Timeline of historic inventions

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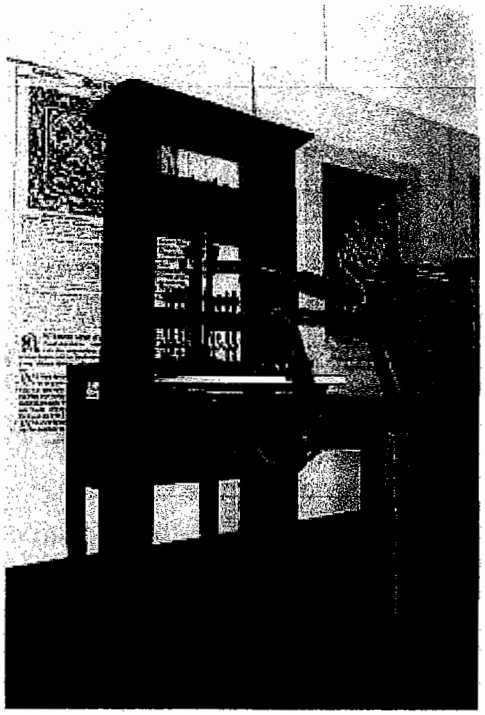
The **timeline of historic inventions** is a chronological list of particularly important or significant technological inventions and the people who created the inventions.

Note: Dates for inventions are often controversial. Inventions are often invented by several inventors around the same time, or may be invented in an impractical form many years before another inventor improves the invention into a more practical form. Where there is ambiguity, the date of the first known working version of the invention is used here.



The 15th-century invention of the printing press with movable type by the German Johannes Gutenberg is widely regarded as the most influential event of the modern era.[1]

Contents

A New Chronology

Print PDF

Synopsis of David Rohl's book "A Test of Time" by John Fulton

The concept of time for us today is taken to be an absolute unchangeable system. We measure time from the fixed point of Christ's birth so that this is the one thousand, nine hundred and ninety-seventh year since he was born. The ancients, however, could not look forward to Christ's birth; instead, they worked on a regnal dating system where events happened in the Nth year of the reign of a particular king.

For most of the Old Testament, we can find a good deal of archaeological evidence in the Middle East to corroborate the historical record e.g.: Moabite, Canaanite, Persian, Assyrian and Babylonian artefacts and excavation. This is not surprising as these neighbouring states had considerable interaction between them. However, from the period of the United Monarchy under Saul, David and Solomon back, only the Egyptian chronology and archaeology is good enough to corroborate the biblical record and here there has been supposedly very little evidence for the existence of Saul, David, Solomon, the Judges, Moses and Joshua or the Patriarchs. This has led some scholars, such as Professor Thomas L. Thompson of Copenhagen University in 1992, to say:-

"If we reflect on how easy it is to challenge the historicity of not only a David or Solomon but of events in the reigns of Hezekiah or Josiah ... the very substance of any historical project that attempts to write a history of the late second or early first millennium BC in Palestine on the basis of a direct integration of biblical and extra biblical sources ... must appear not only dubious but wholly ludicrous."

This was true until the recent work of David M. Rohl in his book A Test of Time: The Bible:- From Myth to History' (Century, London 1995 – ISBN 0 7126 5913 7), of which this paper is a summary. Very simply stated, the problem is to correlate the archaeological ages, the Egyptian pharaonic chronology and the biblical chronology of early Israelite history with the absolute Christological timescale.

The biblical chronology is as follows, based on the widely-accepted work of Edwin Thiele:

1ST & 2ND TIMELINES – BIBLICAL & EGYPTIAN CHRONOLOGIES

The Egyptian chronology is based partly on finds during excavation of the sites of ancient Egypt. These include tablets and statues with inscriptions, pottery fragments, tomb relics and hieroglyphic inscriptions. Also of great worth in determining the chronology are the works of early historians, who often used ancient records not available to us today. As the archaeological evidence of Egypt is more extensive than that of any other contemporary civilization, the chronology of Egypt is used as the basis on which the archaeological ages and the chronologies of neighbouring civilizations are built. The ages concerning us are:-

3RD TIMELINE – ARCHAEOLOGICAL AGES

Therefore we have:-

i. Egyptian History and Chronology

Prehistoric

Note that the dates in the Paleolithic era are approximate and refer to the earliest discovered use of an invention, and are likely to change as more research is done and older sites are found. Similarly, the locations listed are for the site where the earliest example to date has been found, but in most cases there is little certainty how close that may be to where the invention actually first took place.

- 2.6 million years ago: Stone tools (Olduwan) in Ethiopia[2]
- 1.8 million years ago: Fire and then cooking[3]
- 500 thousand years ago (ka): Shelter construction in Japan[4]
- 400 ka: Pigments in Zambia[5]
- 400 ka: Spears in Germany[6]
- 200 ka: Glue in Italy[7]
- 110 ka: Beads in Israel[8]
- 100 ka: Burial in Israel[9]
- 77 ka: Bedding in South Africa[10]
- 64 ka: Spearhead in South Africa, along with what may be an arrowhead.[11]
- 61 ka: Sewing needle in South Africa[11]
- 60 ka: Bow[12]
- 40 - 20 ka: Cremation in Australia.[13]
- 36 ka: Cloth woven from flax fiber in Georgia[14][15]
- 35 ka: Flute in Germany[16]
- 28 ka: Rope[17]
- 16 ka: Pottery in China[18]
- 10 - 7 ka: Mud walls and mudbricks between Syria and Pakistan (see Mureybet and Mehrgarh).
- 7 ka - 4 ka: Writing in Greece, Romania and Egypt (see Dispilio Tablet and Tărtăria tablets).
- 6 ka: Kiln in Mesopotamia[19]
- 5000 - 4500 BC: Lacquer in China[20]
- 5000 - 4500 BC: Rowing oars in China.[21][22]
- 3630 BC: Silk garments (sericulture) in China[23]
- 3500 BC: Wheels in Mesopotamia and the Caucasus.[24]
- 3200 BC: Sailing in ancient Egypt[25][26]
- 3000 BC: Cuneiform in Mesopotamia[27]
- 3000 BC: Bronze in Mesopotamia[28]
- 3000 BC: Papyrus in Egypt[29][30]

1st millennium BC

ii. Israelite History and Chronology
iii. Archaeological Ages

These are combined to form part of an integrated whole, the conventional timescale of the ancient world as we know it:

4TH TIMELINE – INTEGRATION OF 1ST, 2ND & 3RD

In order to integrate the knowledge gained from different civilizations into the timescale as a whole, we need to have common dates that can be used to link known events in two or more civilizations. Examples are battles or marriage alliances between kings. This done, the relation of these different nations can be ascertained.

There were three basic cross-links made by 19th century Egyptologists to synchronise Israelite and Egyptian history.

- The sacking of Thebes in 664 BC by the Assyrian king Ashurbanipal as punishment for a revolt led by Pharaoh Taharka of the 25th Dynasty of kings in Egypt. Assyrian, Babylonian, Egyptian and other sources make this a very firm date, fixing the history of Egypt after this time. This date is beyond contention.
- The identification of Pharaoh Shishak (who is recorded in I Kings 14:25,26 and II Chronicles 12:2-9 as having conquered Jerusalem when Rehoboam was king of Judah) with Pharaoh Shoshenk I of the 22nd Dynasty.
- The identification of Ramesses II (Ramesses the Great, a 19th Dynasty ruler) as the pharaoh of the oppression of the Israelites in Egypt.

The absolute dates for Shishak/Shoshenk I were calculated from the biblical chronology, i.e. counting back regnal years to Rehoboam, the son and successor of Solomon. From this date, the date for Ramesses II was calculated by counting back the regnal lengths of the pharaohs between Ramesses and Shoshenk I. Other Egyptian kings were spread to fill in the gaps between these dates and other data, e.g. from the Ebers Calendar and Leiden Papyrus used to support the chronology.

The problem then arose that when archaeologists searched for materials from the periods, Late Bronze Age to Iron Age IIC, there was little or no evidence of any kind to lend credence to the early biblical account right up to the division of the monarchy. This means that for many years, Genesis, Exodus, Leviticus, Numbers and Deuteronomy, Joshua, Judges and large parts of Kings and Chronicles were relegated to the realm of mythology rather than historical fact. There was no evidence of the major events of Israelite history recorded in the Bible ever occurring. There were little or no data supporting an Israelite nation of several millions in Egypt, no evidence of the Exodus and none of a conquest of Canaan in the relevant archaeological strata of the Late Bronze Age. The Early Iron Age when Saul, David and Solomon were supposed to have reigned in such splendour was a relatively impoverished time with certainly no evidence of the great building works of Solomon that are recorded in the Bible. This has led many archaeologists of this period to doubt the historicity and validity of a large part of the Bible. What has happened? New evidence now revealed shows how the early Egyptologists, in their eagerness to find archaeological proof for the biblical record, made key assumptions which were wrong.

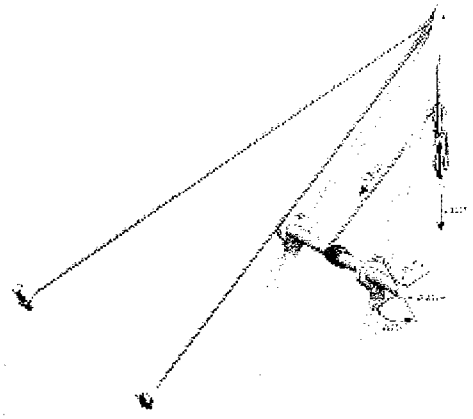
Ramesses

The first of these was the identification of Ramesses II as the pharaoh of the oppression

6th century BC

- c. 515 BC: Crane in Ancient Greece[32]

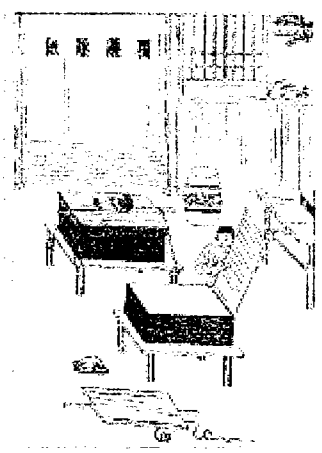
5th century BC



With the Greco-Roman *trispastos* ("three-pulley-crane"), the simplest ancient crane, a single man tripled the weight he could lift than with his muscular strength alone.[31]

- 5th century BC: Crank motion (rotary quern) in Celtiberian Spain[33][34]
- 5th century BC: Cast iron in Ancient China: Confirmed by archaeological evidence, the earliest cast iron was developed in China by the early 5th century BC during the Zhou Dynasty (1122–256 BC), the oldest specimens found in a tomb of Luhe County in Jiangsu province.[35][36][37]
- 5th century BC: Crossbow in Ancient China and Ancient Greece: In Ancient China, the earliest evidence of bronze crossbow bolts dates as early as the mid-5th century BC in Yutaishan, Hubei.[38] In Ancient Greece, the *terminus ante quem* of the *gastraphetes* is 421 BC.[39][40]
- 5th - 4th century BC: Traction trebuchet in Ancient China between 5th - 4th century BC, appeared in the Mediterranean by the 6th century AD.[41]
- Before 421 BC: Catapult in Ancient Greece (incl. Sicily)[39][40]
- c. 480 BC: Spiral stairs (Temple A) in Selinunte, Sicily (see also List of ancient spiral stairs)[42][43]

3rd century BC



An illustration depicting the papermaking process in Han Dynasty China.

- Early 3rd century BC: Canal lock (possibly pound lock) in Ancient Suez Canal under Ptolemy II (283–246 BC) in Hellenistic Egypt[44][45][46]
- Approximately 350 BC: Greek hydraulic semaphore system, an optical communication system developed by Aeneas Tacitus.
- 3rd century BC: Valve Tower Sluice in Sri Lanka[47]
- 3rd century BC: Water wheel in Hellenistic kingdoms described by Philo of Byzantium (c. 280 – 220 BC)[48]
- 3rd - 2nd century BC: Blast furnace in Ancient China: The earliest discovered blast furnaces in China date to the 3rd and 2nd centuries BC, although most sites are from the later Han Dynasty.[35][49]

2nd century BC

- 2nd century BC: Paper in Han Dynasty China: Although it is recorded that the Han Dynasty (202 BC – AD 220) court eunuch Cai Lun (born c. 50 – AD 121) invented the pulp papermaking process and established the use of new raw materials used in making paper, ancient padding and wrapping paper artifacts dating to the 2nd century BC have been found in China, the oldest example of pulp papermaking being a map from Fangmatan, Gansu.[51]

1st century BC

- 1st century BC: Segmental arch bridge (e.g. Pont-Saint-Martin or Ponte San Lorenzo) in Italy, Roman Republic[52][53]
- 1st century BC: Arch dam (Glanum Dam) in Gallia Narbonensis, Roman Republic (see also List of

based on the text of Exodus 1:8-11 which tells of the new pharaoh forcing the Hebrews to build the store cities of Pithom and Raamses. Ramesses II was a great building pharaoh and did build Raamses in Goshen (called Pi-Ramesse or city of Ramesses'). However, this is likely to be the same as saying that the present city of York was built by the Romans; the Romans never actually called their city York but Eboracum. The modern city of York gets its name from the Viking town Yorvik built on the same site. A biblical redactor writing after the event would naturally refer to the city built by the Israelites with the name Raamses to make it familiar to all his contemporaries.

It is remarkable that to identify the pharaoh of the oppression with Ramesses II, the period of the Judges must be reduced by 200 years, which is directly opposed to the biblical narrative. In Judges 11:26, Jephthah (one of the last of the Judges) states that the timespan from the first settlement in Transjordan during the Conquest to his own time, is 300 years. Also in I Kings 6:1, the time from the Exodus to the building of the temple by Solomon in 966 BC is recorded as 480 years, complementing the Judges date. These both place the Exodus around 1450 BC but Ramesses II reigned in the 13th Century (1279 – 1213 BC) under the conventional chronology. Genesis 47:11 also states that Jacob and the Patriarchs settled in the region of Ramesses'. This, however, is centuries before there was a pharaoh named Ramesses, let alone one who built a great city named after him. These early Egyptologists overlooked or ignored the biblical evidence in favour of equating Ramesses II with the pharaoh of the oppression.

Furthermore, the identification of the biblical Shishak (I Kings 14:25,26 and II Chronicles 12:2-9) with Pharaoh Shoshenk I has now been shown to be very shaky. It is based on a misreading of hieroglyphs to read that he captured the kingdom of Judah'. Shoshenk did indeed march north into Palestine but into the region of the Northern Kingdom of Israel; no mention is made of the capture of Jerusalem in this campaign.

The two main pillars of early Egyptian chronology have thus been shown to be unreliable and so the only firm date for tying this period to any timescale is 664 BC, the sacking of Thebes.

However, recent work has now come up with some very interesting finds. These start with archaeological conundrums or puzzles which, detailed in David Rohl's book, shorten the entire length of the Third Intermediate Period (TIP) of Egypt (conventionally dated 1069-664 BC) by 200 years. In essence, there were a lot more co-regencies and parallel dynasties than was previously thought.

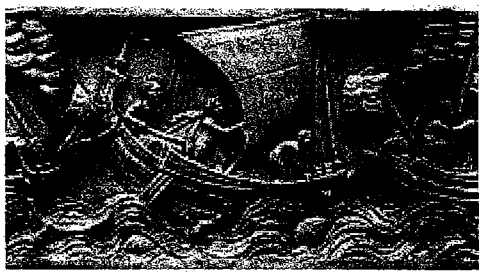
Secondly, research has revealed that Ramesses II was known in the Middle East by the hypocoristicon or nickname of Ss'. This comes from Hittite and Egyptian sources. The Egyptian S'is oftenn pronounced Sh' in Hebrew and like Hebrew and Arabic, no vowels are used but some records indicate that the name ShSh' is pronounced Shysha'. The ancient Hebrews may then have added the k' as this would have given Ramesses the nickname Shysak' which in Hebrew means the one who crushes underfoot', a very appropriate title.

Thirdly and most convincing of all is a finding at the Theban Ramesseum. Ramesses II, in the eighth year of his reign, plundered the city of Shalem or Salem, which we know today as Jerusalem. He is therefore the only pharaoh recorded as having plundered this city and his nickname is Shysha!

Finally, there are three important ancient genealogies:-

Roman dams)[54][55][56][57][58]

- 150 BC Astrolabe invented in the Hellenistic world.
- Before 71 BC (possibly 3rd century BC[59][60][61]): Watermill (grain mill) by Greek engineers in Eastern Mediterranean (see also List of ancient watermills)[62][63]



The earliest fore-and-aft rigs, spritsails, appeared in the 2nd century BC in the Aegean Sea on small Greek craft.[50] Here a spritsail used on a Roman merchant ship (3rd century AD).

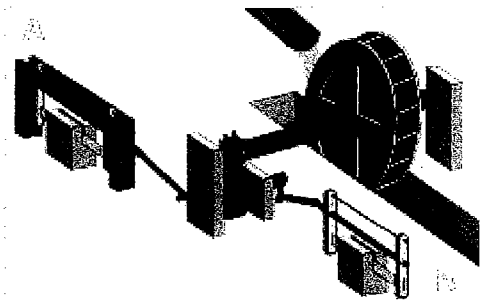
1st millennium AD

2nd century

- 118 AD: Wheelbarrow was found in a tomb at Chengdu, Sichuan province during Han Dynasty China[64]
- 132: Seismometer in Han Dynasty China, built by Zhang Heng. It was a large metal urn-shaped instrument which employed either a suspended pendulum or inverted pendulum acting on inertia, like the ground tremors from earthquakes, to dislodge a metal ball by a lever trip device.[65][66]
- 2nd century: Crankshaft in Augusta Raurica, Roman Empire[67]

3rd century

- Early 3rd century: Woodblock printing was invented in Han Dynasty China at sometime before 220 AD. This made China become the world first print culture.[71]
- Late 3rd century: Crank and connecting rod (Hierapolis sawmill) in Asia Minor, Roman Empire[68][69][70]
- Late 3rd–early 4th century: Turbine in Africa (province), Roman Empire[72][73][74]



Schematic of the Roman Hierapolis sawmill. Dated to the 3rd century AD, it is the earliest known machine to incorporate a crank and connecting rod mechanism.[68][69][70]

4th century

- 4th century: Field mill in Ancient China, first mentioned in the *Yezhongji*, or 'Record of Affairs at the Capital Ye of the Later Zhao Dynasty' written by Lu Hui in the 4th century, describing a field mill built by two engineers, Xie Fei and Wei Mengbian.[75]
- 4th century: Fishing reel in Ancient China: In literary records, the earliest evidence of the fishing reel comes from a 4th-century AD[76] work entitled *Lives of Famous Immortals'*.[77]
- 4th–5th century: Paddle wheel boat (in *De rebus bellicis*) in Roman Empire[78]
- 4th century: Stirrups in Ancient China: The first dependable representation of a rider with paired stirrups was found in China in a Jin Dynasty tomb of about AD 322.[79][80][81] The stirrup appeared to be in widespread use across China by AD 477.[82]

5th century

- 5th century: Horse collar in Southern and Northern Dynasties China: The horse collar as a fully developed collar harness was developed in Southern and Northern Dynasties China during the 5th century AD.[83] The earliest depiction of it is a Dunhuang cave mural from the Chinese Northern Wei Dynasty, the painting dated to 477–499.[84]
- 5th/6th century: Pointed arch bridge (Karamagara Bridge) in Cappadocia, Eastern Roman

- The graffito genealogy of Khnemibre in the Wadi Hammamat.
- The statue genealogy of Nespaherenhat in the Cairo Museum.
- The Memphite genealogy of the High Priests of Ptah, now in Berlin.

These all indicate that the length of the TIP has been artificially overestimated in the original piecing together of the Egyptian chronology. These evidences and more have enabled a new chronology to be established by David Rohl in his book which is summarised below:-

5TH TIMELINE – THE NEW CHRONOLOGY

The effect of all this archaeological research is that the biblical chronology, rather than being squeezed' to fit into the accepted archaeological timeframe, is now being proved to be very accurate. The biblical timeframe is being verified by a whole wave of new data from the Middle East which under the new chronology of Egypt ties in extremely well with the biblical account.

Solomon

The first evidence of this is in the subsequent relocation of the Solomonic period to the Late Bronze Age. This was an age of wealth and prosperity in the Levant, reflecting the biblical narrative of the wealth of Solomon's reign. Previously, Solomon was placed in a period of general impoverishment – the Early Iron Age. The contemporaries of Solomon in Egypt are now shown to have been Haremheb and Seti I. Excavations at Megiddo for this period, which I Kings 9:15 records as being built up by Solomon, revealed a Late Bronze Age palace 50 metres long with two-metre thick walls, a royal treasure-room with a magnificent hoard of treasures and the richest collection of Canaanite carved ivory yet discovered' in Palestine (Yigael Yadin of the University of Jerusalem). One of these ivory pieces depicts a king on his throne flanked by two sphinxes with his queen before him. The queen is presenting the king with lotus flowers, a typical Egyptian scene. In I Kings 10:18-20, Solomon is said to have had a throne flanked with lions'. We also know that he married an Egyptian princess (I Kings 3:1). Could this piece, now in the Rockefeller Museum in Jerusalem, represent Solomon and his Egyptian queen at the height of their power? The architecture of Late Bronze Age Megiddo is identical to that described in the Bible as being performed by Phoenician craftsmen (I Kings 6:36).

In I Kings 9:15, Solomon is recorded as having built the Millo' around Jerusalem. This was a massive stone terrace, erected to increase the building area on top of the City of David. This amazing construction was extensively excavated by Dame Kathleen Kenyon; however, due to the chronological problems already discussed, it was wrongly dated to a couple of centuries before Solomon. This has now been revised under the new chronology and given a date in the Late Bronze Age, contemporary with Solomon, the biblical builder. Furthermore, it is stated in I Kings 7:8 and II Chronicles 8:11 that Solomon built a palace for his Egyptian wife in Jerusalem. The only Egyptian architectural remains ever to be found in Jerusalem now date in the new chronology to the Late Bronze Age II A/B. Previously, it was considered a mystery as to where they had come from and who had been responsible for them.

Saul and The Amarna Tablets

In 1887, 380 clay tablets were discovered in Egypt at a place called Tell el-Amarna and

Empire[85][86]

ɛntury

563: Pendentive dome (Hagia Sophia) in Constantinople, Eastern Roman Empire[87]
589: Toilet paper in Sui Dynasty China, first mentioned by the official Yan Zhitui (531–591), with full evidence of continual use in subsequent dynasties.[88][89]

ɛntury

572: Greek fire in Constantinople, Byzantine Empire: Greek fire, an incendiary weapon likely based on petroleum or naphtha, was invented by Kallinikos, a Greek refugee to Constantinople, as described by Theophanes.[90] However, the historicity and exact chronology of this account is dubious,[91] and it could be that Kallinikos merely introduced an improved version of an established weapon.[92]

7th century: Banknote in Tang Dynasty China: The banknote was first developed in China during the Tang and Song dynasties, starting in the 7th century. Its roots were in merchant receipts of deposit during the Tang Dynasty (618–907), as merchants and wholesalers desired to avoid the heavy bulk of copper coinage in large commercial transactions.[93][94][95]

7th century: Porcelain in Tang Dynasty China: True porcelain was manufactured in northern China from roughly the beginning of the Tang Dynasty in the 7th century, while true porcelain was not manufactured in southern China until about 300 years later, during the early 10th century.[96]

ɛntury

9th century: Gunpowder in Tang Dynasty China: Gunpowder was, according to prevailing academic consensus, discovered in the 9th century by Chinese alchemists searching for an elixir of immortality.[97] Evidence of gunpowder's first use in China comes from the Five Dynasties and Ten Kingdoms period (618–907).[98] The earliest known recorded recipes for gunpowder were written by Zeng Gongliang, Ding Du, and Yang Weide in the *Wujing Zongyao*, a military manuscript compiled in 1044 during the Song Dynasty (960–1279).[99][100][101]

A Mongol bomb thrown against a charging Japanese samurai during the Mongol invasions of Japan after founding the Yuan Dynasty, 1281.

9th century: Playing cards in Tang Dynasty China: The first reference to the card game in world history dates no later than the 9th century, when the *Collection of Miscellanea at Duyang*, written by Su E described players enjoying the "leaf game" in 868.[102][103]

9th century: Numerical zero in Ancient India: The concept of zero as a number, and not merely a symbol for separation is attributed to India.[104] In India, practical calculations were carried out using zero, which was treated like any other number by the 9th century, even in case of division.[104][105]

ɛentury

10th century: Fire lance in Song Dynasty China, developed in the 10th century with a tube of first bamboo and later on metal that shot a weak gunpowder blast of flame and shrapnel, its earliest depiction is a painting found at Dunhuang.[106] Fire lance is the earliest firearm in the world and one of the earliest gunpowder weapon.[107][108]
10th century: Fireworks in Song Dynasty China: Fireworks first appeared in China during the Song

Hadadezer, a startling biblical confirmation.

The hill country to the north of Jerusalem is dominated in the Amarna letters by a king who shows scant respect for the Egyptian pharaoh. His hypocoristic or shortened name is Labayu, translated as Great Lion of (N)' where N is a god's name. The career of the Labayu in the Amarna letters is strikingly similar to that of Saul and this is an alternative name for the biblical Saul, the great lion' of Yahweh.

Another clue to Saul's other name is found in Psalm 57 where his bodyguards are called lebaim', a unique word in the Old Testament meaning great lions'. It is amazing then that as David hides from Saul's men in the cave of En-Gedi (I Samuel 24) he pens Psalm 57:4:-

"I am in the midst of lions (Hebrew 'lebaim'); I lie among ravenous beasts – men whose teeth are spears and arrows, whose tongues are sharp swords."

Labayu in the Amarna letters was active in fighting against the Philistines on the coastal plain to the south-west but was unable to conquer their cities. He was finally killed on Mount Gilboa by a Philistine confederacy. A rebellious king, he even wrote to Pharaoh to warn him not to meddle in his affairs. In letter EA 252 (p208 fig. 245), Labayu writes:-

"If an ant is struck, does it not fight back and bite the hand of the man who struck it?"

It is truly astounding to have in our possession a letter from King Saul. EA 252 was studied in 1943 by the great American archaeologist William Albright. He concluded that the writer knew little of the Akkadian language and that it was idiomatically pure Hebrew, i.e. written in Hebrew first by the king whose beginnings were insignificant (from the house of Benjamin and the least of its families' – I Samuel 9:21) and then translated into Akkadian to be sent to Pharaoh. The untutored Labayu/Saul writes to warn off Pharaoh!

A number of other Amarna tablets attest to this king's disruption of the area. EA 289 states:-

"Are we to act like Labayu when he was giving the land of Shechem to the Habiru?"

Habiru/Hebrews means wanderers' and was a term of contempt used by the other Palestinian leaders. The Jews called themselves Israelites except when speaking of David's Hebrews who were a mercenary group of drifters. Indeed, the Hebrews of David may be seen as a different group of Israelites e.g. I Samuel 13:3-5:-

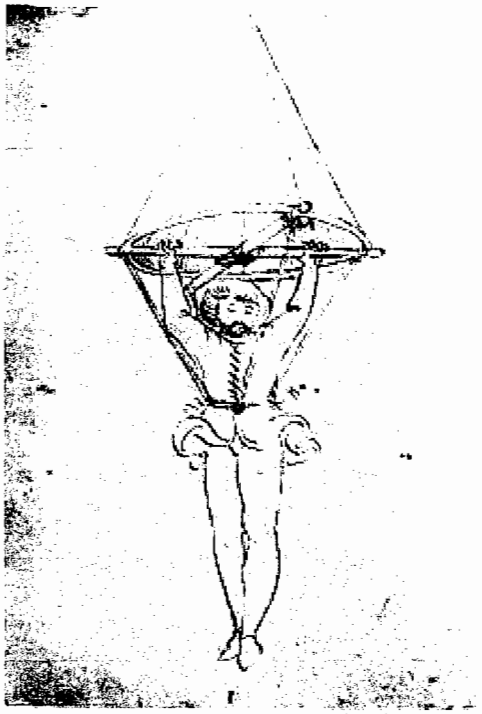
"Jonathan smashed the Philistine pillar which was at Gibeah and the Philistines learnt that the Hebrews had risen in revolt. Saul had the trumpet sounded throughout the country and the whole of Israel heard the news: 'Saul has smashed the Philistine pillar and now Israel has incurred the enmity of the Philistines.'"

This event is mentioned by Labayu as he writes to the Pharaoh in EA 252, to say that he was recapturing his home town which was taken by the Philistines, even after it had been agreed in the presence of the governor from Egypt that this would not happen!

In EA 254, Labayu's third letter to Pharaoh, he reprimands his own son for consorting with the Habiru/Hebrews without his knowledge. This is also told in I Samuel 20:30,31.

The deaths of Saul and his sons, Jonathan, Abinadab and Malkishua are recorded in I Samuel 31. They occur at the battle of Mount Gilboa in a clash with the Philistines. After gathering at the fountain of Jezreel, the Israelites retreated into the mountains so that the Philistines could not make use of their chariots and cavalry. How the Philistines were successful in pursuing Saul up the mountains is not clear in the Bible but the Amarna

- 1420s: Brace in Flandres, Holy Roman Empire[134]
- 1439: Printing press in Mainz, Germany: The printing press was invented in the Holy Roman Empire by Johannes Gutenberg around 1440, based on existing screw presses. The first confirmed record of a press appeared in a 1439 lawsuit against Gutenberg.[135]
- 1470s: Parachute (with frame) in Renaissance Italy[136]
- 1480s: Mariner's astrolabe on Portuguese circumnavigation of Africa[137]
- 1494: Double-entry bookkeeping system codified by Luca Pacioli



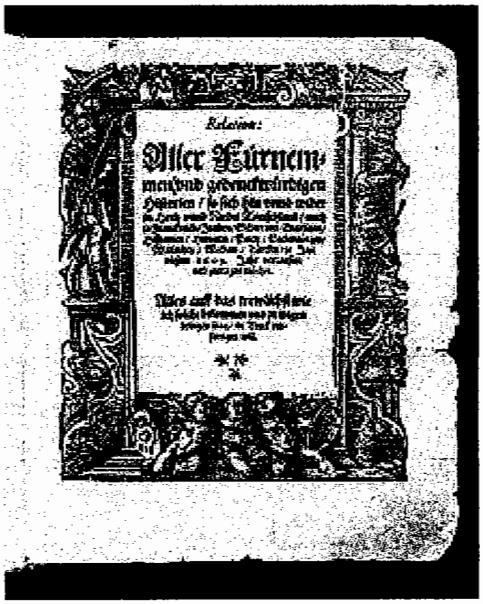
The oldest known parachute is depicted in this anonymous Italian manuscript dated to the 1470s.[134]

16th century

- 1560 Floating dock in Venice, Venetian Republic[138]
- 1569 Mercator Projection map created by Gerardus Mercator

17th century

- 1605: Newspaper (*Relation*): Johann Carolus in Strassburg, Holy Roman Empire of the German Nation (see also List of the oldest newspapers)[139][140]
- 1642: Mechanical calculator. The Pascaline was built by Blaise Pascal



A 1609 title page of the German *Relation*, the world's first newspaper (first published in 1605)[139][140]

18th century

- c. 1700: Bartolomeo Cristofori crafts the first piano
- 1709: Daniel Gabriel Fahrenheit invents the alcohol thermometer .
- 1712: Thomas Newcomen builds the first steam engine to pump water out of mines.[141] Newcomen's engine, unlike Thomas Savery's, used a piston.
- 1733: Stephen Hales takes measurements of blood pressure. John Kay enabled one person to operate a loom with the flying shuttle
- 1742: Anders Celsius develops the Centigrade temperature scale.
- 1745: Musschenbroek and Kleist independently developed Leyden jar, an early form of capacitor.
- 1764: James Hargreaves invented the spinning jenny.
- 1765: James Watt invents the improved steam engine utilizing a separate condenser.
- 1793: Eli Whitney invents the cotton gin.

19th century

1800s

- 1800: Voltaic pile: an early form of battery by Alessandro Volta in Italy, based on previous works by Luigi Galvani.
- 1802: Arc lamp: Humphry Davy (exact date unclear; not practical as a light source until

tablets answer some intriguing questions. In EA 250, a ruler of a city-state reports to Pharaoh that Saul's surviving sons have asked for help to inflict revenge on a city called Gina (biblical En-Ganim) for killing their father. Also, in EA 245, Biridiya, Philistine ruler of Megiddo, writes to say that when he arrived on the battle field, Labayu was already dead and so could not be taken alive and sent to Egypt for public execution as Pharaoh had wanted.

In a map of the battle [1], it can be seen that Saul took up position facing the Philistines over the steep, northern slopes. To the south of his position atop Mount Gilboa lay the gentle slopes of the Vale of Gina and the town of Gina. It is envisaged that the men of Gina had been positioned to guard the southern slopes but that they betrayed Saul and allowed the Philistine archers and chariots to outflank and surprise Saul's army. Then, when the Philistine ruler Biridiya arrived on the battlefield with the main Philistine army, Saul and his sons were already dead. In the biblical account, Saul was mortally wounded by Philistine arrows; rather than being taken alive, he fell on his own sword to kill himself.

David

After the death of Saul/Labayu, we know from the biblical account that Saul's son Ishbaal/Ish-Bosheth and David vied for power (II Samuel 3:1). Ishbaal fled across the Jordan after the death of his father and from there he wrote to Pharaoh the tablet EA 256 (in the British Museum) which reads:-

"Say to Yanhamu, my lord: Message of Mutbaal, your servant. I fall at the feet of my lord. How can it be said in your presence, Mutbaal has fled. He has hidden Ayab'? How can the king of Pella flee from the commissioner, agent of the king, his lord? As the king, my lord, lives, as the king my lord lives, I swear Ayab is not in Pella. In fact, he has been in the field (i.e. on campaign) for 2 months. Just ask Benenima. Just ask Dadua. Just ask Yishuya."

There are several points of note in this extract:-

- Yanhamu is the official representative of Pharaoh in Palestine.
- Mutbaal is the Canaanite form of Ishbaal, son of Saul. Both mean Man of Baal'.
- Pella is one of the Israelite strongholds across the Jordan.

Who, however, is the Ayab that Pharaoh speaks of? It has been ascertained by linguists that Ayab is none other than Joab, commander of David's Hebrew army! Furthermore, it has been worked out that Benenima is Baanah, one of Israel's chieftains, Dadua is a form of the name David, king of Judah and Yishuya is the name Jesse (Heb. Yishay), the father of David.

As well as confirming the names of these characters, the Amarna letters even contain the name Goliath in its Akkadian form Gulatu (in EA 292 and 294)!

David's power begins to rise after the death of Saul; after seven and a half years, he is king of all Israel. As his power increases, we read in the Amarna letters desperate pleas for help from Pharaoh against the rampaging Hebrews. Most poignant of all comes from the Jebusite king of Jerusalem, Abdiheba. In EA 288 he writes that he is an island amidst a sea of violence as cities fall to the Hebrews round about him. The fall of Lachish is recorded and Pharaoh is reminded that he has done nothing to help. The king asks to be brought to Egypt with his brothers for safety. However, there never was a rescue as in 1003 BC, David conquered Jerusalem; nothing is ever heard from Abdiheba again in the

generators)[142]
- 1803: John Dalton's developement of the Atomic Theory.
- 1804: Morphine in Paderborn, Germany: Morphine was discovered as the first active alkaloid extracted from the opium poppy plant in December 1804 by Friedrich Sertürner.[143]
- 1804: Railway steam locomotive: Richard Trevithick[144]
- 1807: François Isaac de Rivaz designed the first automobile powered by an internal combustion engine fuelled by hydrogen.
- 1807: Robert Fulton expanded water transportation and trade with the workable steamboat.

1820s

- 1822: The pattern-tracing lathe (actually more like a shaper) is completed by Thomas Blanchard for the U.S. Ordnance Dept. The lathe could copy symmetrical shapes and was used for making gun stocks, and later, ax handles. The lathe's patent was in force for 42 years, the record for any U.S. patent.[145][146]
- 1825: George Stephenson invented the railroad locomotive.
- 1826: The friction match is invented by John Walker[147]

1830s

- 1831: Michael Faraday and Joseph Henry independently of each other invented methods of Electromagnetic induction.
- 1836: Samuel Morse invents Morse code.
- 1839: James Nasmyth invents the steam hammer.

1850s

- 1856: Refrigeration: Using the principle of vapour compression, James Harrison produced the world's first practical ice making machine and refrigerator in Geelong, Australia.[148]

1870s

- 1873: Crookes radiometer: Invented by the chemist Sir William Crookes as the by-product of some chemical research.
- 1876: Telephone: A patent for the telephone is granted to Alexander Graham Bell. However, others inventors before Bell had worked on the development of the telephone and the invention had several pioneers.[149]
- 1877: The first working phonograph was invented by Thomas Edison.[150]
- 1878: Rebreather: Henry Fleuss was granted a patent for the first practical rebreather[151]
- 1879 Thomas Edison produced the first practical bulb and was granted a U.S. patent.

1880s

- 1886: Process for economically producing Aluminum invented by Charles Martin Hall and independently by Paul Héroult in 1886.
- 1886 Frank Julian Sprague invents the first practical DC electric motor. In 1887 he uses it to build the Richmond Union Passenger Railway, the first successful (and widely copied) large electric street trolley (tram) system.
- 1886 Karl Benz invents the first petrol or gasoline powered auto-mobile (car).[152]
- 1888: Wind turbines for grid electricity invented by Charles F. Brush in 1888.

Amarna letters!
The Amarna letters are not a recent find but have been around for over a century. However, due to the chronological misinterpretation, they were not seen as letters dating from the time of Saul and David. Even then, it greatly puzzled scholars as to how strikingly similar the Palestine of the Amarna letters was to the biblical Davidic picture, because they thought that the letters dated from 100 years before the Exodus. Now with the new dating, the similarities are there because the Amarna letters describe the United Monarchy period of Israelite history. The time gap was simply an illusion of the conventional chronology. Another document and astronomy confirm the new chronology date for the Amarna period as a record survives of a solar eclipse near sunset at Ugarit in April/May. In 1988, using powerful mainframe computers, it was determined that the only date in the whole 2nd millennium BC when this could have happened was 9th May 1012 BC. This is 350 years earlier than the reign of Amenhotep III was previously dated and backs up the new chronology of David Rohl.
It is interesting to note that the only other mention of David found to date is the Tell Dan Stela/Tablet, dated to the mid-9th century BC and mentioning the House of David'. In this light, the Amarna tablets are clearly an incredible find but the greatest amongst them must be the letter from the Israelite king Saul to Pharaoh, written by the untutored Benjamite king in Hebrew and then translated roughly into Akkadian to be sent off to Pharaoh, the most powerful man on earth at that time. EA 252 is surely a priceless artefact!

Moses and The Israelites

One of the most troubling problems for biblical archaeologists was the lack of archaeological evidence for Moses and the Israelites in Egypt. Prior to the Exodus, there were hundreds of thousands of Israelites in Egypt, yet little or no evidence of their existence has been found, even though the sojourn is recorded as lasting for centuries in the Scriptures!
The biblical chronology dates the birth of Moses to around 1527 BC. In the new chronology of Egypt, the pharaoh on the throne of Egypt was Neferhotep I of the 13th Dynasty.
The early Christian historian Eusebius in his work Evangelicae Preparationis' quotes from a book Peri Ioudaion' (Concerning the Jews) by the Jewish historian Artapanus. This work of Artapanus has not survived down to the present but is also quoted in Clement's Stromata'. Artapanus, writing in the 3rd century BC, had access to ancient records in Egyptian temples and perhaps even the famous Alexandrian library of Ptolemy I. Artapanus writes that a pharaoh named Palmanothes was persecuting the Israelites. His daughter Merris adopted a Hebrew child who grew up to be called prince Mousos. Merris married a pharaoh Khenephres. Prince Mousos grew up to administer the land on behalf of this pharaoh. He led a military campaign against the Ethiopians who were invading Egypt; however, upon his return, Khenephres grew jealous of his popularity. Mousos then fled to Arabia to return when Khenephres died and lead the Israelites to freedom. It may be only a Mosaic story with similarities to the biblical account, yet the only pharaoh with the name Khenephres was Sobekhotep IV, who took the name Khaneferre at his coronation. He reigned soon after Neferhotep I of the 13th Dynasty, as mentioned above, the pharaoh

20th century

- 1900: Human voice transmitted wirelessly (by radio) for the first time by Roberto Landell de Moura. The first AM radio factory was opened in 1912.
- 1903: First manually controlled, fixed wing, motorized aircraft takes place in Kitty Hawk, North Carolina by Orville and Wilbur Wright. First modern fixed wing aircraft. 1901: Gustave Weisskopf (Whitehead), a German-American immigrant, is credited with motorized aircraft flight in Bridgeport, Connecticut. Flights were witnessed by citizens and other associates, were recorded in the Bridgeport Herald, a local newspaper, but were not mentioned in a 1904 article in Scientific American.[153] In 2013 Jane's All The World's Aircraft recognized Whitehead as first to make a manned, powered, controlled flight.

1910s

- 1915: The tank was invented by Ernest Swinton,[154] although the British Royal Commission on Awards recognised a South Australian named Lance de Mole who had submitted a proposal to the British War Office, for a 'chain-rail vehicle which could be easily steered and carry heavy loads over rough ground and trenches' complete with extensive drawings in 1912[155]

1920s

- 1928: Penicillin was first observed to exude antibiotic substances by Nobel laureate Alexander Fleming. Development of medicinal penicillin is attributed to a team of medics and scientists including Howard Walter Florey, Ernst Chain and Norman Heatley.

1930s

- 1933: FM radio was patented by inventor Edwin H. Armstrong.
- 1938: Z1 built by Konrad Zuse was the first freely programmable computer in the world.

- 1938, December: Nuclear fission discovered in experiment by Otto Hahn (Nazi Germany), coined by Lise Meitner (fled to Sweden from Nazi-occupied Austria) and Fritz Strassman (Sweden). The Manhattan Project, and consequently the Soviet atomic bomb project were begun based on this research, as well as the German nuclear energy project, although the latter one declined as its physicists were drafted into Germany's war effort.

1940s

- 1942: The V-2 rocket, the world's first long range ballistic missile, developed in Nazi Germany during World War II.

- 1942： Frequency hopping:Hedy Lamarr and George Antheil

- July 1945: The atomic bomb was first successfully developed by the United States, Britain and Canada as a part of the Manhattan Project and swiftly deployed in August 1945 in the atomic bombings of Hiroshima and Nagasaki, effectively causing the end of World War II.

- December 1947: The Transistor, used in almost all modern electronic products was invented in December 1947 by John Bardeen and Walter Brattain under the supervision of William Shockley. Subsequent transistors became steadily smaller, faster, more reliable, and cheaper to manufacture, leading to a revolution in computers, controls, and communication.

- 1947 Floyd Farris and J.B. Clark (Stanolind Oil and Gas Corporation) invented hydraulic fracturing

in power at Moses' birth!
Josephus in his Antiquities of the Jews', with access to very old manuscripts and writing in AD 93, also mentioned Moses' Ethiopian or Kushite war. Here, Moses led an Egyptian army down the Nile valley, past the Third Cataract, deep into Kush (modern Ethiopia). In the British Museum is a stela (page 261, fig. 289) which tells of a 13th Dynasty pharaoh undertaking a campaign south into the region of Kush. That pharaoh is none other than Khaneferre, the step-father of Moses according to Artapanus. He is the only 13th Dynasty pharaoh who is recorded as having campaigned into Upper Nubia or Ethiopia. At Kerma on the Nile an official Egyptian building was found, outside of which was discovered a statue of Khaneferre, so dating this building to the 13th Dynasty. This is many hundreds of kilometres south of the known boundaries of 13th Dynasty Egypt and may have been a governor's residence'. It would have been built to secure Egyptian interests in the area after the military victory of the Egyptians led by Moses, as this was the only Kushite war at that time with Egypt. As Moses was a prince of Egypt and was 40 years old according to the Bible when he fled to Arabia, he could certainly have led this military operation – an Israelite leading an Egyptian army to war! If this part of Josephus' account is true then it adds weight to the rest of his account of the life of Moses and also gives us some firmer evidence of the existence of this charismatic leader!

Avaris

Excavations have been continuing for over 30 years near the Egyptian village of Tell ed-Daba. Here in the Nile Delta region, a large Middle Bronze Age settlement has been uncovered. This is the region of Goshen and the excavation is at the location of the biblical city of Raamses or Pi-Ramesse, the city of Ramesses II (Exodus 1:11). Settlement here spans a period from the 12th to the 20th Dynasties of Egypt. The ancient city at its peak covered an area of ten square kilometres, making it one of the largest cities of the ancient world. It existed for 800 years before being abandoned, when its stones was used to build Tanis.
The city of Pi-Ramesse or Raamses is, of course, famous because it was here that the early Israelites settled as they sojourned in Egypt and here also that they were enslaved. Raamses, however, was not the original name for the city built by the Israelites but as discussed earlier, was a later redaction. The city of Pi-Ramesse was indeed built by the 19th Dynasty ruler Ramesses II (the Great) but, below it, the Austrian team led by Manfred Bietak uncovered a much older city called Avaris which was the actual city built by the Israelites, long before any pharaoh Ramesses had ever reigned.
Avaris was built on a series of sandy hillocks to avoid the annual floodwaters of the Nile. The people who lived in Avaris, however, were not Egyptian but Asiatic Palestinian or Syrian.
The finds there included numerous pottery fragments of Palestinian origin. Several factors about the graves were particularly fascinating:-

- 65% of the burials were of children under 18 months of age, the normal for this period being 20-30%. Could this be due to the killing of the male Israelite children by the Egyptians, recorded in Exodus 1:22?
- A disproportionately high number of adult women as opposed to adult men are buried

technology.[156]

1950s-1960s

- December 20, 1951: First use of nuclear power to produce electricity for households in Arco, Idaho[157][158]
- 1954: Invention of Solar Battery by Bell Telephone scientists, Calvin Souther Fuller, Daryl Chapin and Gerald Pearson capturing the sun's power. First practical means of collecting energy from the sun and turning it into a current of electricity.
- 1955: The intermodal container was developed by Malcom McLean.
- 1957: The first PC used by one person and controlled by a keyboard, the IBM 610 was invented in 1957 by IBM.
- 1958-59: Co-creation of the integrated circuit by Jack Kilby and Robert Noyce.
- 1958-60: The LASER.
- 1969: ARPANET first deployed via UCLA, SRI, UCSB, and The University of Utah.

1970s

- 1972: The first video game console, used primarily for playing video games on a TV, is the Magnavox Odyssey.[159]
- 1973: The first commercial graphical user interface was introduced in 1973 on the Xerox Alto. The modern GUI was later popularized by the Xerox Star and Apple Lisa.
- 1975: Altair 8800 was the spark that ignited the microcomputer revolution.
- 1973-75: The Internet protocol suite was developed by Vinton Cerf and Robert E. Kahn for the Defense Advanced Research Projects Agency (DARPA) ARPANET, creating the basis for the modern Internet.

1980s

- 1982: A CD-ROM contains data accessible to, but not writable by, a computer for data storage and music playback. The 1985 *Yellow Book* standard developed by Sony and Philips adapted the format to hold any form of binary data.[160]

1990s

- 1990:The World Wide Web was first introduced to the public by English engineer and computer scientist Sir Tim Berners-Lee.[161][162]
- 1993: MOSAIC, the first popular web browser is introduced
- 1995: DVD is an optical disc storage format, invented and developed by Philips, Sony, Toshiba, and Panasonic in 1995. DVDs offer higher storage capacity than Compact Discs while having the same dimensions.

See also

- Timeline of electrical and electronic engineering
- Accelerating change
- List of emerging technologies
- List of inventors
- Outline of prehistoric technology

Footnotes

here, again pointing to the slaughter of male Israelite babies.

- There are large numbers of long-haired Asiatic sheep buried which indicate these people to be shepherds.
- Large numbers of weapons found in the male graves indicate the warlike nature of the people.

The continuing archaeological discoveries here in the ancient city of Avaris mirror exactly the early Israelites revealed in the Old Testament. For two centuries no evidence was found for the Israelites when looking in the strata of the 19th Dynasty. Now that the chronologies have begun to be amended and the sojourn in Egypt placed in the 12th and 13th Dynasties, we have a wealth of archaeological evidence corroborating the biblical account.

Before Moses, the Bible records that the Israelites were enslaved by their Egyptian hosts (Exodus 1:8-14). In the Brooklyn Museum [2] resides a papyrus scroll numbered Brooklyn 35:1446 which was acquired in the late 19th century by Charles Wilbour. This dates to the reign of Sobekhotep III, the predecessor of Neferhotep I and so the pharaoh who reigned one generation before Moses. This papyrus is a decree by the pharaoh for a transfer of slaves. Of the 95 names of slaves mentioned in the letter, 50% are Semitic in origin. What is more, it lists the names of these slaves in the original Semitic language and then adds the Egyptian name that each had been assigned, which is something the Bible records the Egyptians as doing, cf. Joseph's name given to him by pharaoh (Genesis 41:45). Some of the Semitic names are biblical and include:-

- Menahem – a Menahem is recorded as the 16th king of Israel in 743-738 BC
- Issachar and Asher – both Patriachs of Israel and sons of Jacob.
- Shiprah – the name carried by one of the Israelite midwives who were instructed in Exodus 1:15-21 to kill Israelite newborn males.

That 50% of the names are Israelite means that there must have been a very large group of them in the Egyptian Delta at that time, corroborating the testimony of Exodus 1:7 which alludes to how numerous the Israelites became. Also, the female slaves outnumber the male slaves on the papyrus by about 3 to 1, again hinting at the culling of male Hebrew children. There was no military campaign into Palestine in the 13th Dynasty to account for these large numbers of slaves.

The Tenth Plague to be sent on Egypt just before the Exodus was the plague on the first-born, recorded in Exodus 12:29,30. At the end of stratum G/1 at Tell ed-Daba or the ancient city of Avaris [3], archaeologists found shallow burial pits into which the victims of some terrible disaster had been thrown. These death pits were not carefully organised internments; the bodies were simply thrown in on top of one another. Could these be the burial pits of the first-born Egyptians? What is more, immediately after this disaster, the remaining population left Avaris en masse; this fits perfectly with the Exodus of the Israelites following the final terrible plague.

A completely new settlement of Avaris by a purely Asiatic people occurs approximately 50 years after the Exodus. These people are not Egyptianised' like their predecessors the Israelites who had resided in Egypt for many generations. These are identified in Egyptian history as Hyksos hordes from Arabia – the biblical Amalekites. They invaded Egypt at the end of the 13th Dynasty, ravaging the country, establishing their own rule and appointing

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Hydrogen Generation & Storage Made Easy with Nano-Technology

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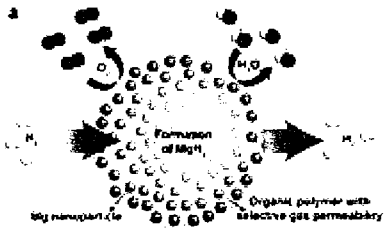

Fuels like gasoline, based on hydrocarbon, create pollution and carbon footprint. Hydrogen has been claimed to be a good alternative to replace fossil fuel since the 1970s. But hydrogen's potential has not been realized even partially mainly because of storage and commercial production difficulties. There have been research being done on renewable energy sources like hydrogen for quite some years. Recently, breakthrough research has been successful in creating a new method for storing hydrogen.

Difficulties faced in usage of hydrogen

Hydrogen is a cleaner renewable energy source if only the two problems of safe storage and easy access are overcome. The traditional way of fastening hydrogen into solids has not been very successful. Too less volume of hydrogen was absorbed while storing and too convoluted methods like too high heating or cooling was needed for releasing it which did not make it commercially viable.

their own king to reign in the north of the country. They received tribute and levy from the rest of the land, dominating Egypt for more than two centuries. Their barbarity is shown in Avaris where ritual burials of young women have been uncovered, evidence of a cruel religious rite. Also, these Hyksos invaders plundered the tombs of previous pharaohs, their tomb relics being found in the Hyksos graves.

Although not directly confirming the biblical account, it does pose the question as to how these people were able to invade, settle and dominate the most powerful country on earth at that time. The Bible, of course, provides the answer as in Exodus 14:28 it records the complete destruction of Pharaoh's army as the waters closed in over them after Moses parted the sea. Egypt without an army would be completely open to invasion by the Hyksos hordes.

The identity of the pharaoh of the Exodus is an interesting conundrum. The Bible dates the Exodus to 1447 BC. The new chronology suggests that the pharaoh at that time was Dudimose. A writer in Ptolemaic Egypt called Manetho records the invasion of the Hyksos hordes. He is quoted by Josephus as he writes:

"Tutimaos: In his reign, for what cause I know not, a blast of God smote us; and unexpectedly, from the regions of the East, invaders of obscure race marched in confidence of victory against our land (Egypt). By main force they easily seized it without striking a blow and having overpowered the rulers of the land, they then burned our cities ruthlessly, razed to the ground the temples of the gods and treated all our natives with cruel hostility, massacring some and leading into slavery the wives and children of others."

Tutimaos is of course pharaoh Dudimose. The Hyksos invaders were confident of victory and could seize the land without striking a blow because Egypt's army had perished! Again, a remarkable corroboration of the biblical chronology.

Joshua

Following the Exodus, the Israelites wandered in the desert of Sinai for 40 years. The book of Exodus closes with Moses' death and the story of the conquest of the Promised Land begins in the book of Joshua. Until David Rohl's new chronology, there was thought to be little evidence of the conquest in archaeology because the conventional chronology dated the conquest to the Early Iron Age IA. However, under the new chronology, the conquest is in the Middle Bronze Age IIB. Here there is a multiplicity of evidence, giving insight into the events recorded in the Bible.

The first major event recorded in the book of Joshua is the capture of Jericho. Excavations at Jericho have been carried out for almost 100 years but the most exacting work was done by Dame Kathleen Kenyon of the Institute of Archaeology, London, in 1952. With the old chronology, the history of Jericho which she found did not correlate to the accepted timing of the conquest. She found a substantial Middle Bronze Age city with a large outer wall 12 feet thick on top of a glacis or steep slope which was plastered smooth so that any enemy could not get a foothold to come near the wall. The slope was held in place by a large revetment wall of heavy field stones built along the bottom of the glacis. Beyond this wall was a deep ditch. The ditch was found to be filled with the remains of the bricks of the city wall.

The walls of Jericho had indeed come tumbling down' (Joshua 6) and they had in many

New way of storing hydrogen

A team of scientists at Lawrence Berkeley National Laboratory (Berkeley Lab), Department of Energy (DOE), US have discovered a new material called air-stable magnesium nano-composites which can help in storing hydrogen without complex methodology. This composite material consists of 'nano-particles of magnesium metal sprinkled through a matrix of polymethyl methacrylate – a polymer related to Plexiglas.'

Advantages of new material

This nano-composite is a pliable material and it is capable of absorbing and releasing hydrogen at an ordinary temperature without oxidizing the metal. This capacity has been touted as the major step towards a better design for hydrogen storage, hydrogen batteries and hydrogen fuel cells. The scientists have been able to design for the first time successfully composite materials that are nano-scale and which are capable of overcoming the barriers that are thermodynamic and kinetic in nature.

Observing the new material scientifically

The team observed the material and its behavior via TEAM 0.5 microscope at National Center for Electron Microscopy (NCEM). They tracked the behavior of hydrogen in the new storage material. They further studied the performance of hydrogen in the nano-composite material at Energy and Environmental Technologies Division (EETD), at the Berkeley Lab. EETD has been pioneering research about technologies about renewable energies, their generation and storage etc including hydrogen.

Role of DOE – Nano-scale Science Research Centers (NSRCs)

The NSRCs are a group of five facilities with state-of-art wherewithal to research in depth about nano-scale materials. The National Nanotechnology Initiative from DOE has resulted in huge investments for developing the infrastructure of these facilities. The team has put together and manufactured this new material at Materials Sciences Division. In words of team member Urban, "The successes we achieve depend critically upon close ties between cutting-edge microscopy at NCEM, tools and expertise from EETD, and the characterization and materials know-how from MSD."

The team

Jeff Urban, Deputy Director, Inorganic Nanostructures Facility, Molecular Foundry, Office of Nano-Science Center DOE, Berkeley Lab, Christian Kisielowski and Ki-Joon Jeon were the co-authors and Hoi Ri Moon, Anne M. Ruminski, Bin Jiang and Rizia Bardhan were the rest of the team. DOE's Office of Science supported the research work.

places filled the defensive ditch at the foot of the steep glacis slope, so enabling the Israelite troops to storm the city. Also found in Jericho were many large earthen jars of carbonised or burnt grain, indicating that the city had been captured rapidly and not after a long siege and famine, as there were lots of supplies. The city, after a sudden capture, had been burned to the ground as is recorded in Joshua 6:24. A layer of ash, in places up to a metre thick, was found, indicating the scale of the fire. Before the redating of the conquest to the Middle Bronze Age, the reason for the destruction of Jericho was unknown. However, now it can easily be viewed as the result of that which Joshua 6:24 speaks of.
The city of Jericho after the conquest remained a desolate ruin for several centuries. I Kings 16:34 maintains that Jericho was not rebuilt until the reign of king Ahab in around 850 BC, 550 years later. This is now in the Late Bronze Age and is at the exact time that archaeologists have placed the building of a much smaller settlement at Jericho.
Of the other cities mentioned as having been captured and burned by the invading Israelites in the book of Joshua, excavation of their sites has revealed that 80% of them were destroyed by fire in the Middle Bronze Age, including Bethel, Lachish, Hazor, Debir, Arad and Hebron.
Another interesting find from the excavation of Jericho and other sites in Palestine are numerous scarabs with the name of the Anakite king Sheshai' who ruled in the Middle Bronze Age. Joshua 15:14 and Judges 1:10 both record that Caleb defeated King Sheshi of Hebron during the conquest.
In 1992, the joint Israeli/Spanish mission were digging at the ruins of Hazor, the largest city of Palestine in the Middle Bronze Age. They found a tablet on which was recorded the name of the powerful king of the city [4]. That name was Jabin, the same as the king of Hazor who Joshua defeated as recorded in Joshua 11:1,10! Again, Hazor was found to have been completely destroyed during the Middle Bronze Age as recorded in the biblical account of the conquest.
Archaeology at Shechem, one of the most prominent sites in the early biblical history of Israel, has revealed a remarkable consistency with the biblical account. Here Abraham rested under the Oak of Moreh (Genesis 12:6), here Jacob erected an altar to El, the God of Israel' (Genesis 33:18-20). Joshua set up a large stone here as a memorial to the covenant God made with Israel (Joshua 24:25,26). Abimelech, son of Gideon, burned the people of Shechem alive in punishment for their rebellion against him, as they sheltered in their massive temple-fortress (Judges 9:46-49).
A temple dating to Middle Bronze Age IIB, the time of Joshua, has been found there. It has been identified as that in which the people of Shechem sheltered from Abimelech. The sacred stone which Joshua erected (Joshua 24:25,26) has been found and now stands for tourists to see; it was discovered in the earlier part of this century by Ernst Sellin who re-erected it in its place. This action was viewed with skepticism by many under the old chronology where the conquest was dated to the Early Iron Age. However, there can now be little doubt that this large white rock is indeed the stone erected by Joshua, standing to this day to witness the renewing of the covenant over 3000 years ago.

Sojourn

The length of the sojourn of the Israelites in Egypt is now taken by many biblical scholars

The Health Dangers of Beryllium

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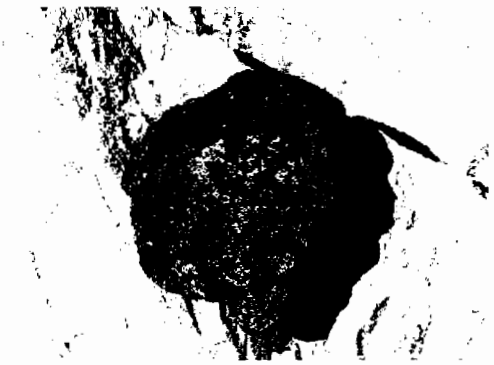

The extensive use of toxic metals in industry and consumer products has resulted in a toxic metal proliferation in our daily lives and environment. Metals are not biodegradable and can remain in the environment to produce a variety of negative effects. Toxic metal exposure has been linked to organ damage and some metals have the potential to cause cancer.

What is Beryllium?

Beryllium is an industrial metal with some attractive attributes. It's lighter than aluminum and 6x stronger than steel. It's usually combined with other metals and is a key component in the aerospace and electronics industries. Beryllium is also used in the production of nuclear weapons. With that, you may not be surprised to learn that beryllium is one of the most toxic elements in existence. Beryllium is a Class A EPA carcinogen and exposure can cause Chronic Beryllium Disease, an often fatal lung disease. [1]

Sources of Beryllium Exposure

Every day, we're all exposed to slight levels of beryllium in the air we breathe, foods we eat, and water we drink. Industrial sources such as coal power plants and manufacturing plants (including nuclear weapon manufacturing) have released beryllium into the environment. Persons living in or near areas with hazardous waste contamination are at high risk for beryllium exposure. The most common and harmful beryllium exposure occurs from inhalation. [1]

Chronic Beryllium Disease

Beryllium is extremely toxic to lung tissue. Prolonged exposure can lead to chronic beryllium disease, a debilitating lung disease with a scary similarity to sarcoidosis. [2] In fact, CBD is sometimes mistaken for sarcoidosis because inhalation of metal dust and fumes (specifically from aluminum, barium, beryllium) can cause granulomatous lung disease which mimics sarcoidosis. [3]

Evidence suggests even very low concentrations of beryllium may cause the disease. A fact known all to well by persons who live near beryllium refineries and even family members of factory workers; as dust is transported via workers' clothes into their homes. For those susceptible, it is not even known if any level of beryllium exposure can be considered "safe", exposure must be reduced. [4]

Symptoms of Chronic Beryllium disease include:

- Weakness
- Fatigue
- Difficulty Breathing
- Weight Loss or Anorexia
- Enlargement of the Right Side of the Heart
- Heart Disease

as around 215 years. The key verse in the determination of this is Exodus 12:40. In the Masoretic text, this verse says:-
"Now the length of time the Israelite people lived in Egypt was 430 years."
However, the Masoretic Hebrew text dates from the 4th century AD and the earliest surviving copy is from the 10th century. The Greek translation of the Old Testament (the Septuagint or LXX) was made under Ptolemy I in the 3rd Century BC and the earliest copy is centuries older than the oldest full Masoretic text we possess. It records the full version of Exodus 12:40 as:-
"Now the length of time the Israelite people lived in Egypt and Canaan, was 430 years."
This rendering of the verse is also found in the Samaritan Pentateuch, again older than the Masoretic text. Josephus in his Antiquities of the Jews' (XV:2), writing in the 1st century, also gives the length of time from Abraham entering Canaan to the Exodus as 430 years. Therefore, in the Masoretic text, it is safe to say that the words "and Canaan" – i.e. the time of Abraham, Isaac and Jacob – have been omitted in transcription over many centuries. Furthermore, I Chronicles 7:22-27 records ten generations from Joshua back to Joseph's son Ephraim, who was a boy of around five years when Jacob arrived in Egypt. Taking a standard average generation length of 20 years, we again arrive at a sojourn time of approximately 200 years. Josephus (op.cit.) records that from the time of Jacob's entry into Egypt until the Exodus there was a period of 215 years. Adding this to the Exodus date of 1447 BC from Edwin Thiele's biblical chronology, we arrive at a date of 1662 BC for Jacob's arrival in Egypt. Alternatively, by adding 430 years, we arrive at a figure of 1877 BC for Abraham's arrival in Canaan.

Famine

Joseph was therefore appointed vizier of Egypt, second only to pharaoh, in the 12th Dynasty, according to the new chronology and specifically in the long reign of Amenemhat III.
Do we have any evidence of famine during the reign of Amenemhat III? Remarkably, we do! The Egyptians depended on the annual flooding of the Nile to irrigate and fertilise the Black Land' of the Nile Valley and Delta. When the flood waters subsided, the enriched soil was then ploughed and sown for a reliable harvest. The German Egyptologist Karl Richard Lepsius, in 1844, worked at the Second Cataract of the Nile, at the ancient sites of the twin fortresses of Semna and Kumma. Here he found records for the heights of the Nile floods during the reign of Amenemhat III. The average height was eleven to twelve metres above the normal river level, which would have given a good harvest.
However, by the twelfth year of his reign, the floods recorded were around seventeen metres; this increased the silt deposited on the Delta and therefore gave richer, more abundant crops – the years of plenty'. This continued for seven to eight years. Then there is recorded a series of extra-high floods averaging 21 metres. This would have brought down three or four times the normal volume of water to the Delta. By the time the floodwaters receded, it would have been too late in the year to plant the crops, so resulting in a number of years of famine! It is interesting to note that Pharaoh's dream, as recorded in Genesis 41:1-4, tells of seven fat and seven thin cows, representing the years of plenty and famine; both came up' from the Nile, indicating that the Nile would have something to

Other Dangers of Beryllium Exposure

Beryllium and related compounds have been associated with chromosomal damage. [5]

A study designed to determine if toxic metal exposure was associated with suicide risk among plant workers found that beryllium exposure likely had an increased hazard ratio. [6]

Welding produces fumes that are toxic when inhaled and beryllium is a welding material of concern. Welding fumes cause lung impairment, lung disease, cough, asthma, and lung carcinoma. Eye and skin irritation, malignant melanoma, and negative reproductive effects are also reported. [7]

In pregnant women, exposure arsenic, cadmium, nickel, and beryllium (all carcinogenic) may negatively impact the fetus. Exposure is often cited as contact with second-hand smoke and living close to transportation routes or industrial exhaust. [8]

Minimize Your Risks from Beryllium Exposure

The use of toxic metals by humans is unlikely to end, this includes the carcinogens- arsenic, beryllium, cadmium, chromium compounds, and nickel compounds. We must take strides to minimize environmental impact and the toxic impact of these materials on our bodies. Your beryllium levels can be determined by blood tests and can also be measured from skin or lung samples. Tests can indicate your levels of beryllium, but cannot tell you where or when exposure happened. If you're concerned about your beryllium levels, I recommend taking inventory of your environmental risk factors, making the appropriate changes, and performing a chemical and toxic metal cleanse.

– Dr. Edward F. Group III, DC, ND, DACBN, DCBCN, DABFM

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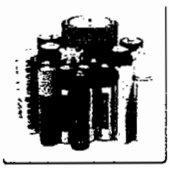

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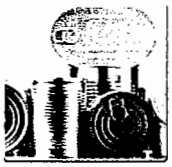

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do with the famine! The grain produced in the Nile Delta was exported all over the Levant, so it is little wonder that the rest of the area suffered during the famine and Joseph's brothers came to buy grain in Egypt.

Around the time of Amenemhat III, the power of the pharaohs was severely compromised by a number of baronies or local chieftains who controlled large parts of Egypt. Being quite rich, they could afford quite elaborate tombs to be buried in. Near the village of Beni Hasan, 39 of these tombs were found cut into a cliff face; the last dated to a period approximately 20 years before Amenemhat III. In this tomb, that of a chieftain called Khnumhotep III, was found a scene depicting a trading party of Asiatics arriving in Egypt [5]. This party is very similar to the Midianite caravaneers to whom Joseph's brothers sold him when he was brought to Egypt (Genesis 37). The inscription below one of these reliefs reads, The chief of the hill country, Abishai' – a good biblical name! These caravaneers are wearing very colourful garments, again showing that it was the custom in the Levant at this time to wear such colourful clothes, cf. Joseph's coat of many colours, presented to him by his father Jacob!

During the reign of Amenemhat III, these local chieftains or nomarchs ceased to build their tombs, indicating that they had had their power removed. At the same time, Amenemhat III rose to be one of the most powerful pharaohs of the 12th Dynasty. The reason for this is recorded in Genesis 47:13-21 where even the wealthy were forced to sell their land and possessions to Pharaoh in exchange for grain during the famine. So, the power of the local bigwigs was broken and Pharaoh reigned supreme in Egypt thanks to the works of Joseph.

Amenemhat's pyramid in which he was buried at Hawara stands beside the ruins of one of the most impressive buildings of the ancient world – the Egyptian Labyrinth – built during his reign. This has thousands of storerooms and the reason for its building can be determined under David Rohl's new chronology. This was Joseph's administration centre, set up to organise the distribution of grain during the famine. It was only fitting that Pharaoh should wish to be buried beside the very means by which he had obtained absolute power in Egypt. Also nearby is an impressive water work undertaken during the time of Amenemhat III. A canal from the Nile to Lake Moeris (Birket Karun today) in the region of Faiyum was built to channel excess water from the annual Nile flood into this basin to help lower the Delta flood waters. Its modern name is Bahr Yussef – the waterway of Joseph! All these can now be looked at as the building works undertaken under the supervision of Joseph the Israelite.

The historians Herodotus, Manetho and Diodorus Siculus come together to agree that the Egyptian labyrinth was an amazing construction. Herodotus writes in the Hellenist period (Book II, 148):-

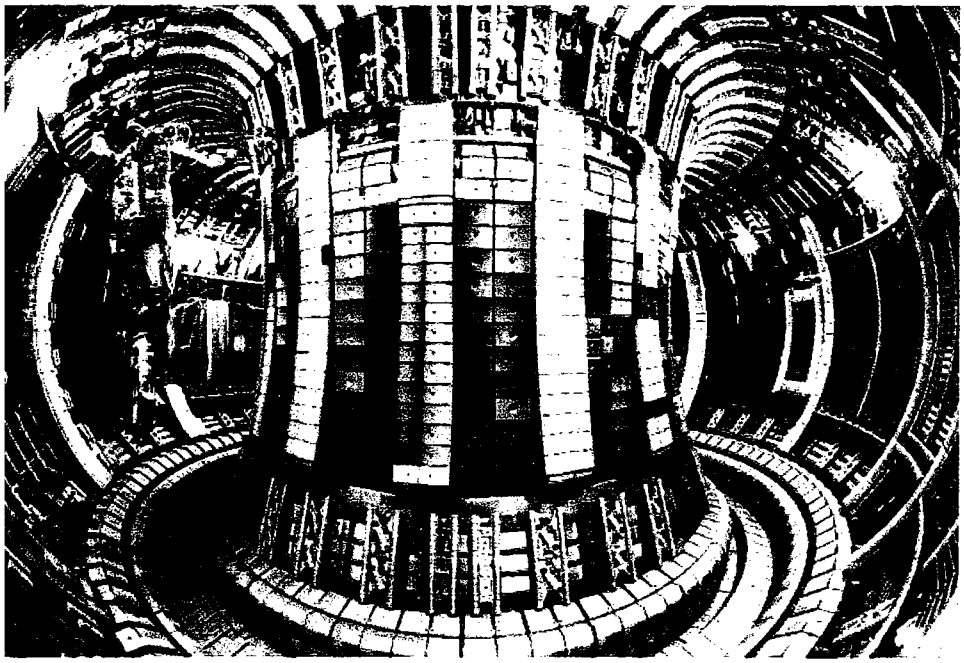
"I have seen it and indeed no words can describe its wonders. Though the pyramids were greater than words can tell and each one of them a match for many great monuments built by the Greeks, this maze surpasses even the pyramids."

Jacob's House in Egypt?

When Jacob and his family arrived in Egypt, the Bible numbers them at around 70 people. The excavations at Tell ed-Daba (ancient Avaris) show a small village dating to this time

lean, limitless fusion power could arrive ooner than expected

Sebastian Anthony on October 8, 2012 at 1:45 pm 102 Comments



Good news, denizens of Earth: If the findings from two premier research labs are to be believed, commercial nuclear fusion is feasible — d could arrive sooner than expected.

e first breakthrough comes from Sandia National Laboratories (the same engineers who ught us the fanless heatsink). At SNL, a research team has been working on a new way creating fusion called magnetized liner inertial fusion (MagLIF). This approach is quite ilar to the National Ignition Facility at the LLNL in California, where they fuse deuterium d tritium (hydrogen isotopes) by crushing and heating the fuel with 500 trillion watts of er power. Instead of lasers, MagLIF uses a massive magnetic pulse (26 million amps), ated by Sandia's Z Machine (a huge X-ray generator), to crush a small cylinder ntaining the hydrogen fuel. Through various optimizations, the researchers discovered a gLIF setup that almost breaks even (i.e. it almost produces more thermal energy than the ctrical energy required to begin the fusion reaction).

bably more significant is news from the Joint European Torus (JET), a magnetic nfinement fusion facility in the UK. JET is very similar to the ITER nuclear fusion reactor, international project which is being built in the south of France. Whereas NIF and Sandia ate an instantaneous fusion reaction using heat and pressure, ITER and JET confine the ing plasma for a much longer duration using strong magnetic fields, and are thus more lined towards the steady production of electricity. JET's breakthrough was the tallation of a new beryllium-lined wall and tungsten floor inside the *tokamak* — the ughnut-shaped inner vessel that confines 11-million-degrees-Celsius plasma (pictured ove).

bon is the conventional tokamak lining (and the lining that had been chosen for the first ation of ITER) but now it seems the beryllium-tungsten combo significantly improves the ility of the plasma. Hopefully this information will allow ITER to skip the carbon tokamak d jump straight to beryllium-tungsten, shaving years and millions of dollars off the project.

Dynasty, the time of bondage of the Israelites. On it are inscribed the names of none other than Jacob and Joseph himself, written in his non-Egyptian name! This is a dramatic confirmation of the existence of the biblical characters and also the anti-Israelite feeling as they were enslaved, leading up to the Exodus.

Conclusion

The Bible does not call itself a history book but it records the dealing of the real God with real people as they lived real lives in real times. It is important then that the biblical records of the Patriarchs and the early Israelites be lifted out of the category of fable and recognized as true stories. Where the Bible touches history, as it does in many places, then more and more the Word of God is coming out as remarkably accurate. To quote David Rohl, who is an agnostic, at the end of his book:-

"Without initially starting out to discover the historical Bible, I have come to the conclusion that much of the Old Testament contains real history."

The events recorded in the Bible are not small events but include the building and destruction of cities and the movement of nations, as well as wars and battles affecting thousands of people's lives. It details the rise and fall of empires as well as the parts played by individuals in that history. Although we may never come up with archaeological evidence for minor bit players' in the story, major events should not be hard to find. What David Rohl and others are doing is looking at obvious evidence which has always been there and re-interpreting it in the light of new data to find that the broad brush-strokes of history portrayed in the Bible are very accurate. We are no longer waiting for one artefact to prove that the Israelites really were in Egypt but now we see their traces as very clear. The conquest is obvious, as are the reigns of Solomon, David and Saul. Our God did not deal with his people in secret but, as always, in the open for all to see (Acts 26:26). The legacy of how he led his people to create history is there to be discovered.

David Rohl's book is essentially a new look at old discoveries to see the big picture'. However, as further work is done, more of the background to how the people of the Bible lived will be made known. Even now, hundreds of new discoveries are about to be published to further expand our knowledge of biblical history. Archaeologists have thousands more sites to dig but as they do this, they dig up new evidence in support of the historicity of the Bible.

Appendix – The Ebla Tablets

In 1964, Dr. Paolo Matthiae, professor of Near East archaeology at the University of Rome began to excavate Tell Mardikh in north-western Syria. It soon became clear that they were excavating the ruins of the ancient city of Ebla. In 1975, as the dig progressed down to Early Bronze Age levels, a remarkable find was made in the form of nearly 20,000 clay tablets which constituted the royal archives of the city. These tablets date back to the middle of the 3rd millenium BC, almost 4,500 years ago. They are written in Sumerian wedge-shaped cuneiform script which is the world's oldest known written language. Deciphering these tablets, Professor Pettinato, also of the University of Rome, found the language used to be what he called Old Canaanite' even though the script was cuneiform Sumerian. This very ancient language is closer in vocabulary and grammar to biblical Hebrew than any other Canaanite dialect', including Ugaritic; this therefore gives evidence

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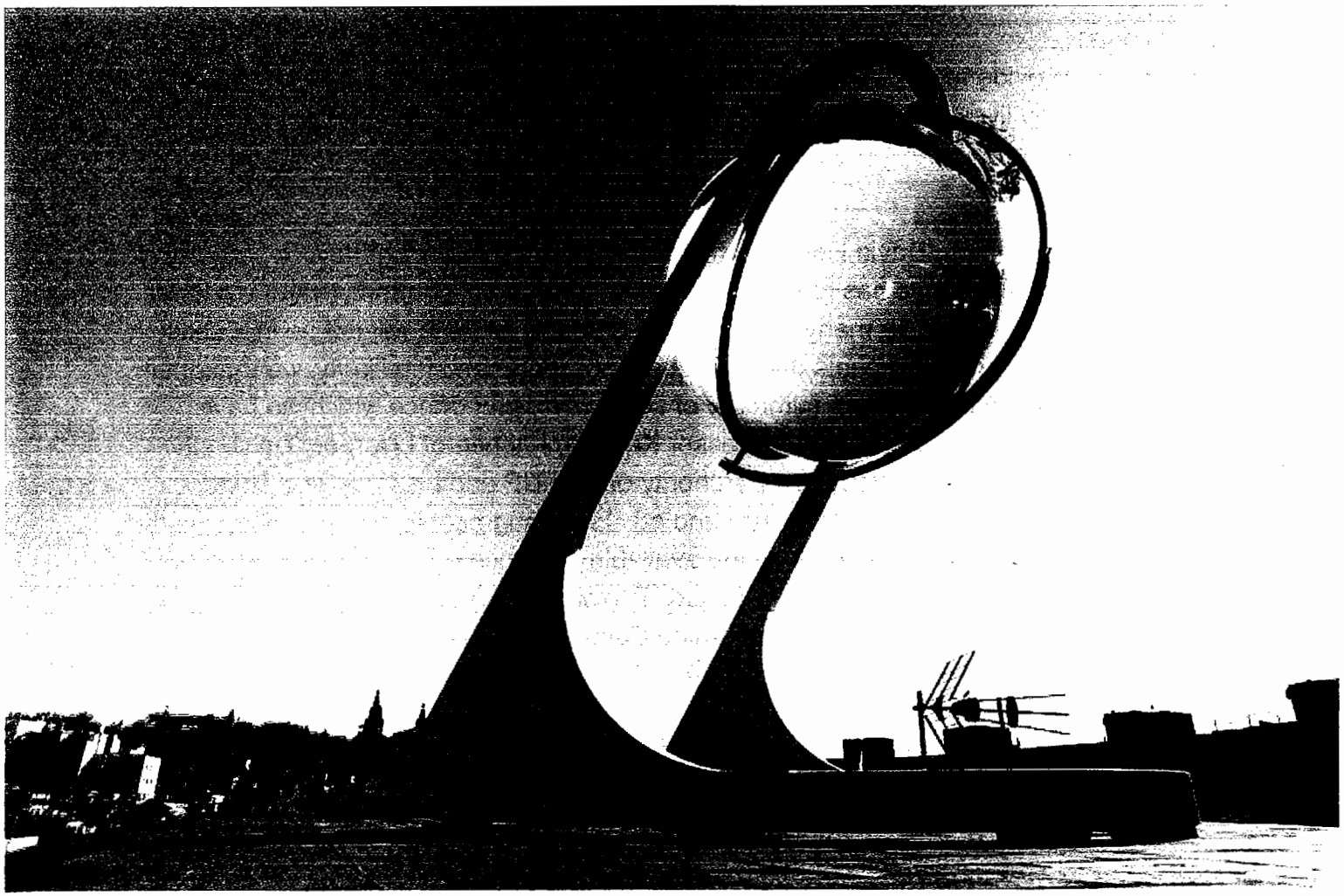


German Architect Andre Broessel believes he has a solution that can "squeeze more juice out of the sun", even during the night hours and in low-light regions. His company Rawlemon has created a spherical sun power generator prototype called the beta.ray. His technology

as to the age of the Hebrew language.
This mass of information from Ebla will take years to digest but already it is very exciting. The city was a large one of 260,000 inhabitants; it traded widely over the known world at that time. A flourishing civilisation existed with many skilled craftsmen in metals, textiles, ceramics, and woodwork. It existed 1,000 years before David and Solomon and was destroyed by the Akkadians in around 1600 BC.
To date, only about one third of the Ebla tablets have been translated. Already, however, Eber has been named as one of its kings. Eber was the great-great-great-great-grandfather of Abraham (Genesis 10:21). Could this Eber, King of Ebla, be the same Eber of the Bible? Other names found, later to be used by biblical men, include Abraham, Esau, Saul, Michael, David, Israel and Ishmael. The supreme god of Ebla was called Yah', a shortened version of Yahweh'; so, some residual knowledge of the one true God was left at this time before Abraham. Another god was called El', short for Elohim', used later by the Hebrews as the generic name for God.
Tablet 1860 names the five cities of Genesis 14:2 in the same order, i.e. Sodom, Gomorrah, Admah, Zeboiim and Zoar. Up until the discovery of the Ebla tablets, the existence of these biblical cities was questioned; yet, here they are mentioned as trade partners of Ebla. This record predates the great catastrophy involving Lot when Sodom and Gomorrah were destroyed.
Also included in the archive are very early Canaanite creation and flood stories which very closely resemble that of the Bible. This is not surprising as these people would have descended from the generation after the flood and so would have had a common history of these events!
These tablets provide much evidence of early life in Syro-Palestine and give a rich background to the lives of Abraham and the Patriarchs. It will be truly amazing once the excavations are completed and the tablets fully deciphered.

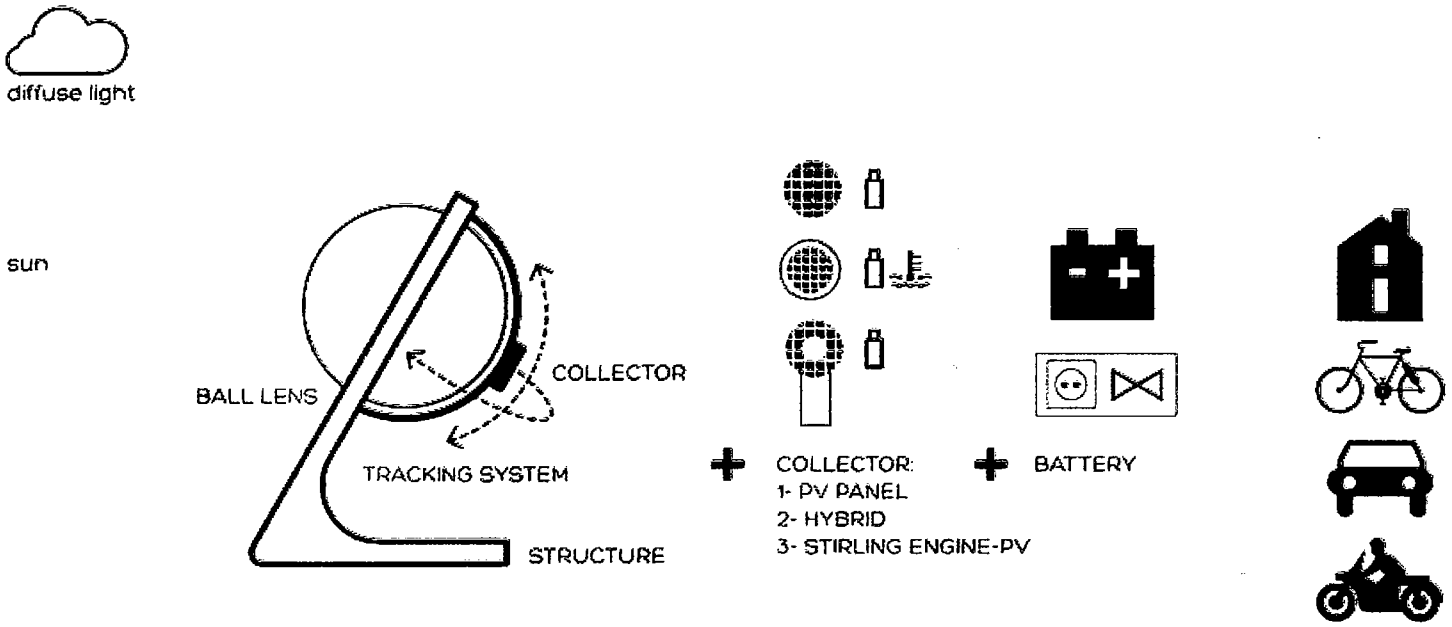
Postscript

As with all new research, David Rohl's work needs to be carefully examined in order to be sure that the conclusions he has reached are sound and do not contradict clear evidence which is in opposition to it. As many of those who read this website will not be in a position to critically evaluate the arguments due to lack of knowledge and familiarity, we thought it would be useful to include a short summary of some correspondence which we have undertaken with both the author and Professor Kenneth Kitchen of Liverpool University. Professor Kitchen is a widely respected authority on the TIP and his book The Third Intermediate Period in Egypt' (Warminster 2nd ed. 1986, augmented reprint 1996) was the first publication that brought together all the available evidence on the TIP and worked it into a whole framework of dating for the period. This was by all estimations a landmark publication; Professor Kitchen's contributions to Egyptology are of undoubted significance, irrespective of whether or not the conventional chronology is proven to require adjustment, as is suggested by David Rohl's work.
There now follow some of the main points raised by Professor Kitchen in reply to David Rohl's book and, alongside them, David Rohl's responses to those points. In order to explain a little more for those unfamiliar with the material, the main conclusion of David

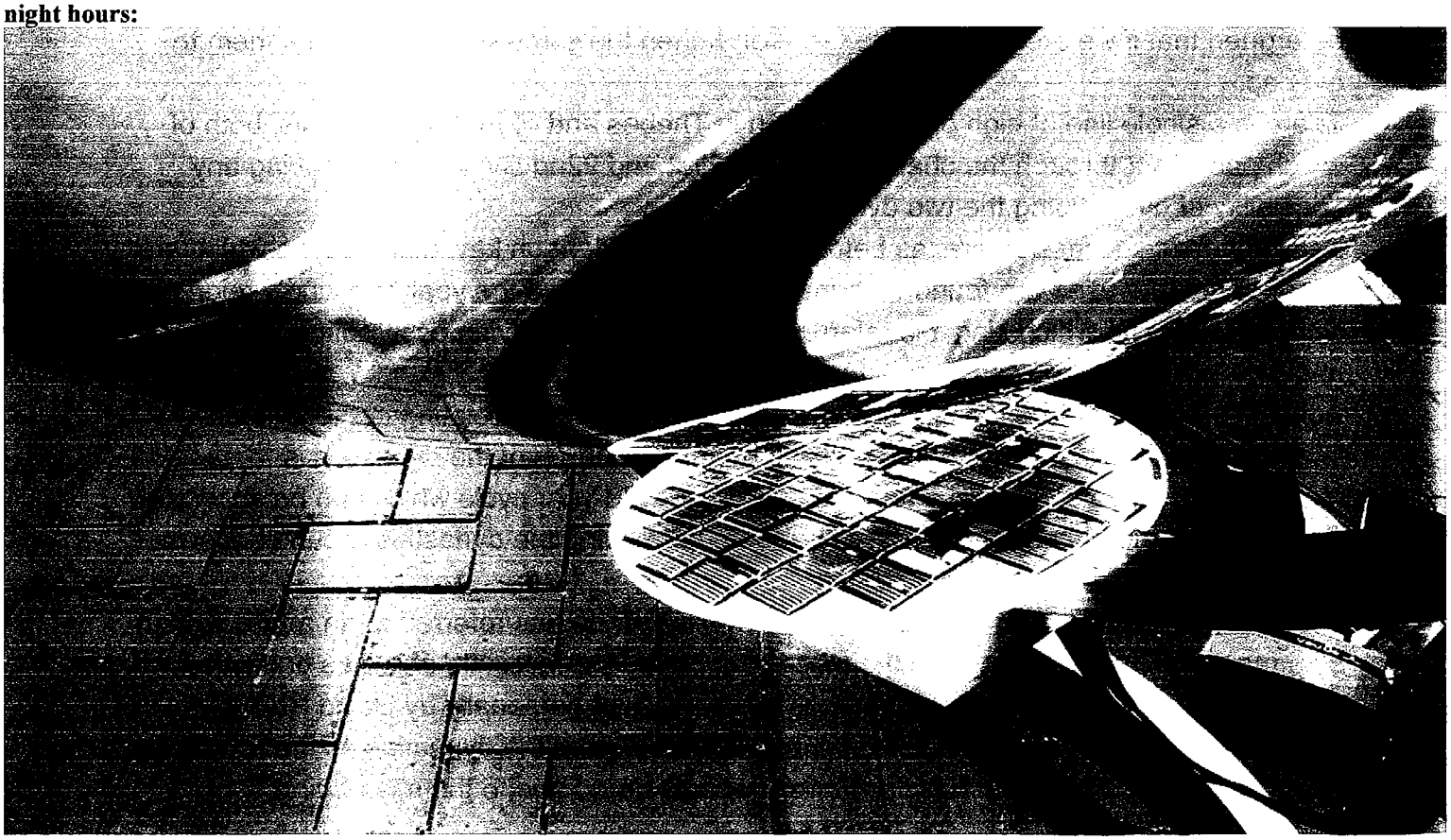
will combine spherical geometry principles with a dual axis tracking system, allowing twice the yield of a conventional solar panel in a much smaller surface area. The futuristic design is fully rotational and is suitable for inclined surfaces, walls of buildings, and anywhere with access to the sky. It can even be used as an electric car charging station. Scroll down for photos and videos...

"The beta.ray comes with a hybrid collector to convert daily electricity and thermal energy at the same time. While reducing the silicon cell area to 25% with the equivalent power output by using our ultra transmission Ball Lens point focusing concentrator, it operates at efficiency levels of nearly 57% in hybrid mode. At nighttime the Ball Lens can transform into a high-power lamp to illuminate your location, simply by using a few LED's. The station is designed for off grid conditions as well as to supplement buildings' consumption of electricity and thermal circuits like hot water."

How it works:



The modular collector system charges and stores energy during daylight hours and can even collect energy from the moon during night hours:



Rohl's book with regard to redating was that the 21st and 22nd dynasties of pharaohs, instead of following on one from the other, actually occurred partly simultaneously, requiring a shrinking down of the conventional dates. This is a crucial part of the argument and so a large part of what follows concerns this overlapping of the two dynasties. Much of the detail has been left out in order not to confuse and it is therefore of necessity very brief. Those who have an interest are encouraged to study the topics in more depth. The books by David Rohl and Professor Kitchen, referenced in the main text, provide ample material and references for the hungry mind.

Professor Kitchen

David Rohl

The founder of the 22nd Dynasty, Shoshenk I, dedicated a statue to his immediate predecessor, Psusennes II, the last king of the 21st Dynasty. This obviously shows that the 21st and 22nd Dynasties did not overlap at all.

This inscription is certainly not conclusive. We know of two kings named Psusennes but are still in the dark as to which came first. Within the framework of the conventional chronology, it is assumed that the Psusennes recorded on this statue must be Psusennes II but there is no hard evidence on which to base this conclusion. Indeed, if Har-Psusennes turns out to be Psusennes I it is actually further proof that Dynasties 21 and 22 were contemporary.

Shoshenk I's son Osorkon I married the daughter of Psusennes II, again demonstrating the continuity of the two dynasties. This is recorded on statue BM8 in the British Museum. The inscription does not inform us which king Osorkon it concerns. His identification is again dependent on the assumption that the two dynasties were continuous. It can easily be argued that if we are dealing with Osorkon II then the same evidence shows them to overlap.

There is a single line of high priests of Amun in Thebes and of Ptah in Memphis, both of which pass right through the change between 21st and 22nd Dynasties, removing any possibility of overlapping the two dynasties.

These lines of succession are, as before, totally dependent on key assumptions which are wrong. The data used are found on burial dockets which give the year of a king's reign without specifying which king it is referring to. Once the underlying assumptions are shown to be wrong, the edifice comes crashing down.

An inscription from the reign of Merenptah of the 19th Dynasty relating to the annual inundation of the Nile shows conclusively that any folding-up of the dynasties is impossible. The data concern a specific point in a 1460-year cycle which can be accurately located in absolute time. There is thus no room for moving the dynasties around because of this firm date.

Professor Kitchen has not seen the inscription himself; he has referred to an article written by a man who has also not seen the inscription but only a facsimile of it. The published reading of the text is quite wrong and has been checked personally by David Rohl when in Egypt. The correct reading actually supports the revision of the dynasties as the fixed point referred to in the inscription has itself been wrongly dated due to the misreading.

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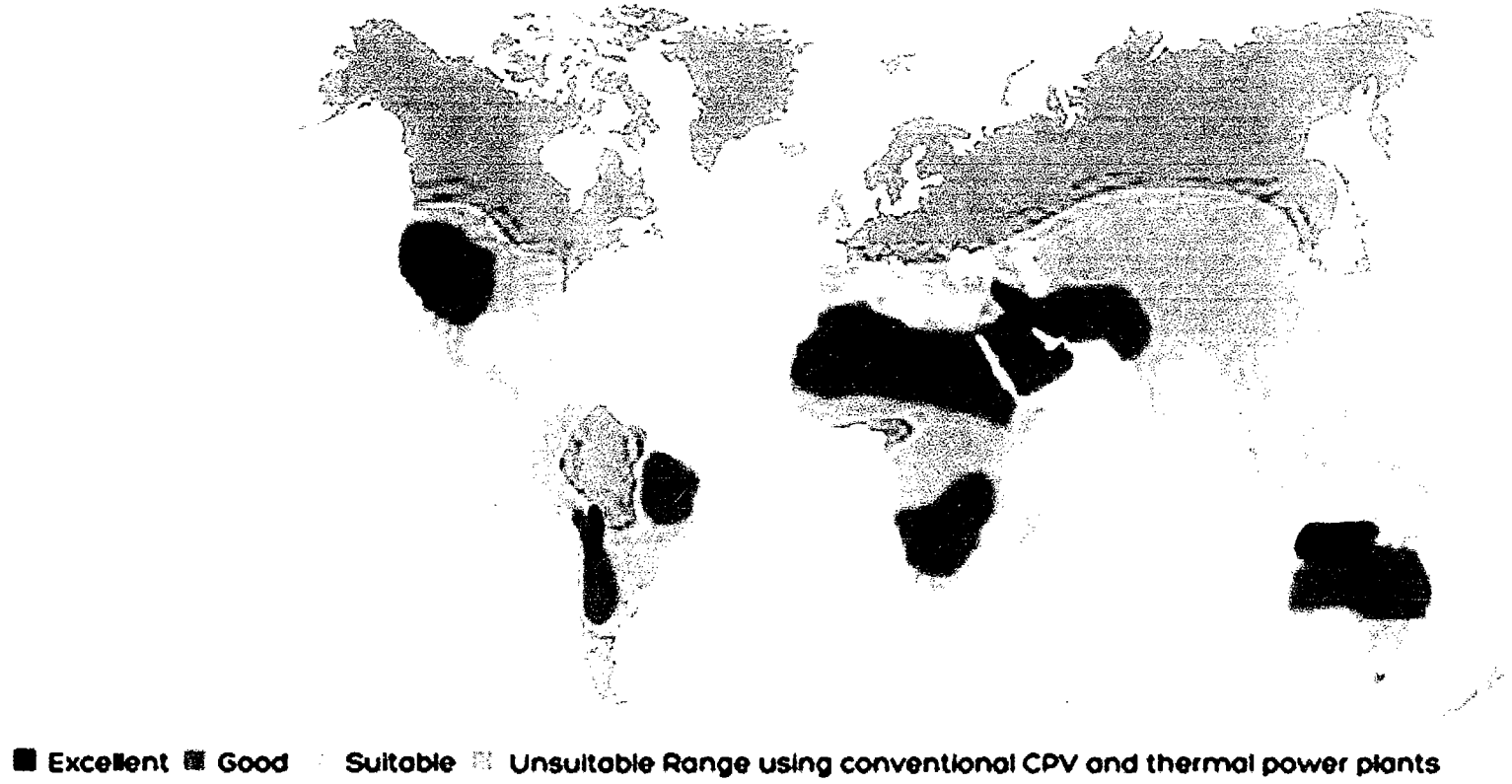

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