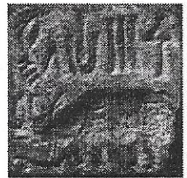
Photograph of 'dumped' skeletons



D. HARAPPAN SYMBOLS



Notice the 'roof' above the fish.



Notice the four marks on the seated figure.

Two Indus Valley seals with corresponding Rapa Nui symbols to illustrate the similarity between characters.

(Image Credits: [Rongorongo and the Indus Script](#))

(Comparison Chart of Similar Symbols From I.V.S and Rongorongo Script)

Arguments Against a Connection:

The main objections to any connection between the two scripts remain as follows:

1). Easter Island is as far away from the Indus Valley Culture as it can possibly be.

Response: As noted above, recent research has shown that the indigenous population of Australia contains the Indus Valley genome which is estimated to have arrived c. 3,000 BC. This is proof that the Indus Valley Dravidians were proficient both at navigation and were exploring the edges of the Pacific ocean at the very time that linguistic studies have shown that an Austronesian expansion occurred from the west to the east across the Pacific ocean arriving at Easter Island c. 1,000 BC. (6)



Sea worthy Vessel from Indus Valley Script.

The Indus Valley Civilisation is known to have interacted and traded across vast stretches of the ancient world. Their close connection with the Sumerians, as was proven by the extensive presence of Harappan seals and cubical weight measures in Mesopotamian urban sites (10). It is interesting to note that no Mesopotamian artefacts have yet been found in an Indus Valley setting.

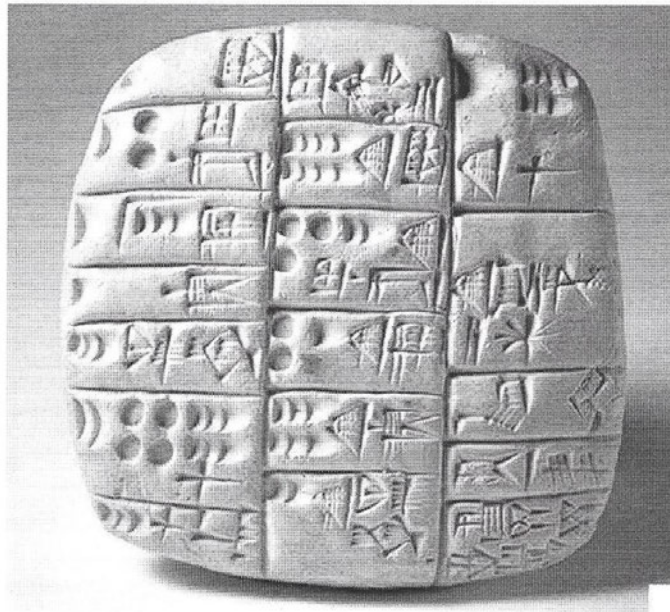
'Dr. E. S. Craghill Handy describes the story of Polynesian culture as "a mere index to Indian history." Author of the 'Ancient Voyagers in Polynesia' is of opinion that Polynesian ancestors came from the west through the waters between Buru and Yap to eastern New Guinea and the Melanesian island and thence to Polynesia by a slow succession of West-East voyage'. (11)

While no-one is suggesting that the I.V.C explorers managed to get as far as Easter Island themselves, it is clear that they had already begun charting the seas, reaching Australia around 4,000 years ago. The subsequent exploration and colonisation of the Pacific islands by Austronesian/Polynesian navigators however, offers a reasonable basis for supporting the theory that Indus Valley Script (or a form of it) was transported step by step to Easter Island, being subsequently maintained over time by elders who considered it a 'sacred' script.

2). The two cultures are separated by at least 2,000 years.

Response: There are several examples of cultures with 'sacred' scripts which were continued for well over a thousand years with important texts being transferred meticulously, and without deviation for millennia, mirroring the ancient 'oral tradition' of our pre-historic ancestors. The fact that we still use the Greek alphabet over two thousands years after the collapse of their civilisation is testimony to the endurance of script, and therefore proof of possibility. The Easter Island population when it was discovered had been settled from at least 900 AD. revealing at least a thousand years of

E. CUNEIFORM SYMBOLS



Web page: erinsingleton.wordpress.com

12/1/2011 Ancient Mesopotamia Cuneiform Writing

The Cuneiform Table collection at South Dakota State University is composed of five Sumerian tablets with d
— cuneiformtable.wordpress.com

(a) Early Cuneiform Pictogram Writing



(b) Later Cuneiform Wedge Shaped Writing

F. HYMNS OF THE ATHARVA – VEDA

1. Charms for Leprosy

(a) I, 23. Leprosy cured by a dark plant.

1. Born by night art thou, O plant, dark, black, sable. Do thou, that art rich in colour, stain this leprosy, and the gray spots!
2. The leprosy and the gray spots drive away from here--may thy native colour settle upon thee--the white spots cause to fly away!
3. Sable is thy hiding-place, sable thy dwelling-place, sable art thou, O plant: drive away from here the speckled spots!
4. The leprosy which has originated in the bones, and that which has originated in the body and upon the skin, the white mark begotten of corruption, I have destroyed with my charm.

(b) I, 24. Leprosy cured by a dark plant.

1. The eagle (suparna) that was born at first, his gall thou wast, O plant. The Âsurî having conquered this (gall) gave it to the trees for their colour.
2. The Âsurî was the first to construct this remedy for leprosy, this destroyer of leprosy. She has destroyed the leprosy, has made the skin of even colour.
3. 'Even-colour' is the name of thy mother; 'Even-colour' is the name of thy father; thou, O plant, producest even colour: render this (spot) of even colour!
4. The black (plant) that produces even colour has been fetched out of the earth. Do thou now, pray, perfect this, construct anew the colours!

2. Charms for Scrofulous (Tuberculosis) Sores

(a) VI, 25. Charm against scrofulous sores upon neck and shoulders

1. The five and fifty (sores) that gather together upon the nape of the neck, from here they all shall pass away, as the pustules of the (disease called) apakit!
2. The seven and seventy (sores) that gather together upon the neck, from here they all shall pass away, as the pustules of the (disease called) apakit!
3. The nine and ninety (sores) that gather together upon the shoulders, from here they all shall pass away, as the pustules of the (disease called) apakit!

(b) VI, 83. Charm for cursing scrofulous sores called apakit

1. Fly forth, ye apakit (sores), as an eagle from the nest! Sûrya (the sun) shall prepare a remedy, Kandramâs (the moon) shall shine you away!
2. One is variegated, one is white, one is black, and two are red: I have gotten the names of all of them. Go ye away without slaying men!
3. The apakit, the daughter of the black one, without bearing offspring will fly away; the boil will fly away from here, the galunta (swelling) will perish.
4. Consume thy own (proper) oblation with gratification in thy mind, when I here offer svâhâ in my mind!

(c) VII, 74.

A. Charm for curing scrofulous sores called apakit

1. We have heard it said that the mother of the black Apakit (pustules) is red: with the root (found by) the divine sage do I strike all these.
2. I strike the foremost one of them, and I strike also the middlemost of them; this hindmost one I cut off as a flake (of wool).

B. Charm to appease jealousy.

3. With Tvashtar's charm I have sobered down thy jealousy; also thy anger, O lord, we have quieted.

C. Prayer to Agni, the lord of vows.

4. Do thou, O lord of vows, adorned with vows, ever benevolently here shine!
May we all, adoring thee, when thou hast been kindled, O Gâtavedas, be rich in offspring!

(d) VII, 76.

A. Charm for curing scrofulous sores called apakit

1. Ye (sores) fall easily from that which falls easily, ye exist less than those that do not exist (at all); ye are drier than the (part of the body called) sehu, more moist than salt.
2. The apakit (sores) that are upon the neck, and those that are upon the shoulders; the apakit that are upon the vigâman (some part of the body) fall off of themselves.

B. Charm for curing tumours called gâyânya.

3. The gâyânya that crushes the ribs, that which passes down to the sole of the foot, and whichever is fixed upon the crown of the head, I have driven out every one.
4. The gâyânya, winged, flies; he settles down upon man. Here is the remedy both for sores not caused by cutting as well as for wounds sharply cut!
5. We know, O gâyânya, thy origin, whence thou didst spring. How canst thou slay there, in whose house we offer oblations?

C. Stanza sung at the mid-day pressure of the soma.

6. Drink stoutly, O Indra, slayer of Vritra, hero, of the soma in the cup, at the battle for riches! Drink thy fill at the mid-day pressure! Living in wealth, do thou bestow wealth upon us!

G. ORIGINAL SUMERIAN CUNEIFORM TEXTS AND THEIR ENGLISH TRANSLATIONS FROM ETCSL

Compositions with a historical background

- King lists and other compositions ([Unicode](#) | [Ascii](#))
- City laments ([Unicode](#) | [Ascii](#))

List of Laments

- The lament for Urim: [transliteration](#) | [translation](#)
- The lament for Sumer and Urim: [transliteration](#) | [translation](#)
- The lament for Nibru: [transliteration](#) | [translation](#)
- The lament for Unug: [transliteration](#) | [translation](#)
- The lament for Eridug: [transliteration](#) | [translation](#)

The Lament for Urim

[101.](#) ka-na-aĝ₂-ĝu₁₀ aĝ₂-gig-ga ba-ĝal₂-la-ke₄-eš

[102.](#) ab₂ amar-ra-gin₇-nam ki šu ħe₂-em-mi-ib-ak

[103.](#) ka-na-aĝ₂-ĝu₁₀ ni₂ šu-a ba-ra-mu-da-ab-gi₄

[104.](#) uru₂-ĝu₁₀ du-lum gig ba-ĝal₂-la-ke₄-eš

[105.](#) mušen an-na-gin₇ a₂ dub₂ ħe₂-em-ši-ak

[106.](#) me-e uru₂-ĝu₁₀-še₃ ħe₂-em-ši-dal-dal-en

[107.](#) uru₂-ĝu₁₀ ki-ĝal₂-ba ħe₂-en-ga-mu-de₃-gul

[108.](#) urim₂^{ki} ki-nu₂-bi-a ħe₂-en-ga-mu-de₃-til

[109.](#) šu ud-da an-ta ba-ĝal₂-la-ke₄-eš

110. gu₃ hu-mu-dub₂ edin-na ud gi₄-a me-e he₂-em-ma-dug₄

111. ud-da gaba-bi ba-ra-mu-da-zig₃

101-111. "Because there was bitterness in my Land, I trudged the earth like a cow for its calf. My Land was not granted success. Because there was bitter distress in my city, I beat my wings like a bird of heaven and flew to my city; and my city was destroyed in its foundations; and Urim perished where it lay. Because the hand of the storm appeared above, I screamed and cried to it "Return, O storm, to the plain". The storm's breast did not rise."

112. nu-nus-ĝen agrun-kug e₂ na-aĝ₂-^dga-ša-an-na-ĝu₁₀

113. bal-ba ud su₃-ra₂ na-ma-ni-in-ĝar-re-eš-am₃

114. er₂ a-še-er-ra ki ħa-ma-ab-us₂-am₃

115. e₂ ki ur₅ sag₉-ge saĝ gig₂-ga i₃-me-a-ke₄-eš

116. ezen-bi-ta ib₂-ba su-mu-ug-ga he₂-en-ga-mu-da-tab-tab-be₂-eš

117. ud tur-bi-še₃ e₂-ĝu₁₀ ki sag₉-ga

118. e₂ zid ħul-a-ĝu₁₀ i-bi₂ ba-ra-bi₂-in-du₈-am₃

119. ur₅ uš₂-a a-še-er aĝ₂-gig-ga

120. a-še-er aĝ₂-gig-ga ħu-mu-ni-tum₂-tum₂-mu-uš

121. e₂ lu₂ zid-de₃ ba-ab-ĝar-ra-ĝu₁₀

122. gi-sig kiri₆-gin₇ bar-ba he₂-bi₂-in-dub₂

112-122. "To me, the woman, in the Agrun-kug, my house of queenship, they did not grant a reign of distant days. Indeed they established weeping and lamentation for me. As for the house which used to be where the spirit of the black-headed people was

soothed, instead of its festivals wrath and terror indeed multiply. Because of this debilitating storm, depression, and lament and bitterness, lament and bitterness have been brought into my house, the favourable place, my devastated righteous house upon which no eye had been cast. My house founded by the righteous was pushed over on its side like a garden fence."

[172.](#) ^den-lil₂-le ud-de₃ gu₃ ba-an-de₂ uĝ₃-e še am₃-ša₄

[173.](#) ud ħe₂-ĝal₂-la kalam-da ba-da-an-kar uĝ₃-e še am₃-ša₄

[174.](#) ud dug₃ ki-en-gi-da ba-da-an-kar uĝ₃-e še am₃-ša₄

[175.](#) ud ħul-ĝal₂-e a₂ ba-da-an-aĝ₂ uĝ₃-e še am₃-ša₄

[176.](#) kin-gal-ud-da ud-da gub-ba šu-na im-ma-an-šum₂

[177.](#) ud kalam til-til-e gu₃ ba-an-de₂ uĝ₃-e še am₃-ša₄

[178.](#) im-ħul-im-ħul-e gu₃ ba-an-de₂ uĝ₃-e še am₃-ša₄

[172-178.](#) Enlil called the storm -- the people groan. He brought the storm of abundance away from the Land -- the people groan. He brought the good storm away from Sumer -- the people groan. He issued directions to the evil storm -- the people groan. He entrusted it to Kin-gal-uda, the keeper of the storm. He called upon the storm that annihilates the Land -- the people groan. He called upon the evil gales -- the people groan.

[179.](#) ^den-lil₂-le ^dgibil a₂-taħ-a-ni mu-na-ni-in-kur₉-re

[180.](#) ud gal an-na-ke₄ gu₃ ba-an-de₂ uĝ₃-e še am₃-ša₄

[181.](#) ud gal-e an-ta gu₃ im-me uĝ₃-e še am₃-ša₄

182. ud kalam til-til-e ki-a mur im-ša₄ uĝ₃-e še am₃-ša₄

183. im-ĥul-e a maĥ e₃-a-gin₇ gu₂-bi nu-ĝa₂-ĝa₂

184. ^{ĝiš}tukul uru₂-ke₄ saĝ gaz i₃-ak-e teš₂-bi i₃-gu₇-e

185. an-na ur₂-ba kana₆? mu-un-ni₁₀-ni₁₀ uĝ₃-e še am₃-ša₄

186. ud-da igi-ba izi mu-un-bar₇-bar₇-e uĝ₃-e še am₃-ša₄

187. ud mir-mir-da izi-ĝi₆-edin-na bar ba-da-an-tab

179-187. Enlil brought Gibil as his aid. He called the great storm of heaven -- the people groan. The great storm howls above -- the people groan. The storm that annihilates the Land roars below -- the people groan. The evil wind, like a rushing torrent, cannot be restrained. The weapons in the city smash heads and consume indiscriminately. The storm whirled gloom around the base of the horizon -- the people groan. In front of the storm, heat blazes -- the people groan. A fiery glow burns with the raging storm.

192. šika bar₇-bar₇-re-da saĥar im-da-tab-tab uĝ₃-e še am₃-ša₄

193. saĝ gig₂-ga tum₉-tum₉ ba-an-dal uĝ₃-e še am₃-ša₄

194. ki-en-gi ĝiš-bur₂-ra i₃-bal-e uĝ₃-e še am₃-ša₄

195. kalam-e saĝ e₂-ĝar₈ du₃ i₃-ak-e teš₂-bi i₃-gu₇-e

196. ud gig er₂-re nam nu-tar-re uĝ₃-e še am₃-ša₄

192-196. The scorching potsherds made the dust glow (?) -- the people groan. He swept the winds over the black-headed people -- the people groan. Sumer was overturned by a snare -- the people groan. It attacked (?) the Land and devoured it completely. Tears cannot influence the bitter storm -- the people groan.

197. ud šu ur₄-ur₄-re kalam i₃-ur₃-ur₃-re

198. ud a-ma-ru-gin₇ uru₂ i₃-gul-gul-e

199. ud kalam til-til-e uru₂-a me bi₂-ib-ĝar

200. ud niĝ₂ u₂-gu de₂-de₂ ĥul-ĝal₂-eš ba-e-DU

201. ud izi-gin₇ bar₇-a uĝ₃-e šu bi₂-ib-ĝar

202. ud ĥul gig dug₄-ga ^den-lil₂-la₂ ud kalam-ta be₄-be₄

203. urim₂^{ki}-ma tug₂-gin₇ ba-e-dul gada-gin₇ ba-e-bur₂

197-203. The reaping storm dragged across the Land. Like a flood storm it completely destroyed the city. The storm that annihilates the Land silenced the city. The storm that will make anything vanish came doing evil. The storm blazing like fire performed its task upon the people. The storm ordered by Enlil in hate, the storm which wears away the Land, covered Urim like a garment, was spread out over it like linen.

205. ud ug-am₃ al-du₇-du₇ uĝ₃-e še am₃-ša₄

205. The storm, like a lion, has attacked unceasingly -- the people groan.

411. ud-bi im an-ta šeĝ₃-ĝe₂₆-gin₇ ki-tuš-bi nam-ba-gur-ru

412. niĝ₂-zi-ĝal₂ an ki saĝ gig₂ im-ma-an-dub₂-ba re

413. ud-ba du₃-a-bi ĥe₂-em-ma-gul-lu

414. abula ĝi₆ u₃-na-gin₇ ĝi^šig ĥe₂-bi₂-in-keše₂-da

415. ud-ba šudum-ma na-an-ni-ĝa₂-ĝa₂

416. niĝ₂-kas₇-bi e₂ ^den-lil₂-la₂-ta ĝi^šgag-ta ĥe₂-em-ta-si-ig

[411-416](#). May that storm, like rain pouring down from heaven, never recur. May that storm, which struck down all the black-headed living beings of heaven and earth, be entirely destroyed. May the door be closed on it, like the great city-gate at night-time. May that storm not be given a place in the reckoning, may its record be hung from a nail outside the house of Enlil.

The Lament for Sumer and Urim

1. ud šu bal ak-de₃ ĝiš-ĥur ĥa-lam-e-de₃ (Cited in [OB catalogue from Nibru, at Philadelphia, 0.2.01, line 34](#); [OB catalogue in the Louvre, 0.2.02, line 29](#); [OB catalogue from Urim \(U2\), 0.2.04, line 45](#))

2. ud-de₃ mar-uru₅-gin₇ teš₂-bi i₃-gu₇-e

1-2. To overturn the appointed times, to obliterate the divine plans, the storms gather to strike like a flood.

27. ki-en-gi-ra me-bi ĥa-lam-e-de₃ ĝiš-ĥur-bi kur₂-ru-de₃

28. urim^{ki}-ma me nam-lugal-la bal-bi sud-su₃-ud-de₃

29. dumu nun-na e₂-kiš-nu-ĝal₂-la-na šu pe-el-la₂ di-de₃

30. ^dnanna uĝ₃ u₈-gin₇ lu-a-na igi-te-en-bi si-il-le-de₃

31. urim^{ki} eš₃ nidba gal-gal-la nidba-bi kur₂-ru-de₃

32. uĝ₃-bi ki-tuš-ba nu-tuš-u₃-de₃ ki-erim₂-e šum₂-mu-de₃

33. šimaški^{ki} elam^{ki} lu₂-kur₂-ra ki-tuš-bi tuš-u₃-de₃

34. sipad-bi e₂-gal-la ni₂-te-na lu₂-erim₂-e dab₅-be₂-de₃

35. ^di-bi₂-^dsuen kur elam^{ki}-ma-še₃ ĝiš-bur₂-ra tum₂-u₃-de₃

36. iši za-bu^{ki} gaba a-ab-ba-ka-ta zag an-ša₄-an^{ki}-na-še₃

37. sim^{mušen} e₂-bi ba-ra-an-dal-a-gin₇ iri-ni-še₃ nu-gur-re-de₃

27-37. so as to obliterate the divine powers of Sumer, to change its preordained plans, to alienate the divine powers of the reign of kingship of Urim, to humiliate the princely son in his house E-kiš-nu-ĝal, to break up the unity of the people of Nanna, numerous as ewes; to change the food offerings of Urim, the shrine of magnificent food offerings;

that its people should no longer dwell in their quarters, that they should be given over to live in an inimical place; that Šimaški and Elam, the enemy, should dwell in their place; that its shepherd, in his own palace, should be captured by the enemy, that Ibbi-Suen should be taken to the land Elam in fetters, that from Mount Zabū on the edge of the sea to the borders of Anšan, like a swallow that has flown from its house, he should never return to his city;

56. nam-tar-ra-bi niĝ₂ nu-kur₂-ru-dam a-ba šu mi-ni-ib₂-bal-e

57. inim dug₄-ga an^den-lil₂-la₂-kam saĝ a-ba-a mu-un-ĝa₂-ĝa₂

56-57. Its fate cannot be changed. Who can overturn it? It is the command of An and Enlil. Who can oppose it?

58. an-ne₂ ki-en-gi ki-tuš-ba bi₂-in-ĥu-luĥ uĝ₃-e ni₂ bi₂-in-te

59. ^den-lil₂-le ud gig-ga mu-un-zal iri-a me bi₂-ib-ĝar

60. ^dnin-tur₅-re ama₅ kalam-ma-ka ^{ĝi}ig-šu-ur₂ im-mi-in-de₆

61. ^den-ki-ke₄ ^{id}idigna ^{id}buranun-na a im-ma-da-an-keše₂

62. ^dutu niĝ₂-si-sa₂ inim gen₆-na ka-ta ba-da-an-kar

63. ^dinana-ke₄ me₃ šen-šen-na ki-bal-e ba-an-šum₂

64. ^dnin-ĝir₂-su-ke₄ ki-en-gi ga-gin₇ ur-e ba-an-de₂

65. kalam-ma ga-ba-ra-ĥum im-ma-an-šub niĝ₂ lu₂ nu-zu-a

66. niĝ₂ igi nu-ĝal₂-la inim nu-ĝal₂-la niĝ₂ šu nu-teĝ₃-ĝe₂₆-dam

67. kur-kur-re ni₂ te-a-bi-a šu suĥ₃-a ba-ab-dug₄

68. iri^{ki} diĝir-bi ba-da-gur sipad-bi ba-da-ĥa-lam

[58-68.](#) An frightened the very dwellings of Sumer, the people were afraid. Enlil blew an evil storm, silence lay upon the city. Nintur bolted the door of the storehouses of the Land. Enkiblocked the water in the Tigris and the Euphrates. Utu took away the pronouncement of equity and justice. Inana handed over victory in strife and battle to a rebellious land. Ningirsu poured Sumer away like milk to the dogs. Turmoil descended upon the Land, something that no one had ever known, something unseen, which had no name, something that could not be fathomed. The lands were confused in their fear. The god of the city turned away, its shepherd vanished.

[69.](#) nam-lu₂-ulu₃ ni₂ te-bi-a zi gig mu-un-pa-an-pa-an

[70.](#) ud-de₃ šu-ne-ne ba-du₃-du₃ ud nu-mu-un-ne-gur-re

[71.](#) ud gi₄-a mu-un-ne-tuku-am₃ ud dur₂-bi-še₃ nu-ĝen

[72.](#) ^den-lil₂ sipad saĝ gig₂-ga-ke₄ a-na bi₂-in-ak-a-bi

[73.](#) ^den-lil₂-le e₂ zid gul-gul-lu-de₃ lu₂ zid tur-re-de₃

[74.](#) dumu lu₂ zid-da-ke₄ dumu-saĝ-e igi ħul dim₂-me-de₃

[75.](#) ud-ba ^den-lil₂-le gu-ti-um^{ki} kur-ta im-ta-an-ed₃

[76.](#) DU-bi a-ma-ru ^den-lil₂-la₂ gaba gi₄ nu-tuku-am₃

[77.](#) tum₉ gal edin-na edin-e im-si igi-še₃ mu-un-ne-ĝen

[78.](#) edin niĝ₂-daĝal-la-ba sag₃ ba-ab-dug₄ lu₂ nu-mu-ni-in-dib-be₂

[69-78.](#) The people, in their fear, breathed only with difficulty. The storm immobilised them, the storm did not let them return. There was no return for them, the storm did not retreat. This is what Enlil, the shepherd of the black-headed people, did: Enlil, to destroy the loyal households, to decimate the loyal men, to put the evil eye on the sons of the loyal men, on the first-born, Enlil then sent down Gutium from the mountains. Their advance was as the flood of Enlil that cannot be withstood. The great wind of the

countryside filled the countryside, it advanced before them. The extensive countryside was destroyed, no one moved about there.

79. ud ku₁₀-ku₁₀-ga šika bar₇-bar₇-ra sa-še₃ ba-ab-de₆

79. The dark time was roasted by hailstones and flames.

292. ^den-lil₂-le abul-la maḥ-ba ḡi^šig tum₉-ma bi₂-[in-gub]

293. urim₅^{ki}-ma lu₂ u₂-še₃ nu-ḡen lu₂ a-še₃ nu-ḡen

294. uḡ₃-bi a tul₂-la₂ de₂-a-gin₇ šu i₃-ni₁₀-ni₁₀[?]-ne

295. usu-bi ni₂-bi-a nu-ḡal₂ ḡiri₃-bi ba-ra-an-dab₅

296. ^den-lil₂-le šag₄-ḡar lu₂ niḡ₂-ḡul iri-a ba-an-da-dab₅

297. niḡ₂ iri gul-gul-e niḡ₂ e₂ gul-gul-e iri-a ba-an-da-dab₅

298. niḡ₂ igi-bi-še₃ ḡi^štukul-e la-ba-gub-bu-a iri-a ba-an-da-dab₅

299. šag₄ nu-si-si igi niḡin₂-bi iri-a ba-an-da-dab₅

300. urim₅^{ki}-ma gi dili du₃-a-gin₇ saḡ sag₃-ge nu-ḡa₂-ḡa₂

301. uḡ₃-bi ku₆ šu dab₅-ba-gin₇ zi-bi mi-ni-in-tum₂-tum₂-mu

302. tur maḥ-bi i₃-barag₂-barag₂-ge-eš lu₂ nu-um-zi-zi-zi

292-302. Enlil threw open the door of the grand gate to the wind. In Urim no one went to fetch food, no one went to fetch water. Its people rushed around like water being poured from a well. Their strength ebbed away, they could not even go on their way. Enlil afflicted the city with an evil famine. He afflicted the city with that which destroys cities, that which destroys houses. He afflicted the city with that which cannot be withstood with weapons. He afflicted the city with dissatisfaction and treachery. In Urim, which was like a solitary reed, there was not even fear. Its people, like fish

being grabbed in a pond, sought to escape. Its young and old lay spread about, no one could rise.

[389.](#) iri^{ki} ġiš^ttukul-e saġ nu-šum₂-mu-a šag₄-ġar-e im-us₂

[390.](#) šag₄-ġar-e iri^{ki} a-gin₇ ba-e-si ġa₂-la nu-um-ta-dag-ge

[391.](#) šag₄-ġar-e igi-bi im-gam-me-e sa-bi im-lug-gu₂-ne

[392.](#) uġ₃-bi a-niġin₂-na ba-e-si zi HĀR i-ak-e

[393.](#) lugal-bi e₂-gal ni₂-te-na-ka zi gig mu-un-pa-an-pa-an

[394.](#) nam-lu₂-ulu₃-bi ġiš^ttukul ba-e-šub ġiš^ttukul ki bi₂-ib₂-tag

[395.](#) šu-bi gu₂-bi-še₃ ba-ši-ib-ri-ri er₂ mu-un-še₈-še₈-ne

[396.](#) ni₂-bi-a ad mi-ni-ib-gi₄-gi₄ inim im-šar₂-šar₂-e-ne

[397.](#) me-li-e-a dug₄-ga-me nam-ġu₁₀ taġ-me nam-ġu₁₀

[398.](#) en₃-še₃-am₃ ka garaš₂-a-ka i-im-til-le-de₃-en-de₃-en

[399.](#) urim₅^{ki}-ma šag₄-bi nam-uš₂-am₃ bar-bi nam-uš₂-am₃

[400.](#) šag₄-bi-a niġ₂ šag₄-ġar-ra-ka i-im-til-le-de₃-en-de₃-en

[401.](#) bar-bi-a ġiš^ttukul elam^{ki}-ma-ka ga-nam ba-[e-til]-le-en-de₃-en

[402.](#) urim₅^{ki}-ma lu₂-erim₂-e a₂ bi₂-ib-ġar ga-nam ba-til-e-de₃-<en>-de₃-en

[389-402.](#) In the city, those who had not been felled by weapons succumbed to hunger. Hunger filled the city like water, it would not cease. This hunger contorted people's faces, twisted their muscles. Its people were as if drowning in a pond, they gasped for breath. Its king breathed heavily in his own palace. Its people dropped their weapons, their weapons hit the ground. They struck their necks with their hands and cried. They sought counsel with each other, they searched for clarification: "Alas, what can we say about it? What more can we add to it? How long until we are finished off by this catastrophe? Inside Urim there is death, outside it there is death. Inside it we are to be

finished off by famine. Outside it we are to be finished off by **Elamite** weapons.

In **Urim** the enemy oppresses us, oh, we are finished."

483. ud gig-ga ud gaba-zu zig₃-ga-ab ud e₂-za gi₄-bi

484. ud **uru**₂ gul-gul ud gaba-zu zig₃-ga-ab ud e₂-za gi₄-bi

485. ud e₂ gul-gul ud gaba-zu zig₃-ga-ab ud e₂-za gi₄-bi

486. ud **ki-en-gi-ra** ba-e-zal-la kur-re ħe₂-eb-zal

487. ud ma-da ba-e-zal-la kur-re ħe₂-eb-zal

488. kur **ti-id-nu-um**^{ki}-**ma-ka** ħe₂-eb-zal kur-re ħe₂-eb-zal

489. kur **gu-ti-um**^{ki}-**ma-ka** ħe₂-eb-zal kur-re ħe₂-eb-zal

490. kur **an-ša₄-an**^{ki}-**na-ka** ħe₂-eb-zal kur-re ħe₂-eb-zal

491. **an-ša₄-an**^{ki}-**e** im-ĥul dal-la-gin₇ kuš₇ ħe₂-ni-ib-su-su

492. šag₄-ġar lu₂ niġ₂-ĥul ħe₂-en-da-dab₅ uġ₃ ħe₂-em-ši-ib-gam-e

483-492. O bitter storm, retreat, O storm, storm return to your home. O storm that destroys cities, retreat, O storm, storm return to your home. O storm that destroys houses, retreat, O storm, storm return to your home. Indeed the storm that blew on **Sumer**, blew also on the foreign lands. Indeed the storm that blew on the land, blew on the foreign lands. It has blown on **Tidnum**, it has blown on the foreign lands. It has blown on **Gutium**, it has blown on the foreign lands. It has blown on **Anšan**, it has blown on the foreign lands. It levelled **Anšan** like a blowing evil wind. Famine has overwhelmed the evildoer; those people will have to submit.

The Lament for Unug

- [21.](#) e-ne ba-ab-te saḫar-ra e-ne ba-an-/tuš^ʔ\ ḡiri₃ a-na-aš ba-da-ze₂-er
- [22.](#) dim₂-ma-bi šu bal a-ba-a bi₂-in-ak umuš-bi a-/ba\-[a bi₂-in]-/kur₂\
- [23.](#) ^dudug sag₉-ga-bi a-ba-a ib₂-ta-an-dub₂ ^dlamma-bi a-ba-a in-/ga\-[an]-/ra\
- [24.](#) ni₂ me-lem₄ saḡ-ḡa₂ ḡal₂-la-bi šu ḫul a-ba-a [bi₂-in-dug₄]
- [25.](#) unug^{ki}-ga teš₂-bi a-ba-a ib₂-ta-an-/gu₇^ʔ\-[(X) X] gig a-ba-a in-[ga-X (X)]
- [26.](#) iri-da kur-kur [(...)] /unug^{ki}-ga e₂-ba a-[ba-a ...]
- [27.](#) e-ne [...]

[21-27.](#) That one drew nearer. That one settled upon the ground. Why would he withdraw? Who distorted Unug's good sense and deranged its good counsel? Who smashed its good *udug* deity? Who struck its good *lamma* deity too? Who desecrated the fearsome radiance which crowned it? Who brought about mob panic in Unug? Who sickness too? Along with the city, the foreign lands, who in the temple of Unug? That one

- [51.](#) me₃ /ki-bal\ [...] X šeg₁₁ /mu\-[...-gi₄-gi₄]
- [52.](#) ti mar-uru₅-a-/gin₇\ [...] -til-e [...]
- [53.](#) ki-en-gi-ra lu₂-/erim₂\ [...]
- [54.](#) gu-ti-um ur-re ba-e-/bal\ [...]
- [55.](#) ki-«^d»en-gi ḡiš-bur₂-ra i₃-bal-/la\ X [...]
- [56.](#) uḡ₃-bi šu suḫ₃-ḫa im-ma-ab-dug₄ X [...]
- [57.](#) ur-saḡ kalag-ga ki-en-gi-ra-ke₄ ḡiš [...]
- [58.](#) šag₄ ^{tum}₉u₁₈-lu-da zu NE EN /ed₃^ʔ\ [...]

- [59.](#) erin₂ saĝ-gin₇ mu-un-laĥ₅-laĥ₅-eš-am₃ AN [...]
- [60.](#) KASKAL X-gin₇ mu-un-gaz-uš 1-a re an-gin₇ [...]
- [61.](#) me₃ zu-ba šu-ba bi₂-/ib\šub dim₂-ma-bi [...]-ak
- [62.](#) saĝ erin₂-na lu₂-ta e₃-a-me-eš gar₃ ĥul-/bi\ [...] X
- [63.](#) gu-ti-um^{ki} /ur-ra\ X E NE [...] ĝiš⁴tukul [...] X
- [64.](#) igi-bi da-bi-a nu-mu-un-bar-bar-re-eš-a ĜIR₂-ĜIR₂ [...]
- [65.](#) su-bir^{ki}-e a maĥ e₃-a-gin₇ a X [(...)] X-gin₇ ki-en-gi-ra ba-an-de₂

[51-65.](#) War enemy lands echoed. Like arrows in a quiver Evildoers in Sumer..... Gutium, the enemy, overturned Sumer, caught in a trap, Its people were thrown into turmoil The mighty heroes of Sumer the heart of a hurricane They advanced like the front rank of troops, Like they were crushed, every one of them Their war veterans gave up, their brains were muddled. The troop leaders, the most outstanding of the men, were viciously hewn down. Gutium, the enemy, weapons Not looking at each other Like a swelling flood, like, Subir poured into Sumer.

The Exploits of Ninurta

- [57.](#) ^{jic}rab₃ dijir-re-e-ne na-dab₅-en
- [58.](#) tarah an-na kur umbin ba-e-zukum
- [59.](#) ^dnin-urta en dumu ^den-lil₂-la₂ a-na zig₃-bi mu-un-gi₄
- [60.](#) a₂-sag₃ zig₃-ga-bi cu la-ba-jal₂ dugud-da-bi im-gu-ul
- [61.](#) ugnim-bi-ta KA ib₂-ta-de₆ erin₂-bi igi la-ba-tej₃-je₂₆
- [62.](#) ur₅-ra kalag-ga-bi saj im-gi₄ ^{jic}tukul-e jic la-ba-ab-kij₂
- [63.](#) ^dnin-urta CEN.CITA₂ cukur mah-e su-bi nu-dar-e
- [64.](#) ur-saj na-me-gin₇ na-ra-dim₂
- [65.](#) en me mah-e a₂-kuc₃ sud-sud
- [66.](#) ce-er-zid me-te dijir-re-e-ne
- [67.](#) gud muc₃-ba am gal murgu tuku lal₃ gal-zu ur₅-ra
- [68.](#) ^dnin-urta alan-za ^den-ki-ke₄ igi bar-bar-ra-ju₁₀
- [69.](#) ^du₄-ta-u₁₈-lu en dumu ^den-lil₂-la₂ a-na ak²-ju₁₀

[57-69](#)"But you will force it into the shackles of the gods. You, Antelope of Heaven, must trample the Mountains beneath your hooves, **Ninurta**, Lord, son of **Enlil**. Who has so far been able to resist its assault? The besetting **Asag** is beyond all control, its weight is too heavy. Rumours of its armies constantly arrive, before ever its soldiers are seen. This thing's strength is massive, no weapon has been able to overturn it. **Ninurta**, neither the axe nor the all-powerful spear can penetrate its flesh, no warrior like it has ever been created against you. Lord, you who reach out towards the august divine powers, splendour, jewel of the gods, you bull with the features of a wild bull, with a prominent backbone, this fellow is clever! My **Ninurta**, whose form **Enki** contemplates with favour, my **Uta-ulu**, Lord, son of **Enlil**, what is to be done?

- [265.](#) e ur-saj a-na in-ga-ra-jal₂-la
- [266.](#) mir kur-ra-ke₄ ba-ra-bi₂-tag-tag-/ge₄?\
- [267.](#) ^dnin-urta en dumu ^den-lil₂-la₂ ud-gin₇ ci-in-ga-du₃
- [268.](#) u₃-bu-bu-ul e₃-a-bi nu-dug₃-ga
- [269.](#) ac-gin₇ giri₁₇ e₃-a-bi nu-sig₁₀-ge
- [270.](#) en inim gib cag₄-ce₃ nu-ra-gid₂
- [271.](#) lugal-ju₁₀ dijjir-gin₇ mu-ra-an-du₃ a-ba saj ma-ra-ab-us₂-e
- [272.](#) ur-saj muru₉-a ki ba-ab-us₂ naja-am₃ /ki? \ [...] X /RI? \
- [273.](#) ^dnin-urta dur₃^{ur}₃ kur-ra mu-ni-in-sar-sar-re
- [274.](#) ni₂ me-lem₄-e sahar i₃-ur₄-ru cika im-e-ec i₃-cej₃
- [275.](#) ki-bal-a pirij zu₂ sis mu-un-ra lu₂ nu-mu-ni-in-dab₅-be₂
- [276.](#) mir mir-ra lil₂ tec₂ im-gaz-za-ta ur₅ tu₁₁ mu-e-ak-e
- [277.](#) amac lil₂-la₂-en-da igi tab-ba a ki-a mi-ni-ib-had₂
- [278.](#) ud tec₂-e ri-a uj₃ im-til a₂-cu-du₇ nu-tuku
- [279.](#) lu₂-erim₂ zi cag₄-ge nu-jal₂-la
- [280.](#) ur-saj gal en gaba-zu zig₃-ga-ab sig₉-ga-bi im-me

[265-280](#)"Hero, ah, what further awaits you? Do not on any account meddle with the hurricane of the Mountains. **Ninurta**, Lord, son of **Enlil**, I tell you again, it is made like a storm. It is a blister whose smell is foul, like mucus which comes from the nose it is unpleasant, Lord, its words are devious, it will not obey you. My master, it has been created against you as a god; who can help you? Hero, it falls on the land as a whirlwind, it scrubs it as if with saltwort, **Ninurta**, it chases the onagers before it in the Mountains. Its terrifying splendour sends the dust into clouds, it causes a downpour of potsherds. In the rebel lands it is a lion striking with savage teeth; no man can catch it.

After reducing everything to nothing in the north wind, it The sheepfolds have been closed by ghostly demons. It has dried up the waters in the ground. In the whirlwind storm, the people are finished, they have no solution (?). From an implacable enemy, great Hero, Lord, turn away," he said quietly.

[372.](#) u₃-mu-un a₂ mah-a-ni kur-re nu-il₂-i

[373.](#) ur-saj gal an-gin₇ ib₂-ba-na a₂-bi lu₂ nu-tej₃-je₂₆

[374.](#) ud sumur ki-a du uc₁₁ gaba-ba jar-a

[372-374](#)"The Mountains could not bear the Lord's great strength. The great Hero -- the force of whose rage no one can approach, like heaven itself; the savage storm which walks on earth, spilling poison in the earth's breast

The Death of Ur-Namma – A version from Nippur

1. [...]ta kalam tec₂-a mi-ni-/ib\ -X
2. [...] /in[?]\ -sag₃ e₂-gal im-sig₁₀-sig₁₀
3. [...] /saj\ gig₂ tuc-a-ba ni₂ ul₄-la bi₂-/ib₂\ -te
4. [(X)] X X X X ki-cub-ba-bi ki-en-gi-ra bi₂-ib-jar
5. [(X)] /nij₂\ -dajal-ba iri /ba\ -an-gul uj₃-e ni₂ bi₂-in-te
6. /urim₅\^{ki}-ma hul-jal₂ im-ci-DU sipad zid ba-ra-ab-e₃
7. /sipad zid\ ur-^d/namma\ /ba\ -ra-ab-e₃ sipad zid ba-ra-ab-e₃

¹⁻⁷..... entire land, struck, the palace was devastated. panic spread rapidly among the dwellings of the black-headed people. abandoned places in Sumer. the cities were destroyed in their entirety; the people were seized with panic. Evil came upon Urim and made the trustworthy shepherd pass away. It made Ur-Namma, the trustworthy shepherd, pass away; it made the trustworthy shepherd pass away.

31. sipad kug-zu [...] X A [...] X a₂[?] /nu\-[mu]-da-an-aj₂-e
32. me₃ /cen\-[cen-na ...] A SI /A ba\ -da-/ab-tab[?]-e[?]\
33. lugal ka-mud-jal₂ /ki-en\ -gi-/ra\ [me-te unken-na]
34. ur-^dnamma ka-/mud-jal₂\ ki-en-[gi-ra me]-/te[?]\ unken-na
35. mas-su /ki-en-gi-ra-ke₄[?]\ [(...) i₃]-nu₂ tur₅-ra-am₃
36. cu-ni /dab₅-ba\ nu-mu-/un-dab₅[?]\ in-nu₂ tur₅-ra-am₃
37. /jiri₃\-[ni] X (X) nu-um-un-da-/dib[?]\ i₃-nu₂ tur₅-ra-am₃
38. [...] X X IM X UC [...] /saj[?]\ ME ba-BU

- [39.](#) sipad zid /lugal\ jiri₂ gal ki-en-gi-ra-ke₄
- [40.](#) [ur-^dnamma] lugal kalam-ma-ke₄ e₂-sumur-ra ba-an-te
- [41.](#) /urim₂\^[ki]-/ma\ im-te ur-^dnamma e₂-zu₂-ra-ah-/a\ X-kur₉
- [42.](#) saj-kug-/jal₂\ e₂-gal-a-na i₃-nu₂
- [43.](#) ur-^dnamma lu₂ erin₂-e ki aj₂-ja₂ gu₂ nu-mu-un-da-zig₃-ge
- [44.](#) igi-jal₂ [X X]-ra i₃-nu₂ jic-la₂-bi im-DU
- [45.](#) tec₂ kalam-ma-ka ba-cub^{ub} hur-saj-gin₇ ba-gul
- [46.](#) /tir\ [ha-cu]-/ur₂\-ra-gin₇ im-ma-sug₄ me-dim₂-bi ba-kur₂
- [47.](#) ^{jic}tackarin(source: CE₃)-gin₇ ki-[tuc giri₁₇-zal]-/la\ -na gij₄ mu-ni-in-jar-re-ec
- [48.](#) ^{jic}erin duru₅-gin₇ /e₂-gal\-[la] /nu₂\-a mu-ni-in-bal-bal-e-ne
- [49.](#) ki-nu₂ nitalam-a-/ni ba\-[X (X)] X X u₁₈-lu-da ba-da-dul
- [50.](#) /cec-a\ -ni-da dam-a-ni-/gin₇\ gu₂-/da[?] am₃-mi-ib-la₂
- [51.](#) ud /dug₄\-ga-ni sa₂ mu-ni-/ib[?]\-dug₄ a-la-na ba-ra-/e₃\

[31-51](#)The wise shepherd does not give orders any more. in battle and combat.

The king, the advocate of Sumer, the ornament of the assembly, Ur-Namma, the advocate of Sumer, the ornament of the assembly, the leader of Sumer, lies sick.

His hands which used to grasp cannot grasp any more, he lies sick. His feet cannot step any more, he lies sick.

1 line fragmentary

The trustworthy shepherd, king, the sword of Sumer, Ur-Namma, the king of the Land, was taken to the house. He was taken to Urim; the king of the Land was brought into the house. The proud one lay in his palace. Ur-Namma, he who was beloved by the troops, could not raise his neck any more. The wise one lay down; silence descended. As he, who was the vigour of the Land, had fallen, the Land became demolished like a mountain; like a cypress forest it was stripped, its appearance

changed. As if he were a boxwood tree, they put axes against him in his joyous dwelling place. As if he were a sappy cedar tree, he was uprooted in the palace where he used to sleep (?). His spouse resting place; was covered by a storm; it embraced it like a wife her sweetheart (?). His appointed time had arrived, and he passed away in his prime.

Letter from Sîn-iddinam to the god Utu about the distress of Larsa

21. kur elam^{ki}-ma X^{mucen}-gin₇ mah-/bi\ lu₂ uc₂-a nu-jal₂-la

22. su-bir^{ki} muru₉ dugud-da diji₄-re-e-ne ni₂ tej₃-je₂₆ nu-/zu\ -a

23. ma-da-bi nu-ub-ta-be₄ /ud-bi\ nu-jal₂-la

21-23The mountain land of **Elam** where there are no dead in great numbers (?) like, and **Subir**, a heavy cloud, which knows no reverence even towards the gods -- these districts have not been,; their time has not yet come.

Gilgamesh and Huwawa, version A

21. ^dutu inim ga-ra-ab-dug₄ inim-ju₁₀-uc jectug₂-zu

22. silim ga-ra-ab-dug₄ jizzal he₂-em-ci-ak

23. iri^{ki}-ja₂ lu₂ ba-uc₂ cag₄ ba-sag₃

24. lu₂ u₂-gu ba-an-de₂ {cag₄-ju₁₀} {(2 mss. *have instead:*) cag₄ hul} ba-an-gig

25. bad₃-da gu₂-ja₂ im-ma-an-la₂

26. ad₆ a-a ib₂-dirig-ge igi im-ma-an-sig₁₀

21-26"Utu, I have something to say to you -- a word in your ear! I greet you -- please pay attention! In my city people are dying, and hearts are full of distress. People are lost -- that fills me with (*1 ms. adds wretched*) dismay. I craned my neck over the city wall: corpses in the water make the river almost overflow. That is what I see.

62. hur-saj 7-kam-ma bal-e-da-bi ^{jic}erin cag₄-ga-ni mu-ni-in-pad₃

63. en₃ nu-un-tar ki nu-un-kij₂

64. ^dgilgamec₂ ^{jic}erin-na al-sag₃-ge

{

65. en-ki-du₁₀ pa-bi i₃-ku₅-ru /NE\ [(...)] KI TUM [X] X ^dgilgamec₂-ce₃ [...]

}

{

(*1 ms. has instead the line:*)

65a. en-ki-du₁₀ ^{jic}pa-/bi\ [...] dumu iri-na /mu\-[...]

}

{

(1 ms. adds 1 line:)

65A. [...] -ra en-ki-du₁₀ [...]

}

66. gu-ru-/ma\ [...] X X-/ma\ im-ma-gub

{

(1 ms. adds 1 line:)

66A. hu-/wa\-[wa ...]

}

67. ni₂ /te\-[...] /mu-na\ -ra-an-la₂

}

{

(instead of lines 65-67, 1 ms. has:)

D. en-ki-du₁₀ /jic\ mu-na-an-kud dumu nu-mu-su-e mu-un-de₃-re-ec₂

E. gu₂-ru-[ma] /im\ -ma-ja₂-ja₂-ne

F. KA [...] X KA [...] -bi-a ^dgilgamec_x(BIL₄.MEC₃:GA) ^dhu-wa-wa ki-nu₂-a-
ni im-ma-hu¹-luh-ha

G. /ni₂\ ta-ni [X]-/mu\ -ra-e₃-a

}

62-67 When he had crossed the seventh mountain range, there his intuition led him to find the cedars. He did not need to ask, nor did he have to search any further.

Lord Gilgamec began to chop at the cedars, while Enkidu lopped off their branches, to Gilgamec. (1 ms. has instead: while Enkidu their branches, and his fellow-

citizens) (1 ms. adds: to, Enkidu) stacked them in piles. (1 ms. adds: Huwawa) He loosed his terrors against (*instead of lines 65-67, 1 ms. has instead:* while Enkidu cut up the timbers, and the widows' sons who had come with him heaped them up in piles. Since, because of the, Huwawa had been scared in his lair by Gilgamec, he began to radiate his terrors)